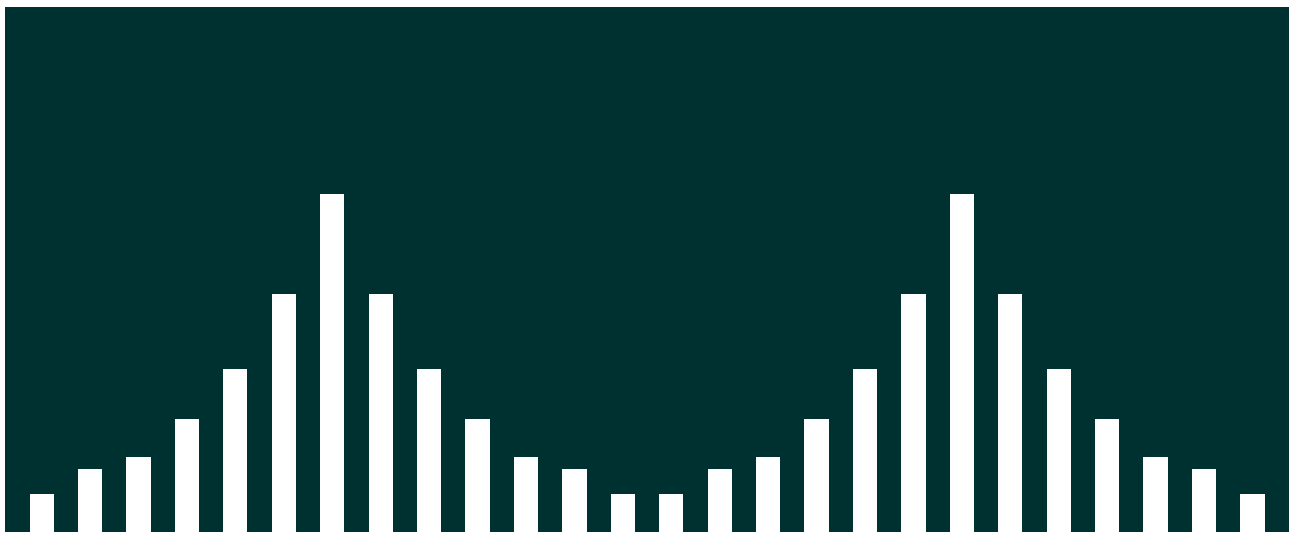


*Semester One
Journal and
Study Guide*

CISCO SYSTEMS



**NETWORKING
Academy**

CCNA 1 Chapter 1

Introduction to Networking

It is important to be able to recognize and name the major components of a PC for the following three reasons:

- Computers are important network-building devices.
- Many networking devices are special-purpose computers, with many of the same parts as "normal" PCs.
- For you to view the online curriculum, your own computer must be in working order, which means that you might need to occasionally troubleshoot simple problems in your computer's hardware and software.

Concept Questions

Demonstrate your knowledge of these concepts by answering the questions in the Engineering Journal space provided.

1. The transistor and the integrated circuit made modern computers possible. Explain why.
2. If your computer doesn't power up, what steps might you take to identify and correct the problem?
3. Explain how to do the following:
 - A. Select the NIC card.
 - B. Set the correct IP address.
 - C. Adjust the display (if necessary).
 - D. Install and set up the browser.

CCNA 1 Chapter 1

Introduction to Networking

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 1 of the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, material for help.

ASCII

Backplane

Backplane components

Binary

Bits

Bus

Bytes

Capacitor

CD-ROM drive

CPU

Expansion slots

Floppy disk drive

Hard disk drive

Hexadecimal

IRQ

LAN (Local-area network)

LEDs

Microprocessor

Monitor connector

Motherboard

Mouse port

CCNA 1 Chapter 1

Introduction to Networking

Network

NIC

Parallel port

PC components

PCBs (Printed circuit boards)

Personal computer subsystems

Power supply

Protocol

RAM

Resistor

ROM

Serial port

Small, discrete components

Solder

Sound card

Subnetwork

Subnetwork mask

Throughput

Transistor

Video card

WANs

Web browser

CCNA 1 Chapter 1

Introduction to Networking

Focus Questions

1. What are the major components of a PC?
2. What is the information flow in an idealized computer?
3. What is the relationship of NICs to PCs?
4. Describe the components of a PC compared to those of a laptop.
5. What is data throughput and how does it relate to digital bandwidth?
6. What factors affect bandwidth and throughput? What units measure the quantity of information?
7. How do binary numbers represent alphanumeric data?
8. How do you convert the hexadecimal number 444 to decimal? (Show your work in the space provided.)

CCNA 1 Chapter 1

Introduction to Networking

CCNA Exam Review Questions

1. Which of the following best defines networking?
 - A. A set of rules or procedures that is either widely used or officially specified
 - B. A connection of computers, printers, and other devices for the purpose of communication
 - C. A set of rules that govern how computer workstations exchange information
 - D. A device that is connected to a computer to provide auxiliary functions
2. Which of the following is not a base 16 number?
 - A. CAB
 - B. 089
 - C. GA6
 - D. 222
3. Which of the following terms is used in computing to refer to physical parts or equipment?
 - A. Hardware
 - B. Software
 - C. Protocol
 - D. Network
4. Which of the following terms is used in computing to refer to programs or applications?
 - A. Hardware
 - B. Software
 - C. Peripheral
 - D. Network
5. Which of the following terms refers to devices that are connected to a computer to provide auxiliary functions such as printing, added disk space, scanning, or CDROM?
 - A. Protocol
 - B. Software
 - C. Peripheral
 - D. Network
6. Why are individual PCs not efficient or cost effective for business applications?
 - A. Individual PC use requires businesses to duplicate equipment and resources.
 - B. It is difficult for businesses to communicate quickly or efficiently by using individual PCs.
 - C. It is difficult to provide management for operating individual PCs.
 - D. All of the above.

CCNA 1 Chapter 1

Introduction to Networking

7. What is the number 198 in binary?
 - A. 01101011
 - B. 11000110
 - C. 11001100
 - D. 11000010

8. What kind of computer operates independently from other computers?
 - A. Mainframe
 - B. PC
 - C. Mac
 - D. Standalone

9. What is the hex number C0D in decimal?
 - A. 3632
 - B. 3005
 - C. 3096
 - D. 3085

10. What does the term protocol mean in computing terms?
 - A. A tool that allows Macintosh and PC computers to communicate with each other
 - B. A universal translator that allows different kinds of computers to share data
 - C. A description of a set of rules and conventions that govern how devices on a network exchange information
 - D. The language that all the computers on a network must use to communicate with each other

11. Which of the following best defines protocol?
 - A. A formal description of a set of rules and conventions
 - B. A device that is connected to a computer to provide auxiliary functions
 - C. A group of people who are assigned to work as a team
 - D. The connection of computers, printers, routers, and switches

12. What is the binary number 11100011 in decimal?
 - A. 227
 - B. 193
 - C. 223
 - D. 235

13. Why are protocols important?
 - A. By setting rules, protocols allow different types of computers to talk to each other.
 - B. By consolidating the industry, protocols save companies money.
 - C. By forming electronic islands, protocols bypass the sneaker net.
 - D. By using common carriers, protocols manage data efficiently.

CCNA 1 Chapter 1

Introduction to Networking

14. What must all computers on a network be able to do for the network to operate properly?
- A. Print to a local printer
 - B. Connect to a telephone line
 - C. Use CD-ROMs
 - D. Speak the same language
15. A protocol allows which of the following to be linked into a network?
- A. Only PC terminals and workstations
 - B. Only Macintosh computers and peripherals
 - C. Only PCs to a mainframe
 - D. Any type of computer terminal or workstation

CCNA 1 Chapter 2

Networking Fundamentals

Data networks developed as a result of business applications that had been written for microcomputers. At the time, microcomputers were not connected as mainframe computer terminals were, so there was no efficient way of sharing data between multiple microcomputers. Businesses needed a solution that would successfully address the following three questions:

- How to avoid duplication of equipment and resources
- How to communicate efficiently
- How to set up and manage a network

Local-area networks (LANs) are high-speed, low-error data networks that cover a relatively small geographic area (up to a few thousand meters). LANs connect workstations, peripherals, terminals, and other devices in a single building or another geographically limited area. LANs provide multiple-connected desktop devices (usually PCs) with access to high-bandwidth media. LANs connect computers and services to a common Layer 1 media.

The OSI reference model is a descriptive network scheme whose standards ensure greater compatibility and interoperability between various types of network technologies. Further, the OSI reference model is a way of illustrating how information travels through networks. It is a conceptual framework specifying the network functions that occur at each layer. The OSI model describes how information or data makes its way from application programs (such as spreadsheets) through a network medium (such as wires) to another application program that is located on another computer on a network.

Concept Questions

Demonstrate your knowledge of network fundamentals by answering the following questions in the space provided.

1. What are the major characteristics of a LAN?

2. What are some common networking devices specifically found in LANs?

3. The OSI reference model is a descriptive network scheme whose standards ensure greater compatibility and interoperability between various types of network technologies. Why is such a standard necessary?

CCNA 1 Chapter 2 Networking Fundamentals

4. The OSI reference model organizes distinct functions of a network into seven numbered layers. Briefly describe what each layer does and give two examples of these functions for each layer.

Layer 7: The application layer

Layer 6: The presentation layer

Layer 5: The session layer

Layer 4: The transport layer

Layer 3: The network layer

Layer 2: The data link layer

Layer 1: The physical layer

CCNA 1 Chapter 2

Networking Fundamentals

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 2 of the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, material for help.

AUI

Bandwidth

Bridge

Broadcast

Broadcast domain

Bus topology

Collision

Collision domain

Compression

Datagram

De-encapsulation

Dialog separation

Encapsulation

Encryption

Extended-star topology

Extranet

Firewall

Flooding

Frame

Full-mesh topology

Hierarchical topology

CCNA 1 Chapter 2

Networking Fundamentals

Hub

IEEE 802.3

IEEE 802.5

Intranet

LAN (local-area network)

Layer 1: Physical

Layer 2: Data Link

Layer 3: Network

Layer 4: Transport

Layer 5: Session

Layer 6: Presentation

Layer 7: Application

MAC address

MAN

MAU

Media

Media Access Control (MAC)

Medium

Microsegmentation

Packet

Partial-mesh topology

Peer-to-peer

Protocol

CCNA 1 Chapter 2

Networking Fundamentals

Repeaters

Ring topology

Router

SAN

Segment

Session

Star topology

Switch

TCP/IP

TCP/IP application layer

TCP/IP Internet layer

TCP/IP network layer

CCNA 1 Chapter 2

Networking Fundamentals

Focus Questions

1. Briefly list six reasons why a layered network model is used in internetworking.
2. From memory, list the seven layers of the OSI model and briefly describe their function.
3. What is meant by the term *peer-to-peer communication*?

CCNA 1 Chapter 2 Networking Fundamentals

14. What is the symbol and purpose of a repeater?

15. What is the function of a hub?

16. What is the purpose of a bridge?

17. What is the purpose of a switch?

18. What is the purpose of a router?

19. What does the cloud in a network topology suggest?

20. What is the purpose of network segments?

CCNA 1 Chapter 2 Networking Fundamentals

21. What is a linear bus network topology?

22. What is a ring network topology?

23. Are the rings of a dual-ring network topology connected? Why or why not?

24. Where is the node of a star network topology located?

25. Where does each node link in an extended star network topology?

26. What are the advantages of using a layered model for troubleshooting problems?

CCNA 1 Chapter 2 Networking Fundamentals

27. When in the session layer, what are the responsibilities of both hosts when sending a message?
28. What type of two-way communication is the session layer most involved in?
29. What are the most common ways that bandwidth is measured?
30. What are the features of a network that affect throughput?
31. What are the three functions of the presentation layer?
32. At the receiving station, from which layer does the presentation layer get the data?

CCNA 1 Chapter 2 Networking Fundamentals

33. What is a JPEG?

34. Use an analogy to describe bandwidth.

35. Compare analog and digital bandwidth.

36. What are the two most important models of network communication?

CCNA 1 Chapter 2

Networking Fundamentals

CCNA Exam Review Questions

1. What business problem resulting from the proliferation of standalone computers did networks solve?
 - A. Inability to communicate and lack of management
 - B. Losses due to lack of business by common carriers
 - C. Inefficient use of information technology professionals
 - D. Increasing level of electromagnetic interference
2. What did early networks allow?
 - A. Common carriers to finally make a profit
 - B. Workers to copy files onto floppy disks and then carry the disks to a coworker's PC to print
 - C. The duplication of resources to expand
 - D. The easy and efficient sharing of files and printers
3. Which of the following is *not* a problem that networking helped solve?
 - A. Lack of network management
 - B. Lack of new hardware and software products
 - C. Duplication of equipment and resources
 - D. Inability to communicate efficiently
4. Why is it desirable to network?
 - A. Don't have to duplicate equipment and resources
 - B. Makes it easy to communicate quickly and efficiently using standalone computers
 - C. Makes it easy to provide management for operating standalone computers
 - D. All of the above
5. Why is networking a variety of networks together difficult?
 - A. People try to network different types of computer systems together.
 - B. Emerging network technologies use different hardware and software specifications.
 - C. Incompatibility results from hardware changes.
 - D. Computer designers try to make their own protocols, and they are incompatible.
6. Why are networking standards needed?
 - A. Many networks now cover wide geographic areas.
 - B. Technologies must be compatible to allow communication.
 - C. Hardware and software are continually being redesigned.
 - D. LANs, MANs, and WANs use different kinds of equipment.

CCNA 1 Chapter 2 Networking Fundamentals

7. Which one of the following is a TCP/IP model application layer protocol?
 - A. Ethernet
 - B. IP
 - C. UDP
 - D. FTP

8. Why did using different hardware and software cause problems after networks were established?
 - A. Networks cannot be formed if some people have Macs and others have PCs.
 - B. Different hardware and software did not provide auxiliary functions for the users.
 - C. Different hardware and software implementations used in the new technologies were incompatible.
 - D. Each department or business was unable to act as an electronic island; instead, the departments or businesses were forced to work together.

9. What is a LAN?
 - A. A network that connects workstations, terminals, and other devices in a geographically limited area
 - B. A network that connects workstations, terminals, and other devices in a metropolitan area
 - C. A network that serves users across a broad geographic area and often uses transmission devices that a common carrier provides
 - D. A network that covers a larger area than a MAN

10. Which one of the following is a TCP/IP application layer protocol?
 - A. HTTP
 - B. TCP
 - C. FDDI
 - D. SNAP

11. What is a network that connects computer equipment in a single building called?
 - A. LAN
 - B. WAN
 - C. MAN
 - D. DCN

12. Which of the following best defines *standards*?
 - A. A set of rules or procedures that are either widely used or officially specified
 - B. A connection of computers, printers, and other devices for purposes of communication
 - C. A set of rules that govern how computer workstations exchange information
 - D. A device that is connected to a computer to provide auxiliary functions

CCNA 1 Chapter 2 Networking Fundamentals

13. What is the OSI model?
- A. A conceptual framework that specifies how information travels through networks
 - B. A model that describes how data makes its way from one application program to another through a network
 - C. A conceptual framework that specifies which network functions occur at each layer
 - D. All of the above
14. As described by the OSI model, how does data move across a network?
- A. Directly from each layer at one computer to the corresponding layers at another computer
 - B. Through wires connecting each layer from computer to computer
 - C. Down through the layers at one computer and up through the layers at another
15. Which best defines the function of the lower layers (called the media layers) of the OSI model?
- A. Provide for the accurate delivery of data between computers
 - B. Convert data into the 1s and 0s that a computer understands
 - C. Receive data from peripheral devices
 - D. Control the physical delivery of messages over the network
16. Which of the following describes the host layers of the OSI model?
- A. Control the physical delivery of messages over the network
 - B. Make up the lower layers in the OSI model
 - C. Contain data that is more like 1s and 0s than like human language
 - D. Provide for accurate delivery of data between computers
17. Which of the following is a logical topology?
- A. Token-passing
 - B. Bus
 - C. Star
 - D. Mesh
18. Which layer of the OSI model is concerned with physical addressing, network topology, line discipline, and flow control?
- A. Physical layer
 - B. Data link layer
 - C. Transport layer
 - D. Network layer
19. Which layer of the OSI model provides connectivity and path selection between two end systems where routing occurs?
- A. Physical layer
 - B. Data link layer
 - C. Network layer
 - D. Transport layer

CCNA 1 Chapter 2 Networking Fundamentals

20. Which layer of the OSI model is responsible for reliable network communication between end nodes and provides mechanisms for the establishment, maintenance, and termination of virtual circuits, transport fault detection and recovery, and information flow control?
- A. Physical layer
 - B. Data link layer
 - C. Network layer
 - D. Transport layer
21. Which layer of the OSI model establishes, manages, and terminates sessions between applications and manages data exchange between presentation layer entities?
- A. Transport layer
 - B. Session layer
 - C. Presentation layer
 - D. Application layer
22. Which layer of the OSI model ensures that information sent by the application layer of one system will be readable by the application layer of another system, is concerned with the data structures used by programs, and negotiates data transfer syntax for the application layer?
- A. Transport layer
 - B. Session layer
 - C. Presentation layer
 - D. Application layer
23. Which layer of the OSI model identifies and establishes the availability of intended communication partners, synchronizes cooperating applications, and establishes agreement on procedures for error recovery and control of data integrity?
- A. Transport layer
 - B. Session layer
 - C. Presentation layer
 - D. Application layer
24. Which of the following best defines *encapsulation*?
- A. Segmenting data so that it flows uninterrupted through the network
 - B. Compressing data so that it moves more quickly
 - C. Moving data in groups so that it stays together
 - D. Wrapping of data in a particular protocol header
25. What type of topology uses a single backbone cable with all nodes connecting directly?
- A. Star
 - B. Bus
 - C. Broadcast
 - D. Hierarchical

CCNA 1 Chapter 2 Networking Fundamentals

26. What one of the following is a type of VPN?
- A. internal
 - B. access
 - C. broadband
 - D. external
27. Which layer of the OSI model establishes, manages, and terminates communication between applications?
- A. Application
 - B. Presentation
 - C. Session
 - D. Transport
28. What device is used to connect a LAN to a WAN?
- A. Bridge
 - B. Router
 - C. Switch
 - D. Hub
29. Which of the following is the Layer 3 protocol data unit?
- A. Segments
 - B. Packets
 - C. Frames
 - D. Bits
30. Which of the following is a Layer 4 protocol data unit?
- A. Segments
 - B. Packets
 - C. Frames
 - D. Bits
31. Which best describes the function of the presentation layer?
- A. Establishes, manages, and terminates applications
 - B. Supports communication between programs like electronic mail, file transfer, and web browsers
 - C. Guides how graphic images, sound, and video are handled
 - D. Provides transport services from the host to the destination
32. Which best describes the function of the MAC address on a NIC?
- A. Provides a Layer 2 address
 - B. Supports communication between the network layer and the physical layer
 - C. Provides a unique flat address assigned by the manufacturer
 - D. All of the above

CCNA 1 Chapter 2 Networking Fundamentals

33. Which layer of the OSI model layer handles data encryption?
- A. Application
 - B. Presentation
 - C. Session
 - D. Transport
34. Which of the following is a function of the data link layer?
- A. Adds a destination MAC address to the frame
 - B. Supports the network layer
 - C. Uses frames as the PDU
 - D. All of the above
35. Which of the following are Layer 5 protocols?
- A. (NFS) Network File System
 - B. (SQL) Structured Query Language
 - C. (RPC) Remote Procedure Call
 - D. X Window System
 - E. (ASP) AppleTalk Session Protocol
 - F. DNA (Digital Network Architecture)
 - G. SCP (Session Control Protocol)

CCNA 1 Chapter 3

Networking Media

Electricity is a fact of modern life. We use it to perform a variety of tasks. It is brought to our homes, schools, and offices by power lines that carry it in the form of *alternating current* (AC). Another type of current, called *direct current* (DC), is the current found in a flashlight, car battery, and on the motherboard of a computer.

It is important to understand the difference between these two types of current flow. Direct current flows at a constant value when circuits are turned on. Alternating current rises and falls in current values as power companies manufacture it.

When electricity reaches our homes, schools, and offices, it is carried to appliances and machines via wires concealed in walls, floors, and ceilings. Consequently, inside these buildings, AC power-line noise is all around us. If not properly addressed, power-line noise can present problems for a network.

In fact, as you will discover the more you work with networks, AC line noise coming from a nearby video monitor or hard disk drive can be enough to create errors in a computer system. It does this by burying the desired signals and preventing a computer's logic gates from detecting the leading and trailing edges of the square signal waves. This problem can be further compounded when a computer has a poor ground connection.

The third type of electricity is *static electricity*. This most damaging uncontrollable form of electricity must be dealt with to protect sensitive electronic equipment. Such static discharges can destroy semiconductors and data in a seemingly random fashion as they shoot through a computer like bullets. As it can with problems related to AC line noise, good grounding helps solve problems that arise from electrostatic discharge.

Networking media are the various physical environments through which transmission signals pass. For computers to communicate encoded information with each other, networking media must physically connect them to each other. The networking media used to connect computers varies. Several kinds of network media can be used to connect computers:

- Coaxial cable
- Unshielded twisted-pair (UTP) cable
- Shielded twisted-pair (STP) cable
- Fiber-optic cable

CCNA 1 Chapter 3

Networking Media

Concept Questions

Demonstrate your knowledge of these concepts by answering the following questions in the space provided.

1. Each wire in a cable can act like an antenna. When this happens, the wire actually absorbs electrical signals from other wires in the cable and from electrical sources outside the cable. If the resulting electrical noise reaches a high enough level, it can become difficult for network interface cards to discriminate the noise from the data signal. When electrical noise on the cable originates from signals on other wires in the cable, this is known as crosstalk. How can you minimize crosstalk?

2. To ensure optimal performance, it is important for the network media to carry the signal from one device to another with as little degradation as possible. In networking, several factors can cause the signal to degrade. Some of these factors are internal, whereas others are external. Name some of the factors that can cause a signal to degrade and how to correct the problem.

3. Inside copper wires, factors such as opposition to the flow of electrons (*resistance*), opposition to changes in voltage (*capacitance*), and opposition to changes in current (*inductance*) can cause signals to degrade. External sources of electrical impulses that can attack the quality of electrical signals on the cable include lighting, electrical motors, and radio systems. These types of interference are referred to as *electromagnetic interference* (EMI) and *radio frequency interference* (RFI). How can you protect your network from RFI?

CCNA 1 Chapter 3

Networking Media

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 3 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

AC

AM

Ampere

Analog transmission

Angle of incidence

Backbone

Circuits

Coaxial cable

Collision Domain

Conductor

Crosstalk

DC

Digital signal

Dispersion

Electricity

Electrons

EIA

EMI

ESD

Fiber-optic cable

FM

CCNA 1 Chapter 3 Networking Media

IEEE

Impedance

Latency

Media

Multimeter

Multimode

Neutrons

Noise

Oscilloscope

PM

Propagation

Protons

Reflection

Refraction

Resistance

Router

Single-mode

Standard

Thicknet

Thinnet

TIA

Twisted cable

UTP

Wavelength

CCNA 1 Chapter 3

Networking Media

Focus Questions

1. What are some examples of electrical insulators?
2. What are some examples of electrical conductors?
3. What is the formula for calculating electric current?
4. What types of charges repel each other and why?
5. Which direction does DC voltage always flow?
6. When does voltage occur?
7. What is it called when static, or resting, electrons move and a flow of charges is created?
8. What is the difference between AC and DC?
9. How do you measure impedance? What is its abbreviation?

CCNA 1 Chapter 3 Networking Media

10. What three components are necessary to make up a circuit, and how do they allow the control of current?

11. What equipment do you use to graph electrical waves, pulses, and patterns?

12. What are some of the characteristics of an analog signal?

13. What is an ampere?

14. What are the five sources of noise that can affect a bit on a wire?

15. At what speed do modern networks typically work?

16. Compare and contrast four different Ethernet LAN devices in increasing order of complexity (and typically cost).

Repeaters

Hubs

Bridges

Switches

CCNA 1 Chapter 3 Networking Media

17. What are some of the characteristics of shielded twisted-pair (STP)?

18. What are some of the characteristics of unshielded twisted-pair (UTP)?

19. What are some of the characteristics of coaxial cable?

20. What is the difference between STP and UTP?

21. What are the benefits of using coaxial cable?

22. What are the advantages of fiber-optic cable?

23. What are the disadvantages of fiber-optic cable?

24. What is the medium for wireless communication?

25. What are TIA/EIA standards?

CCNA 1 Chapter 3 Networking Media

26. How does cancellation reduce signal loss?

27. How many conductors does an RJ-45 jack have?

28. What is a shared media environment?

29. Where on a network do collisions occur?

30. What happens to the signal in a collision?

31. How do you recognize a collision domain?

32. How do repeaters extend collision domains?

33. How do hubs extend collision domains?

34. Do repeaters filter network traffic?

CCNA 1 Chapter 3 Networking Media

35. What is the four-repeater rule?

36. How can two wireless workstations be networked together without an AP?

37. What is the 802.11b standard?

38. What is the 802.11a standard?

39. What type of connector is used to connect a PC running HyperTerminal to a router console port?

CCNA 1 Chapter 3

Networking Media

CCNA Exam Review Questions

1. Which of the following correctly describes the type of signal that the network media carries?
 - A. Coaxial cable carries pulses of light.
 - B. UTP cable carries impedance signals.
 - C. STP cable carries electrical impulses.
 - D. Fiber-optic cable carries electrical impulses.
2. Which network media carries pulses of light?
 - A. Coaxial cable
 - B. Fiber-optic cable
 - C. UTP cable
 - D. STP cable
3. Which of the following is an external source of degradation of the signal on cabling?
 - A. EMI caused by electrical motors
 - B. RFI caused by light leakage
 - C. Impedance caused by radio systems
 - D. RFI caused by lighting
4. Which of the following combinations of charges repel each other?
 - A. Positive and positive
 - B. Negative and negative
 - C. Positive and negative
 - D. Neutral and neutral
5. What is the cause of crosstalk?
 - A. Cable wires that are too large in diameter
 - B. Too much noise in a cable's data signal
 - C. Electrical motors and lighting
 - D. Electrical signals from other wires in a cable
6. Which one of the following is not a characteristic of 10BASE-T?
 - A. Twisted pair cable
 - B. Baseband transmission
 - C. T style connectors
 - D. 10 megabits per second data rate
7. What is a cost-effective way to limit cable signal degradation?
 - A. Specify the maximum cable length between nodes.
 - B. Increase the size of the conductors in the cabling.
 - C. Improve the type of insulating material.
 - D. Use a braid or foil covering on wires as a shield.

CCNA 1 Chapter 3 Networking Media

8. How can cable signal degradation be limited in a cost-effective way?
 - A. Improve the type of insulating material.
 - B. Place same-circuit wires close to each other.
 - C. Use a braid or foil covering on wires as a shield.
 - D. Increase the diameter of the conductor in the cabling.
9. What is cancellation in networking media?
 - A. The magnetic fields of same-circuit wires cancel each other.
 - B. External magnetic fields cancel the fields inside network cabling.
 - C. Wires in the same circuit cancel each other's electrical current flow.
 - D. Twisting wire pairs cancels the electrical impedance in the wires.
10. Which of the following describes cancellation in cabling?
 - A. Wires in the same circuit cancel each other's electrical current flow.
 - B. Twisting wire pairs provides self-shielding within the network media.
 - C. The magnetic fields of wires on different electrical circuits cancel each other.
 - D. External magnetic fields cancel the fields inside network cabling.
11. Which of the following describes impedance in networking media?
 - A. Impedance involves resistance and reactance to current caused by signal degradation.
 - B. Electrical components in the NICs create impedance on the networking media.
 - C. Signal degradation causes impedance.
 - D. Networking media impedance needs to match the network interface card electrical components.
12. When can impedance degrade the signal in networking media?
 - A. When resistance opposes reactance
 - B. When cable impedance does not match network interface card electrical components
 - C. When networking media is not properly shielded from EMI/RFI interference
 - D. When cancellation techniques are not employed
13. Which of the following best describes *attenuation*?
 - A. The termination of a message
 - B. The interception of a message
 - C. The weakening of a message
 - D. The ignoring of a message
14. Which of the following best describes how data is transmitted on a network?
 - A. As hexadecimal code
 - B. As ASCII text
 - C. As 1s and 0s
 - D. As voltage pulses

CCNA 1 Chapter 3 Networking Media

15. Which of the following best describes the states of digital signals?
- A. Alphanumeric
 - B. Octets
 - C. On or off
 - D. Yes or no
16. What does the binary number 1 correspond to in a digital signal?
- A. On
 - B. One
 - C. The letter A
 - D. Off
17. What does the binary number 0 correspond to in a digital signal?
- A. On
 - B. One
 - C. The letter A
 - D. Off
18. Which best describes a *digital signal*?
- A. A sine wave of normal shape and amplitude
 - B. An electrical technique used to convey binary signals
 - C. A language of computers with only two states—on and off—which are indicated by a series of voltage pulses
 - D. A transmission sent by a transceiver back to a controller to let it know the collision circuitry is functional
19. How do computers recognize digital signals?
- A. They receive a broadcast signal from the network.
 - B. They look for ARP requests that match their IP address.
 - C. They monitor the network connection for modulations.
 - D. They measure and compare the signals to a reference point.
20. What is the signal reference ground?
- A. A neutral contact point where the computer chassis and the network connection meet
 - B. A point that devices use to measure and compare incoming digital signals to
 - C. A device that the name server uses to send messages over the network
 - D. A ground that prevents users from receiving shocks when power fails
21. What is the point that a device uses to measure and compare incoming digital signals called?
- A. Input point
 - B. Zero point
 - C. Null reference setting
 - D. Signal reference ground

CCNA 1 Chapter 3 Networking Media

22. How is the signal reference ground established?
- A. By connecting the ground wire to the network wire
 - B. By connecting the network wire to the jumper connector
 - C. By connecting the ground plane to the computer's cabinet
 - D. By connecting the computer chassis to the network cable
23. What purpose does the computer chassis serve?
- A. It prevents electrical short circuits and electrical fires.
 - B. It serves as signal reference ground and AC power-line ground.
 - C. It amplifies digital signals.
 - D. It reduces electromagnetic interference.
24. What is the most likely cause of interference on a network?
- A. Improper cabling and jack choices
 - B. Electromagnetic interference from radios and other electrical devices
 - C. High voltage device in the vicinity
 - D. Problems with the power ground
25. What is the most likely cause of problems with the power ground?
- A. Length of the neutral and ground wires in electrical outlets
 - B. Excessive stripping or untwisting of cable
 - C. Equipment not located in a climate-controlled area
 - D. Poor-quality cabling material used in the network
26. What do long neutral and ground wires in electrical outlets act as?
- A. Lightning rods
 - B. Amplifiers for digital signals
 - C. Antenna for electrical noise
 - D. Line signal dampeners
27. How does electrical noise affect networks?
- A. It shuts down the network.
 - B. It burns out network devices, especially hubs.
 - C. It reduces data transmission speed through the network because error-trapping routines are initiated.
 - D. It distorts or buries digital signals to the point that they become unrecognizable.
28. How can the problem of electrical noise be avoided?
- A. By limiting the number and type of electrical devices near the LAN
 - B. By working closely with your electrical contractor and the local power company
 - C. By making sure that all electrical devices are FCC and UL listed
 - D. By installing surge suppressors on every network device

CCNA 1 Chapter 3 Networking Media

29. How can having a single power transformer dedicated to your LAN reduce electrical noise?
- A. You can detect and filter out fluctuations in line voltage before they reach your LAN.
 - B. You can specify the size and capacity of the transformer.
 - C. You can place the transformer in a central location.
 - D. You can control how and where devices such as motors or high current devices are attached.
30. What is the unit of measure for electrical current?
- A. Volt
 - B. Watt
 - C. Amp
 - D. Ohm
31. What type of fiber-optic cable is required by the TIA/EIA-568B standard for horizontal cabling?
- A. Two pairs of 100-ohm cable
 - B. Two pairs of 150-ohm cable
 - C. Two fibers of 62.5/125 um multimode cable
 - D. Four fibers of 62.5/125 um multimode cable
32. How can you determine which category of UTP cable a cabling belongs to?
- A. By looking at the end connectors
 - B. By reading the UL marking
 - C. By measuring the cable diameter
 - D. By the color of the cable sheathing
33. Why do networks need to use an access method?
- A. To regulate access to the networking media equitably
 - B. To regulate the access of data into certain parts of networking media
 - C. To keep unwanted, foreign users from having access to the network
 - D. To prioritize data transmissions so that important items have greater access
34. Which of the following best describes an access method?
- A. The method that software uses to access network file servers
 - B. The method that is used to verify users as authorized for access to the network
 - C. The way that users access the network
 - D. The way that network devices access the network medium
35. Ethernet uses what access method?
- A. Token header transmission protocol.
 - B. Ethernet does not use an access method.
 - C. Carrier sense multiple access collision detect.
 - D. Ethernet transmission carrier collision detect.

CCNA 1 Chapter 3 Networking Media

36. Which of the following best describes a collision?
- A. The frames from two devices impact and are damaged when they meet on the physical media.
 - B. Two nodes transmit at the same time and one data packet has priority, so it obliterates the lesser packet.
 - C. Two data transmissions cross paths on the network media and corrupt each other.
 - D. A data transmission is corrupted due to an energy spike over the network media.
37. Which of the following best describes a backoff algorithm?
- A. A process wherein the network holds up some data so that other, more important data can get through
 - B. The retransmission delay that is enforced when a collision occurs
 - C. The signal that a device on the network sends out to tell the other devices that data is being sent
 - D. A mathematical function that networking software performs to prioritize data packets
38. What is most important when considering the type of networking media to use in an installation?
- A. Management's wishes
 - B. Availability of networking media from local sources
 - C. Applicable fire, building, and safety codes
 - D. Your experience and expertise
39. Which grade of UTP cabling described in the TIA/EIA-568B standard is used for running CDDI and can transmit data at speeds up to 100 Mbps?
- A. Category 2
 - B. Category 3
 - C. Category 4
 - D. Category 5
40. Which grade of UTP cabling described in the TIA/EIA-568B standard is the one most frequently recommended and implemented in installations today?
- A. Category 2
 - B. Category 3
 - C. Category 4
 - D. Category 5
41. What is Category 5 UTP cabling suitable for?
- A. Transmitting data at speeds up to 10 Mbps
 - B. Transmitting data at speeds up to 100 Mbps
 - C. 10BASE-T networks
 - D. Token Ring networks

CCNA 1 Chapter 3 Networking Media

42. What type of STP cable does the TIA/EIA-568B standard require for horizontal cabling?
- A. Two pairs of 100-ohm cable
 - B. Two pairs of 150-ohm cable
 - C. Four pairs of 100-ohm cable
 - D. Four pairs of 150-ohm cable
43. What type of UTP cable does the TIA/EIA-568B standard require for horizontal cabling?
- A. Two pairs of 100-ohm cable
 - B. Two pairs of 150-ohm cable
 - C. Four pairs of 100-ohm cable
 - D. Four pairs of 150-ohm cable

CCNA 1 Chapter 4 Cable Testing

3. An important way of describing networking signals is a unit of measure called the decibel (dB). The decibel is related to the exponents and logarithms. The formulas for calculating decibels are as follows:

$$\text{dB} = 10 \log_{10} (P_{\text{final}} / P_{\text{ref}}), \text{ or } \text{dB} = 20 \log_{10} (V_{\text{final}} / V_{\text{reference}})$$

What do the following terms represent in these preceding formulas?

4. What is it called when you use an oscilloscope to analyze the x-axis or domain of the mathematical function over time?
5. All communications systems have noise. Even though you completely eliminate noise, you can minimize its effects if you understand the sources of the noise. What are some sources of noise?
6. Bandwidth is an extremely important concept in communications systems. There are two ways of considering bandwidth that are important for the study of LANs: analog bandwidth and digital bandwidth. Describe the differences between analog and digital bandwidth.

CCNA 1 Chapter 4

Cable Testing

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 4 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

Analog bandwidth

Amplitude

Attenuation

Crosstalk

Decibel

Digital bandwidth

Frequency

Impedance mismatch

NEXT

Oscilloscope

Propagation delay

PSNEXT

Sine waves

Square waves

TIA/EIA-568-B standard

Wave

White Noise

CCNA 1 Chapter 4

Cable Testing

CCNA Exam Review Questions

1. Which standards body created the cables and connector specification used to support Ethernet implementation?
 - A. ISO
 - B. ANSI
 - C. EIA/TIA
 - D. IETF
2. Which of the following is an external source of degradation of the signal on cabling?
 - A. EMI caused by electrical motors
 - B. RFI caused by light leakage
 - C. Impedance caused by radio systems
 - D. RFI caused by lighting
3. Which of the following would increase attenuation in a long 10BASE-T cable run?
 - A. Type of network traffic
 - B. Length of cable
 - C. Type of electrical ground
 - D. Number of hosts connected to the segment
4. What is the cause of crosstalk?
 - A. Cable wires that are too large in diameter
 - B. Too much noise in a cable's data signal
 - C. Electrical motors and lighting
 - D. Electrical signals from other wires in a cable
5. How does crosstalk occur?
 - A. Two wires are placed in close proximity to each other.
 - B. Network interface cards fail to discriminate the noise from the data signal.
 - C. Electrical noise originates from signals on other wires in the cable.
 - D. Wires in a cable absorb electrical impulses from sources that are outside the cable.
6. What is a cost-effective way to limit cable signal degradation?
 - A. Specify the maximum cable length between nodes.
 - B. Increase the size of the conductors in the cabling.
 - C. Improve the type of insulating material.
 - D. Use a braid or foil covering on wires as a shield.
7. What is *cancellation* in networking media?
 - A. The magnetic fields of same-circuit wires cancel each other.
 - B. External magnetic fields cancel the fields inside network cabling.
 - C. Wires in the same circuit cancel each other's electrical current flow.
 - D. Twisting wire pairs cancels the electrical impedance in the wires.

CCNA 1 Chapter 4 Cable Testing

8. Which of the following describes cancellation in cabling?
 - A. Wires in the same circuit cancel each other's electrical current flow.
 - B. Twisting wire pairs provides self-shielding within the network media.
 - C. The magnetic fields of wires on different electrical circuits cancel each other.
 - D. External magnetic fields cancel the fields inside network cabling.

9. Which of the following describes impedance in networking media?
 - A. Impedance involves resistance and reactance to current that signal degradation causes.
 - B. Electrical components in the network interface cards create impedance on the networking media.
 - C. Signal degradation causes impedance.
 - D. Networking media impedance needs to match the network interface card electrical components.

10. When can impedance degrade the signal in networking media?
 - A. When resistance opposes reactance
 - B. When cable impedance does not match network interface card electrical components
 - C. When networking media is not properly shielded from EMI/RFI interference
 - D. When cancellation techniques are not employed

11. Which of the following best describes *attenuation*?
 - A. The termination of a message
 - B. The interception of a message
 - C. The weakening of a message
 - D. The ignoring of a message

12. How is data transmitted on a network?
 - A. As hexadecimal code
 - B. As ASCII text
 - C. As 1s and 0s
 - D. As voltage pulses

13. Which of the following best describes the states of digital signals?
 - A. Alphanumeric
 - B. Octets
 - C. On or off
 - D. Yes or no

14. What does the binary number 1 correspond to in a digital signal?
 - A. On
 - B. One
 - C. The letter A
 - D. Off

CCNA 1 Chapter 4 Cable Testing

15. What does the binary number 0 correspond to in a digital signal?
- A. On
 - B. One
 - C. The letter A
 - D. Off
16. Which of the following best describes a digital signal?
- A. A sine wave of normal shape and amplitude
 - B. An electrical technique that is used to convey binary signals
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 - B. It serves as signal reference ground and AC power-line ground.
 - C. It amplifies digital signals.
 - D. It reduces electromagnetic interference.

CCNA 1 Chapter 4 Cable Testing

22. What is the most likely cause of problems with the power ground?
- A. Length of the neutral and ground wires in electrical outlets
 - B. Excessive stripping or untwisting of cable
 - C. Equipment not located in a climate-controlled area
 - D. Poor-quality cabling material used in the network
23. What do long neutral and ground wires in electrical outlets act as?
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24. How does electrical noise affect networks?
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 - D. It distorts or buries digital signals to the point that they become unrecognizable.
25. How can the problem of electrical noise be avoided?
- A. By installing surge suppressors on every network device
 - B. By making sure all electrical devices are FCC and UL listed
 - C. By getting a single power transformer dedicated to your LAN
 - D. By limiting the number and type of electrical devices near the LAN
26. Which is a reason for shielding copper based media?
- A. Ground the host.
 - B. Protect the data from outside forces
 - C. Decrease attenuation on the wire
 - D. Increase the crosstalk on the wire.
27. For which frequency should cable always be tested?
- A. Highest frequency that the cable is rated to support
 - B. Lowest frequency that the cable is rate to support
 - C. 10 kHz in each direction
 - D. 100 bps in each direction

CCNA 1 Chapter 5

Cabling LANs and WANs

This chapter describes issues related to cabling networking devices for a LAN and a WAN. For the LAN to function properly, the physical layer medium must meet the industry standards specified for the data rate used to transmit signals over Ethernet (10, 100, 1000, or 10,000 Mbps). The use of "signals" in this text refers to the data signals that move from the transmitter to the receiver. The signals will weaken (attenuate) traveling over the physical media; however, the receiver must still be able to clearly determine the state of each bit of the data (one or zero). Otherwise, the error rate on the network will be too high for the LAN to be useful.

Upon completion of this chapter, you will be able to:

- Demonstrate how to cable a LAN
- Demonstrate how to cable a WAN

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 5 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

Active hub

AUI

Crossover cable

GBIC (Gigabit Interface Converter)

IEEE 802.1X/Extensible Authentication Protocol (EAP)

Intelligent hub

Passive hub

Peer-to-peer network

Straight-through cable

WEP

CCNA 1 Chapter 5

Cabling LANs and WANs

CCNA Exam Review Questions

1. Which of the following is an 802.3u specification?
 - A. 10BASE-F
 - B. 10BASE-T
 - C. 100BASE-TX
 - D. 1000BASE-CX
2. Which of the following is the most appropriate choice for Ethernet connectivity?
 - A. Use 10-Mbps Ethernet as a connection between server and LAN.
 - B. Use Gigabit Ethernet as the link at the user level to provide good performance.
 - C. Use Fast Ethernet as a link between the user level and network devices to support the aggregate traffic from each Ethernet segment on the access link.
 - D. None of the above.
3. Which of the following statements does *not* correctly describe a media connector?
 - A. An RJ-45 connector is an 8-pin connector that is used mainly to terminate coaxial cable.
 - B. An AUI is a 15-pin connector that is used between a network interface card and an Ethernet cable.
 - C. The GBIC is a transceiver that converts serial electric currents to optical signals, and vice versa.
 - D. None of the above.
4. For which of the following would you *not* need to provide a crossover cable?
 - A. Connecting uplinks between switches
 - B. Connecting routers to switches
 - C. Connecting hubs to switches
 - D. None of the above
5. Which technology is *not* a type of wireless communication?
 - A. Cellular
 - B. Wideband
 - C. Infrared
 - D. Spread spectrum
6. Which statement does *not* describe the features of direct-sequence spread spectrum (DSSS)?
 - A. DSSS is reliable because each bit is represented by a string of 1s and 0s.
 - B. If up to 40 percent of the string is lost, you can reconstruct the original transmission.
 - C. DSSS technology has low throughput of data and short-range access.
 - D. The recently released evolution of the IEEE standard, 802.11b, provides for a full Ethernet-like data rate of 11 Mbps over DSSS.

CCNA 1 Chapter 5 Cabling LANs and WANs

7. Which of the following is *not* a feature of wired equivalent privacy (WEP)?
 - A. WEP uses the RC4 stream cipher for encryption.
 - B. WEP is a security mechanism defined within the 802.3 standards.
 - C. One of the goals of WEP is to deny access to the network by unauthorized users who do not possess the appropriate WEP key.
 - D. None of the above.

8. Which of the following is *not* a physical WAN implementation?
 - A. DSL
 - B. ISDN
 - C. Frame Relay
 - D. Ethernet

9. What type of data-transmission method does a WAN use?
 - A. Parallel
 - B. Serial
 - C. Single
 - D. None of above

10. What best describes a DCE?
 - A. User device at the end of a network
 - B. Equipment that serves as the data source or destination
 - C. Physical devices such as protocol translators and multiplexers
 - D. Devices that make up the network end of the user-to-network interface

11. Which of the following media is used to interconnect the ISDN BRI port to the service-provider device?
 - A. Category 5 UTP straight-through
 - B. Category 5 UTP crossover
 - C. Coaxial
 - D. Fiber optic

12. What type of connector is used for DSL connection?
 - A. RJ-45
 - B. RJ-11
 - C. F
 - D. DB-9

13. What type of connector is used to connect a router and a cable system?
 - A. RJ-45
 - B. RJ-11
 - C. F
 - D. AUI

CCNA 1 Chapter 5 Cabling LANs and WANs

14. What type of cable is used to connect a terminal and a console port?
- A. Straight-through
 - B. Rollover
 - C. Crossover
 - D. Coaxial
15. Which of the following correctly describes the type of signal that the network media carries?
- A. Coaxial cable carries pulses of light.
 - B. Unshielded twisted-pair (UTP) cable carries impedance signals.
 - C. Shielded twisted-pair (STP) cable carries electrical impulses.
 - D. Fiber-optic cable carries electrical impulses.
16. Which network media carries pulses of light?
- A. Coaxial cable
 - B. Fiber-optic cable
 - C. UTP cable
 - D. STP cable

CCNA 1 Chapter 6

Ethernet Fundamentals

In this chapter, you learn about the history of Ethernet and IEEE Ethernet standards. This chapter discusses the operation of Ethernet, Ethernet framing, error handling, and the different type of collisions on Ethernet networks. In addition, this chapter introduces the collision domains and broadcast domains. Finally, this chapter describes segmentation and the devices used to create the network segments.

Concept Questions

Demonstrate your knowledge of these concepts by answering the following questions in the space provided.

1. The IEEE is a professional organization that defines network standards. In 1985, the IEEE standards committee for local and metropolitan networks published its standards for LANs. Describe some of the purposes of this organization.

2. An abbreviated description (called an *identifier*) is also assigned to the supplement. The following are examples of some of the supplements:
10BASE-2
10BASE-5
100BASE-T
1000BASE-TX

What do these abbreviated descriptions consist of?

3. LAN standards define the physical media and the connectors that are used to connect devices to media at the physical layer of the OSI reference model. LAN standards also define the way devices communicate at the data link layer. In addition, LAN standards define how to encapsulate protocol-specific traffic. To provide these functions, the IEEE Ethernet data link layer has two sublayers. What are these layers, and what purposes do they serve?

CCNA 1 Chapter 6

Ethernet Fundamentals

4. To allow for local delivery of frames on an Ethernet segment, there must be an addressing system and a way of naming the computers and interfaces. Every computer has a unique way of identifying itself. Each computer on a network has a physical address. No two physical addresses on a network should be alike. Referred to as the MAC address, the physical address is located on the network interface card. Explain how Ethernet uses the MAC address, and define what the parts of the MAC address represent.

5. All frames (and the bits, bytes, and fields that are contained within them) are susceptible to errors from a variety of sources. The frame check sequence (FCS) field contains a number that is calculated by the source computer and is based on the data in the frame. When the destination computer receives the frame, it recalculates the FCS number and compares it to the FCS number included in the frame. If the two numbers are different, an error is assumed, the frame is discarded, and the source is asked to retransmit.

Cyclic redundancy check (CRC) –

Two-dimensional parity –

Internet checksum –

CCNA 1 Chapter 6

Ethernet Fundamentals

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 6 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

10 Gigabit-Ethernet

Auxiliary port

backoff[

broadcast

broadcast domain

collision

collision domain

connectionless

CSMA/CD

CSU/DSU

DCE

Encapsulation

Ethernet

Fast Ethernet

FDDI

full duplex

Gigabit Ethernet

half duplex

header

CCNA 1 Chapter 6

Ethernet Fundamentals

IEEE

IEEE 802.2

IEEE 802.3

LLC

MAC

MAC address

MTU

OUI

PPP

propagation delay

segment

simplex

SNMP

Token Ring

Trailer

Transceiver

CCNA 1 Chapter 6

Ethernet Fundamentals

CCNA Exam Review Questions

1. Which of the following is *not* one of the recognized IEEE sublayers?
 - A. MAC
 - B. Data Link Control
 - C. Logical Link Control
 - D. None of the above
2. The recognized IEEE sublayers are concerned with what layers of the OSI reference model?
 - A. 2 and 3
 - B. 1 and 2
 - C. 3 and 4
 - D. 1 and 3
3. The LLC, as a sublayer, participates in which of the following processes?
 - A. Encryption
 - B. Encapsulation
 - C. Framing
 - D. All of the above
4. What do the first six hexadecimal numbers in a MAC address represent?
 - A. Interface serial number
 - B. Organizational unique identifier
 - C. Interface unique identifier
 - D. None of the above
5. MAC addresses are _____ bits in length.
 - A. 12
 - B. 24
 - C. 48
 - D. 64
6. What is the name of the method used in Ethernet that explains how Ethernet works?
 - A. TCP/IP
 - B. CSMA/CD
 - C. CMDA/CS
 - D. CSMA/CA
7. Where does the MAC address reside?
 - A. Transceiver
 - B. Computer BIOS
 - C. Network interface card
 - D. CMOS

CCNA 1 Chapter 6

Ethernet Fundamentals

8. Which of the following statements best describes communication between two devices on a LAN?
- A. The source device encapsulates data in a frame with the MAC address of the destination device and then transmits it. Everyone on the LAN sees it, but the devices that have nonmatching addresses otherwise ignore the frame.
 - B. The source encapsulates the data and places a destination MAC address in the frame. It puts the frame on the LAN, where only the device that has the matching address can check the address field.
 - C. The destination device encapsulates data in a frame with the MAC address of the source device, puts it on the LAN, and the device that has the matching address removes the frame.
 - D. Each device on the LAN receives the frame and passes it up to the computer, where software decides whether to keep or to discard the frame.
9. Which functions are associated with framing?
- A. Identification of which computers are communicating with one another
 - B. Signaling when communication between individual computers begins and when it ends
 - C. Flagging corrupted frames
 - D. All of the above
10. How does a computer on a LAN detect an error in a frame?
- A. It sends a copy of the frame back to the sender for verification.
 - B. It checks the destination address to verify that the frame was really intended for it.
 - C. It compares a frame check sequence (FCS) in the frame to one that the computer calculates from the contents of the frame.
 - D. It calculates a checksum from the data in the frame and then sends it back to the source for verification.
11. What does MAC refer to?
- A. The state in which a network interface card has captured the networking media and is ready to transmit
 - B. Rules that govern media capturing and releasing
 - C. Protocols that determine which computer on a shared-medium environment is allowed to transmit the data
 - D. A formal byte sequence that has been transmitted
12. Which best describes a CSMA/CD network?
- A. One node's transmission traverses the entire network and is received and examined by every node.
 - B. Signals are sent directly to the destination if the source knows both the MAC and IP addresses.
 - C. One node's transmission goes to the nearest router, which sends it directly to the destination.
 - D. Signals are always sent in broadcast mode.

CCNA 1 Chapter 6 Ethernet Fundamentals

13. In an Ethernet or IEEE 802.3 LAN, when do collisions occur?
- A. When one node places a packet on a network without informing the other nodes
 - B. When two stations listen for a traffic, hear none, and transmit simultaneously
 - C. When two network nodes send packets to a node that is no longer broadcasting
 - D. When jitter is detected and traffic is disrupted during normal transmission
14. Which of the following is an important Layer 2 data link layer function?
- A. Logical link control
 - B. Addressing
 - C. MAC
 - D. All of the above
15. Which of the following is an Ethernet frame error type?
- A. Local collision
 - B. Remote collision
 - C. Late collision
 - D. All of the above
16. Which of the following protocols is a nondeterministic protocol?
- A. Token Ring
 - B. CSMA/CD
 - C. IPX
 - D. RIP
17. Which of the following is true of a deterministic MAC protocol?
- A. It defines collisions and specifies what to do about them.
 - B. It allows the hub to determine the number of users who are active at any one time.
 - C. It allows hosts to "take turns" sending data.
 - D. It allows network administrators to use a "talking stick" to control the media access of any users who are considered troublemakers.
18. What is the network area within which data packets originate and collide?
- A. Collision domain
 - B. Network domain
 - C. Broadcast domain
 - D. Network segment
19. Which of the following best describes broadcasting?
- A. Sending a single frame to many stations at the same time
 - B. Sending a single frame to all routers to simultaneously update their routing tables
 - C. Sending a single frame to all routers at the same time
 - D. Sending a single frame to all hubs and bridges at the same time

CCNA 1 Chapter 6 Ethernet Fundamentals

20. Using repeaters _____ the collision domain.
- A. Reduces
 - B. Has no effect on
 - C. Extends
 - D. None of the above
21. What is the process of using the complex networking devices—such as bridges, switches, and routers—to break up the collision domains known as?
- A. Sectioning
 - B. Segmentation
 - C. Collision domain reduction
 - D. None of the above
22. Which of the following best describes a backoff algorithm?
- A. A process wherein the network holds up some data so that other, more important data can get through
 - B. The retransmission delay that is enforced when a collision occurs
 - C. The signal that a device on the network sends out to tell the other devices that data is being sent
 - D. A mathematical function performed by networking software that prioritizes data packets
23. Why do networks need to use an access method?
- A. To regulate access to the networking media equitably
 - B. To regulate the access of data to certain parts of networking media
 - C. To keep unwanted, foreign users from having access to the network
 - D. To prioritize data transmissions so that important items have greater access
24. Which of the following would not use a crossover cable?
- A. Router to a switch
 - B. Workstation to a hub
 - C. Switch to a workstation
 - D. All of the above
25. Ethernet uses which of the following access methods?
- A. Token header transmission protocol.
 - B. Ethernet does not use an access method.
 - C. CSMA/CD.
 - D. Ethernet transmission carrier collision detect.
26. Which of the following best describes a collision?
- A. The frames from two devices impact and are damaged when they meet on the physical media.
 - B. Two nodes transmit at the same time and one data packet has priority, so it obliterates the lesser packet.
 - C. Two data transmissions cross paths on the network media and corrupt each other.
 - D. A data transmission is corrupted due to an energy spike over the network media.

CCNA 1 Chapter 6 Ethernet Fundamentals

27. Where do all communications on a network originate?
- A. Peripherals
 - B. Sources
 - C. Computers
 - D. Hosts
28. Which layer of the OSI model is concerned with media?
- A. Transport
 - B. Network
 - C. Physical
 - D. Application
29. What is a source device?
- A. A source device receives data and information from other computers in a network.
 - B. A source device sends data and information to other computers in a network.
 - C. A source device is information that moves among computers in a network.
 - D. A source device provides connectivity among computers in a network.
30. Which of the following best defines a destination?
- A. Logically grouped units of information
 - B. A network device that is receiving data
 - C. A redundant use of equipment to prevent data loss
 - D. A network device that is sending data
31. What is another name for link layer addresses?
- A. MAC addresses
 - B. IP addresses
 - C. Logical addresses
 - D. Network addresses
32. Which of the following is not a type of hub?
- A. Active
 - B. Intelligent
 - C. Passive
 - D. Transparent
33. On which layer of the OSI model are physical addresses located?
- A. On the presentation layer
 - B. On the session layer
 - C. On the data link layer
 - D. On the network layer

CCNA 1 Chapter 6 Ethernet Fundamentals

34. Which of the following is true about MAC addresses?
- A. They are unique for each LAN interface.
 - B. They are located at the network layer.
 - C. They are also called logical addresses.
 - D. They identify host networks.
35. Where is the MAC address located?
- A. At the network layer
 - B. Burned into ROM at the factory
 - C. In the AUI
 - D. At the MAU interface
36. Which of the following describes the structure of a MAC address?
- A. 32-bit network identity plus 32-bit host identity
 - B. Network, subnet, subnet mask, host
 - C. 24-bit vendor code plus 24-bit serial number
 - D. Network code plus serial number
37. Which of the following could be a MAC address?
- A. 172.15.5.31
 - B. 1111.1111.1111
 - C. FFFF.FFFF.FFFF
 - D. 0000.0c12.3456
38. Which of the following best describes CSMA/CD?
- A. Devices check the channel to make sure no signals are being sent before transmitting data.
 - B. Devices transmit data and listen to make sure that they are received properly.
 - C. Devices transmit a request prior to transmitting data over the network and wait for an "all clear" reply.
 - D. Devices monitor the channel continuously to track and manage traffic.
39. Which of the following is *not* a function of CSMA/CD?
- A. Transmitting and receiving data packets
 - B. Decoding data packets and checking them for valid addresses
 - C. Detecting errors within data packets or on the network
 - D. Cleaning up collisions on the network medium

CCNA 1 Chapter 7

Ethernet Technologies

4. Ethernet, Fiber Distributed Data Interface (FDDI), and Token Ring are widely used LAN technologies that account for virtually all deployed LANs. LAN standards specify cabling and signaling at the physical and data link layers of the OSI model. Because they are widely adhered to, this book covers the Ethernet and IEEE 802.3 LAN standards. Why do you suppose that Ethernet technology is so heavily used?

5. When it was developed, Ethernet was designed to fill the middle ground between long-distance, low-speed networks and specialized, computer-room networks carrying data at high speeds for limited distances. Ethernet is well suited to applications in which a local communication medium must carry sporadic, occasionally heavy traffic at high-peak data rates. Why is Ethernet so well suited to this kind of traffic?

6. Today, the term *standard Ethernet* refers to all networks using Ethernet (a shared-medium technology) that generally conform to Ethernet specifications, including IEEE 802.3. To use this shared-medium technology, Ethernet uses the carrier sense multiple access collision detect (CSMA/CD) protocol to allow the networking devices to negotiate for the right to transmit. What are the major benefits of Ethernet?

CCNA 1 Chapter 7

Ethernet Technologies

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 7 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

4D-PAM5

8B1Q4

10BASE-2

10BASE-5

10BASE-T

100BASE-FX

100BASE-TX

1000BASE-LX

1000BASE-SX

1000BASE-T

CCNA 1 Chapter 7

Ethernet Technologies

Focus Questions

1. What are the field names in a generic frame?
2. What happens on an Ethernet network after a collision occurs?
3. What address information is found in a layer 2 frame?
4. What are the features of Token Ring?
5. What are three advantages that optical fiber has over copper wiring?
6. What network device must all network traffic pass through on a star topology?
7. What factors led to the widespread growth of Ethernet networks?

CCNA 1 Chapter 7

Ethernet Technologies

CCNA Exam Review Questions

1. What is the maximum distance for thick Ethernet without using a repeater?
 - A. 185 m (606.95 feet)
 - B. 250 m (820.2 feet)
 - C. 500 m (1640.4 feet)
 - D. 800 m (2624.64 feet)
2. 10 Mbps Ethernet operates within the timing limits offered by a series of not more than _____ segments separated by no more than _____ repeaters.
 - A. Three, two
 - B. Four, three
 - C. Five, four
 - D. Six, five
3. Fast Ethernet supports up to what transfer rate?
 - A. 5 Mbps
 - B. 10 Mbps
 - C. 100 Mbps
 - D. 1000 Mbps
4. Identify two Gigabit Ethernet cable specifications.
 - A. 1000BASE-TX
 - B. 1000BASE-FX
 - C. 1000BASE-CS
 - D. 1000BASE-LX
 - E. 1000BASE-X
5. What is the transmission medium for 1000BASE-SX?
 - A. Long-wave laser over single-mode and multimode fiber
 - B. Category 5 UTP copper wiring
 - C. Balanced, shielded, 150 ohm, two-pair STP copper cable
 - D. Short-wave laser over multimode fiber
6. 4D-PAM5 encoding is used in which of the following Gigabit Ethernet standards?
 - A. 1000BASE-LX
 - B. 1000BASE-SX
 - C. 1000BASE-T
 - D. 1000BASE-CX
7. What is the IEEE standard for 10-Gigabit Ethernet?
 - A. 802.3z
 - B. 802.3u
 - C. 802.3ae
 - D. 803.3

CCNA 1 Chapter 8

Ethernet Switching

This chapter introduces Layer 2 bridging and switching techniques. Switching and bridging are techniques that decrease congestion in LANs by reducing traffic and increasing bandwidth. Three switching modes can be used to forward a frame through a switch: store-and-forward, cut-through, and fragment-free switching. The latency of each switching mode depends on how the switch forwards the frames. The faster the switching mode is, the smaller the latency is in the switch. Finally, this chapter introduces the Spanning Tree Protocol (STP), tells how STP works, and covers the STP switch port states.

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 8 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

BPDU

cut-through switching

encoding

fragment-free switching

latency

LLC

Manchester encoding

MAC

microsegmentation

NRZ

NRZI

SNR

spanning tree

store-and-forward switching

STP

WDM

CCNA 1 Chapter 8

Ethernet Switching

Focus Questions

1. What are two reasons that LANs are segmented?
2. Ethernet uses which access method to detect errors within data packets or on the network?
3. What are the three common types of switching methods?

CCNA 1 Chapter 8

Ethernet Switching

CCNA Exam Review Questions

1. What is the name of the method used in Ethernet that explains how Ethernet works?
 - A. TCP/IP
 - B. CSMA/CD
 - C. CMDA/CS
 - D. CSMA/CA
2. Which of the following do LAN switches use to make the forwarding decision?
 - A. IP address
 - B. MAC address
 - C. Network address
 - D. Host address
3. Which of the following is a feature of full-duplex transmission?
 - A. It offers two 10- to 1-Gbps data-transmission paths.
 - B. It doubles bandwidth between nodes.
 - C. It provides collision-free transmission.
 - D. All of the above.
4. The STP allows which of the following?
 - A. Bridges to communicate Layer 3 information
 - B. A redundant network path without suffering the effects of loops in the network
 - C. Static network paths for loop prevention
 - D. None of the above
5. Which of the following is *not* one of the STP port states?
 - A. Blocking
 - B. Learning
 - C. Listening
 - D. Transmitting
6. Which of the following is true concerning a bridge and its forwarding decisions?
 - A. Bridges operate at OSI Layer 2 and use IP addresses to make decisions.
 - B. Bridges operate at OSI Layer 3 and use IP addresses to make decisions.
 - C. Bridges operate at OSI Layer 2 and use MAC addresses to make decisions.
 - D. Bridges operate at OSI Layer 3 and use MAC addresses to make decisions.
7. Which of the following is *not* a feature of bridges?
 - A. They operate at Layer 2 of the OSI model.
 - B. They are more intelligent than hubs.
 - C. They do not make forwarding decisions.
 - D. They build and maintain address tables.

CCNA 1 Chapter 8 Ethernet Switching

8. Which of the following statements is true of microsegmentation?
 - A. Each workstation gets its own dedicated segment through the network.
 - B. All the workstations are grouped as one segment.
 - C. Microsegmentation increases the number of collisions on a network.
 - D. None of the above.

9. Which of the following is true for LAN switches?
 - A. They repair network fragments known as microsegments.
 - B. They are high-speed multiport bridges.
 - C. Lower bandwidth makes up for higher latency.
 - D. They require new network interface cards on attached hosts.

10. Which of the following best describes the data link layer of the OSI model?
 - A. It transmits data to other network layers.
 - B. It provides services to application processes.
 - C. It takes weak signals, cleans them, amplifies them, and sends them on their way across the network.
 - D. It provides reliable transit of data across a physical link.

11. Which layer provides reliable transit of data across a physical link?
 - A. Data link
 - B. Physical
 - C. Application
 - D. Transport

12. Which of the following processes is the data link layer concerned with?
 - A. Physical addressing, network topology, line discipline, error notification, ordered delivery of frames, and flow control
 - B. Establishing, managing, and terminating sessions between applications and managing data exchange between presentation layer entities
 - C. Synchronizing cooperating applications and establishing agreement on procedures for error recovery and control of data integrity
 - D. Providing mechanisms for the establishment, maintenance, and termination of virtual circuits, transport fault detection, recovery, and information flow control

13. Physical addressing and network topology are handled by which layer?
 - A. Physical
 - B. Presentation
 - C. Data link
 - D. Session

14. Which of the following best describes MAC addressing?
 - A. Addresses reside in the network interface card and the manufacturers assign them.
 - B. The IEEE committee assigns addresses and the network administrator must request them.
 - C. The distance of the computer from the network hub determines addresses.
 - D. Addresses are given to every computer when it is manufactured.

CCNA 1 Chapter 8 Ethernet Switching

15. On a network, where does a device connect to the media?
 - A. Ethernet card
 - B. Hub
 - C. Router
 - D. Network interface card

16. What is another name for the MAC address?
 - A. Binary address
 - B. Octadecimal address
 - C. Physical address
 - D. TCP/IP address

17. In which layer is the MAC address located?
 - A. Session
 - B. Data link
 - C. Physical
 - D. Transport

18. What does MAC address stand for?
 - A. Macintosh Access Capable
 - B. Mainframe Advisory Council
 - C. Media Access Control
 - D. Machine Application Communication

19. Which of the following items is located in the data link layer?
 - A. Destination
 - B. Peripheral
 - C. Repeater
 - D. MAC address

20. What is required for every port or device that connects to a network?
 - A. Repeater
 - B. Termination
 - C. MAC or physical address
 - D. ATM switch

21. How does a source device locate the destination for data on a network?
 - A. The network interface card at the destination identifies its MAC address in a data packet.
 - B. A data packet stops at the destination.
 - C. The network interface card at the destination sends its MAC address to the source.
 - D. The source sends a unique data packet to each MAC address on the network.

22. Which of the following has twelve hexadecimal digits?
 - A. IP address
 - B. MAC address
 - C. SNAP address
 - D. SAP address

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

This chapter presents an overview of the TCP/IP Protocol Suite. It starts with the history and future of TCP/IP, compares the TCP/IP protocol model to the OSI reference model, and identifies and describes each layer of the TCP/IP protocol suite.

The U.S. Department of Defense (DoD) created the TCP/IP reference model because it wanted a network that could survive any conditions, even a nuclear war. To illustrate further, imagine a world at war, criss-crossed by different kinds of connections, such as wires, microwaves, optical fibers, and satellite links. Then imagine a need for data to be transmitted, regardless of the condition of any particular node or network on the internetwork (which, in this case, might have been destroyed by the war). The DoD wants its packets to get through every time, under any conditions, from any one point to any other point. This difficult design problem brought about the creation of the TCP/IP model and has since become the standard on which the Internet has grown.

The present version of TCP/IP is old. IPv4 was standardized in September, 1981. In 1992, the Internet Engineering Task Force (IETF) supported the standardization of a new generation of IP, often called IPng. IPng is now known as IPv6. IPv6 has not yet gained wide implementation, but most vendors of networking equipment have already released it, and it will become the dominant standard in the future.

Concept Questions

1. IPv6 is the latest version of the TCP/IP protocol. What are some of the important IPv6 requirements?
2. What does the Application layer provide in the TCP/IP Protocol Suite Model?
3. What does the Transport layer provide in the TCP/IP Protocol Suite Model?

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 9 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

BOOTP

Broadcast address

Class A address

Class B address

Class C address

Class D address

Class E addresses

DHCP

ICMP

Internet Layer

IP Address Classes

IPv6

Multicast address

Network Access Layer

Subnetting

TCP/IP

Transport Layer

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

Focus Questions

1. The Class D address class was created to enable _____ in an IP network.
2. IP _____ is a bandwidth-conserving technology that reduces traffic by _____ delivering a single stream of information to thousands of corporate recipients and homes.
3. Complete the address chart that follows.

Address Class	First Octet Range	# of Possible Networks	# of Hosts Per Network
Class A			
Class B			
Class C			

4. Fill in the class of address indicated by the network and host octets.

Class	Network		Host	
Octet	1	2	3	4

Class	Network	Host		
Octet	1	2	3	4

Class	Host			
Octet	1	2	3	4

Class	Network			Host
Octet	1	2	3	4

5. Two benefits of hierarchical addressing are...

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

6. Three key features were invaluable in staving off depletion of the IPv4 address space. These features are the following:
 7. Eliminating _____ wouldn't necessarily recover the addresses locked into those address spaces that were already assigned, but it would enable the remaining addresses to be used much more _____.
 8. CIDR enables Internet routers (or any CIDR-compliant router) to more efficiently _____ routing information. In other words, a single entry in a routing table can represent the address spaces of many _____.
 9. _____ is nothing more than using _____ blocks of Class _____ address spaces to simulate a single, albeit larger address space.
 10. Each CIDR-compliant network address is advertised with a _____.
 11. _____, which is the next-generation IP, introduces a _____ bit address.
 12. Five solutions to slow the depletion of IP addresses and to reduce the number of Internet route table entries by enabling more hierarchical layers in an IP address are as follows:

CCNA 1 Chapter 9 TCP/IP Protocol Suite and IP Addressing

13. _____ provide the capability to include more than one subnet mask within a class-based address and the capability to subnet an _____.
14. VLSMs can be used when the routing protocol sends a _____ along with each network address.
15. Route summarization, also called *route* _____ or _____ reduces the number of routes that a router must maintain because it represents a series of network numbers as a single summary address.
16. Route summarization reduces memory use on routers, CPU for recalculations, and routing-protocol network traffic. Requirements for summarization to work correctly are as follows:
- Multiple IP addresses must share the same _____ - _____.
- _____ and _____ must base their routing decisions on a 32-bit IP address and prefix length that can be up to 32 bits.
- Routing protocols must carry the _____ (subnet mask) with the 32-bit IP address.
17. _____ and _____ do not advertise subnets or support noncontiguous subnets.
18. _____ and _____ are the two transport layer protocols.
19. Complete the following chart of private addresses. In the column on the right, give the network address with the CIDR prefix.

Class	RFC 1918 Internal Address Range	CIDR Prefix
A		
B		
C		

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

20. The _____ router translates the internal local addresses into globally unique IP addresses before sending packets to the outside network.
21. _____ is also used for security reasons to hide internal _____.
22. Cisco IOS Software Release 11.2 and later supports the following additional NAT features:
23. A _____ refers to a route whose associated mask has all 32 bits set to 1 --- 255.255.255.255. For an address and mask such as this, there can be only one host.
24. Which two OSI model layers match the TCP/IP model network layer?
25. Why is IP an unreliable protocol?

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

CCNA Exam Review Questions

1. Which transport layer protocol does TFTP use?
 - A. TCP
 - B. IP
 - C. UDP
 - D. CFTP
2. Which of the following is a basic service of the transport layer?
 - A. Provide reliability by using sequence numbers and acknowledgments
 - B. Segment upper-layer application data
 - C. Establish end-to-end operations
 - D. All of the above
3. Which of the following protocols operates at the TCP/IP Internet layer?
 - A. IP
 - B. ICMP
 - C. ARP
 - D. All of the above
4. What is the first thing that happens when a DHCP clients boots?
 - A. DHCPREQUEST
 - B. DHCPBOOT
 - C. DHCPDISCOVER
 - D. None of the above
5. How does the network layer forward packets from the source toward the destination?
 - A. By using a routing table
 - B. By using ARP responses
 - C. By referring to a name server
 - D. By referring to the bridge
6. If a device doesn't know the MAC address of a device on an adjacent network, what does it send an ARP request to?
 - A. The default gateway
 - B. The closest router
 - C. The router interface
 - D. All of the above
7. Which one of the following is not a method to expand the number of IP addresses available for public use?
 - A. A 64-bit addressing scheme
 - B. CIDR
 - C. NAT
 - D. IPv6

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

8. What are the two parts of an IP?
 - A. Network address and host address
 - B. Network address and MAC address
 - C. Host address and MAC address
 - D. MAC address and subnet mask

9. Which Internet protocol is used to map an IP address to a MAC address?
 - A. UDP
 - B. ICMP
 - C. ARP
 - D. RARP

10. Which of the following initiates an ARP request?
 - A. A device that cannot locate the destination IP address in its ARP table
 - B. The RARP server, in response to a malfunctioning device
 - C. A diskless workstation that has an empty cache
 - D. A device that cannot locate the destination MAC address in its ARP table

11. Which of the following best describes an ARP table?
 - A. A method to reduce network traffic by providing lists of shortcuts and routes to common destinations
 - B. A way to route data within networks that are divided into subnetworks
 - C. A protocol that performs an application layer conversion of information from one stack to another
 - D. A section of RAM on each device that maps IP addresses to MAC addresses

12. Which of the following best describes the ARP reply?
 - A. The process of a device sending its MAC address to a source in response to an ARP request
 - B. The route of the shortest path between the source and the destination
 - C. The updating of ARP tables through intercepting and reading messages that are traveling on the network
 - D. The method of finding IP addresses based on the MAC address, used primarily by RARP servers

13. Why are current, updated ARP tables important?
 - A. For testing links in the network
 - B. For limiting the amount of broadcast
 - C. For reducing network administrator maintenance time
 - D. For resolving addressing conflicts

14. Which of the following is a function of ICMP?
 - A. It provides name resolution services.
 - B. It provides error messages for troubleshooting IP networks.
 - C. It allows the network administrator to message users.
 - D. It controls the flow of information between two routers.

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

15. Class A addresses begin with what two bits? (Choose two)
- A. The first bits of the binary address are always 00
 - B. The first bits of the binary address are always 01
 - C. The first bits of the binary address are always 10
 - D. The first bits of the binary address are always 11
16. Which of the following best describes TCP/IP?
- A. It is a suite of protocols that can be used to communicate across any set of interconnected networks.
 - B. It is a suite of protocols that allows LANs to connect into WANs.
 - C. It is a suite of protocols that allows for data transmission across a multitude of networks.
 - D. It is a suite of protocols that allows different devices to be shared by interconnected networks.
17. Which of the following does not describe the TCP/IP protocol stack?
- A. It maps closely to the OSI reference model's upper layers.
 - B. It supports all standard physical and data link protocols.
 - C. It transfers information in a sequence of datagrams.
 - D. It reassembles datagrams into complete messages at the receiving location.
18. The TCP/IP protocol suite has specifications for which layer(s) of the OSI reference model?
- A. 1 through 3
 - B. 1 through 4 and 7
 - C. 3, 4, and 5 through 7
 - D. 1, 3, and 4
19. Which of the following is *not* a function of the network layer?
- A. RARP determines network addresses when data link layer addresses are known.
 - B. ICMP provides control and messaging capabilities.
 - C. ARP determines the data link layer address for known IP addresses.
 - D. UDP provides connectionless exchanges of datagrams without acknowledgments.
20. Which of the following is not a function of IP?
- A. Routing packets to remote hosts
 - B. Transferring data between the data link layer and the transport layer
 - C. Defining packets
 - D. Defining frames
21. Which of the following is one of the protocols found at the transport layer?
- A. UCP
 - B. UDP
 - C. TDP
 - D. TDC

CCNA 1 Chapter 9

TCP/IP Protocol Suite and IP Addressing

22. Which of the following is not a transport layer function?
- A. Path determination
 - B. End to end communication
 - C. Flow control
 - D. Reliability
23. Which of the following is not one of the protocols found at the TCP/IP application layer?
- A. UDP
 - B. HTTP
 - C. FTP
 - D. SNMP

CCNA 1 Chapter 10

Routing Fundamentals and Subnets

The network layer interfaces to networks and provides the best end-to-end packet delivery services to its user, the transport layer. The network layer sends packets from the source network to the destination network.

Routers are devices that implement the network service. They provide interfaces for a wide range of links and subnetworks at various speeds. Routers are active and intelligent network nodes; therefore, they can participate in managing the network. Routers manage networks by providing dynamic control over resources and supporting the tasks and goals for networks: connectivity, reliable performance, management control, and flexibility.

In addition to the basic switching and routing functions, routers have implemented a variety of value-added features that help to improve the cost-effectiveness of the network. These features include sequencing traffic based on priority and traffic filtering.

Typically, routers are required to support multiprotocol stacks, each with its own routing protocols, and to allow these different environments to operate in parallel. In practice, routers also incorporate bridging functions and can serve as a limited form of hub.

IP addressing makes it possible for data that is passing over the network media of the Internet to find its destination. Because each IP address is a 32-bit value, there are four billion different IP address possibilities. IP addresses are hierarchical addresses, like phone numbers and zip codes. They provide a better way to organize computer addresses than MAC addresses, which are "one-dimensional" addresses (like social security numbers). IP addresses can be set in software, so they are flexible. MAC addresses are burned into hardware. Both addressing schemes are important for efficient communications among computers.

CCNA 1 Chapter 10

Routing Fundamentals and Subnets

Concept Questions

Demonstrate your knowledge of these concepts by answering the following questions in the space provided.

1. Path determination occurs at the network layer. Routers are another type of internetworking device. These devices pass data packets among networks based on network protocol or Layer 3 information. Explain how this process works.
2. Routers have the capability to make intelligent decisions as to the best path for delivery of data on the network. What criteria do routers use to make these decisions?
3. IP addresses are 32-bit values that are written as four octets separated with periods. To make them easier to remember, IP addresses are usually written in dotted notation with decimal numbers. IP addresses are used to identify a machine on a network and the network to which it is attached. What do dotted-decimal and hexadecimal mean?
4. Convert the following decimal numbers to hexadecimal numbers.
 - A. 32,014
 - B. 56,432
 - C. 57,845
 - D. 98,764
 - E. 54,462
5. Convert the following hexadecimal numbers to decimal numbers.
 - A. 23F6
 - B. 6AB7
 - C. 5FE3
 - D. 87CE
 - E. 59AC

CCNA 1 Chapter 10

Routing Fundamentals and Subnets

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 10 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

Address

Broadcast address

Broadcast storm

Default Mask

IP

ISPs

Router

Segment

Subnet mask

CCNA 1 Chapter 10

Routing Fundamentals and Subnets

Focus Questions

1. What type of addressing scheme does the network layer address use?
2. Switches can learn layer two addresses and routers can learn layer three addresses. Why must switches forward broadcasts, leading to possible broadcast storms?
3. What type of determination is the process the router uses to choose a course for the packet to travel to its destination?
4. At what layer does logical addressing occur?
5. When a computer is moved to a different network, what type of address remains the same and what type of address must be reassigned?
6. What is the difference between a flat addressing scheme and a hierarchical addressing scheme?
7. In the IP header, what information does the "total length" contain?

CCNA 1 Chapter 10

Routing Fundamentals and Subnets

CCNA Exam Review Questions

1. Which layer of the OSI model uses the Internet Protocol addressing scheme to determine the best way to move data from one place to another?
 - A. Physical layer
 - B. Data link layer
 - C. Network layer
 - D. Transport layer
2. Which of the following functions allows routers to evaluate available routes to a destination and to establish the preferred handling of a packet?
 - A. Data linkage
 - B. Path determination
 - C. SDLC interface protocol
 - D. Frame Relay
3. IP addresses are necessary for which of the following reasons?
 - A. To identify a machine on a network and the network to which it is attached
 - B. To identify a machine on a network
 - C. To identify the network
 - D. To keep track of who is on a network
4. Which of the following best describes a network address on the Internet?
 - A. All four octets in the address are different.
 - B. Each address is unique.
 - C. The first three octets can be the same, but the last one must be different.
 - D. Two of the four octets can be the same, but the other two must be different.
5. Who assigns the network portion of every IP address?
 - A. The local network administrator
 - B. The person who owns the computer
 - C. The Network Information Center
 - D. The host network administrator
6. The network number plays what part in an IP address?
 - A. It specifies the network to which the host belongs.
 - B. It specifies the identity of the computer on the network.
 - C. It specifies which node on the subnetwork is being addressed.
 - D. It specifies which networks the device can communicate with.
7. The host number plays what part in an IP address?
 - A. It designates the identity of the computer on the network.
 - B. It designates which node on the subnetwork is being addressed.
 - C. It designates the network to which the host belongs.
 - D. It designates which hosts the device can communicate with.

CCNA 1 Chapter 10

Routing Fundamentals and Subnets

8. A Class A address is given to what sort of organization?
 - A. An individual
 - B. A medium-size company
 - C. A large corporation
 - D. A government

9. In a Class A address, which octets does InterNIC assign?
 - A. The first octet
 - B. The first and second octet
 - C. The first, second, and third octets
 - D. All the octets

10. In a Class A address, the value of the first octet can equal which of the following?
 - A. 0 through 127
 - B. 128 through 191
 - C. 192 through 223
 - D. 192 through 255

11. A Class B address is given to what sort of organization?
 - A. An individual
 - B. A medium-size company
 - C. A large corporation
 - D. A government

12. In a Class B address, which octets are assigned locally?
 - A. The first octet
 - B. The second octet
 - C. The second and third octets
 - D. The third and fourth octets

13. The address 129.21.89.76 is of which class?
 - A. Class A
 - B. Class B
 - C. Class C
 - D. Address not valid

14. Given a host with the IP address of 172.16.55.33 and the default subnet mask, what is the network number?
 - A. 172.16.55.32
 - B. 172.16.55.0
 - C. 172.16.0.0
 - D. 172.0.0.0

CCNA 1 Chapter 10

Routing Fundamentals and Subnets

15. Which of the following addresses is a Class C address? (Choose all that apply.)
- A. 129.219.95.193
 - B. 209.101.218.30
 - C. 151.13.27.38
 - D. 192.119.15.17
16. What address changes as a frame is received at each router?
- A. Layer 4 address
 - B. Layer 3 address
 - C. Layer 2 address
 - D. All of the above
17. If you have only one class C network and you need to create 6 subnets with at least 22 hosts, on each subnet what will your subnet mask be?
- A. 255.255.255.0
 - B. 255.255.255.128
 - C. 255.255.255.192
 - D. 255.255.255.224
18. If you have only one class C network and you need to create 11 subnets with at least 11 hosts, on each subnet what will your subnet mask be?
- A. 255.255.255.224
 - B. 255.255.255.240
 - C. 255.255.255.248
 - D. 255.255.255.252
19. What is the maximum number of bits that can be borrowed from a Class C network?
- A. 2
 - B. 4
 - C. 6
 - D. 8
20. What is the maximum number of bits that can be borrowed from a Class B network?
- A. 2
 - B. 8
 - C. 14
 - D. 16
21. How many subnets are usable with a subnet mask of 255.255.252.0 with a Class B network?
- A. 62
 - B. 64
 - C. 256
 - D. 1024

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Routing Fundamentals and Subnets

22. How many subnets are created with a subnet mask of 255.255.255.240 with a Class B network?
- A. 16
 - B. 2048
 - C. 4096
 - D. 65,536

CCNA 1 Chapter 11

TCP/IP Transport and Application Layer

Services that are located in the transport layer enable users to segment several upper-layer applications onto the same transport layer data stream. These services also allow for the reassembly of the same upper-layer application segments at the receiving end.

The transport layer data stream provides transport services from the host to the destination. Services such as these are sometimes referred to as *end-to-end services*. The transport layer data stream is a logical connection between the endpoints of a network.

As the transport layer sends its data segments, it can also ensure the integrity of the data. One method of doing this is called *flow control*. Flow control avoids the problem of a host at one side of the connection overflowing the buffers in the host at the other side. Overflows can present serious problems because they can result in data loss.

Transport-layer services also allow users to request reliable data transport between hosts and destinations. To obtain such reliable transport of data, a connection-oriented relationship is used between the communicating end systems. Reliable transport can accomplish the following:

- It ensures that delivered segments will be acknowledged back to the sender.
- It provides for retransmission of any segments that are not acknowledged.
- It puts segments back into their correct sequence at the destination.
- It provides congestion avoidance and control.

The application layer supports the communicating component of an application. A computer application can require only information that resides on its computer. However, a network application might have a communicating component from one or more network applications.

Concept Questions

Demonstrate your knowledge of these concepts by answering the following questions in the space provided.

1. For data transfer to begin, both the sending and receiving application programs inform their respective operating systems that a connection will be initiated. How is this accomplished?

2. In concept, one machine places a call that the other must accept. If the receiving machine does not accept the call, what happens?

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TCP/IP Transport and Application Layer

3. Protocol software modules in the two operating systems communicate by sending messages. Messages are sent across the network to verify that the transfer is authorized and that both sides are ready. How is this accomplished?

4. After all synchronization occurs, a connection is established and data transfer begins. How do both machines know that the data is flowing correctly?

5. Windowing is a process of flow control. Describe the operation of TCP window size?

6. The application layer provides services to application processes. What services are provided?

7. The application layer identifies and establishes the availability of intended communication partners and the resources that are required to connect with them. What are these resources?

8. The domain naming system was developed in order to associate the contents of a site with the address of that site. What is the intent of each major domain suffix?

9. Port numbers are used by FTP. What is the purpose of using both port 20 and port 21?

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TCP/IP Transport and Application Layer

Vocabulary Exercise

Define the following terms as completely as you can. Use the online curriculum or CCNA 1 Chapter 11 from the *Cisco Networking Academy Program CCNA 1 and 2 Companion Guide*, Revised Third Edition, for help.

Agent

Application layer

Best-effort delivery

Client

Client/server computing

DNS

Domain server

Flow control

FTP

Full duplex

HTML

HTTP

IP address

NMS

CCNA 1 Chapter 11

TCP/IP Transport and Application Layer

Redirector

SMTP

SNMP

TCP

Telnet

TFTP

Transport layer

UDP

URL

Window size

CCNA 1 Chapter 11

TCP/IP Transport and Application Layer

Focus Questions

1. What type of numbers is used to keep track of different conversations that cross the network at the same time?
2. What is the name of a protocol that combines connectionless and connection-oriented service?
3. What is the difference between TCP and UDP?
4. What is the field in a TCP segment that ensures correct sequencing of the arriving data?
5. Which protocols use UDP?
6. Which protocols use TCP?
7. What range of port numbers is reserved for public applications?
8. Which window type has a window size that is negotiated dynamically during the TCP session?

CCNA 1 Chapter 11

TCP/IP Transport and Application Layer

9. Which network application uses the direct interface that the application layer provides?

10. Which network application uses the indirect interface that the application layer provides?

11. Where is the server side of a client/server application located?

12. What is the looped routine that a client/server application constantly repeats?

13. What does DNS do?

14. Which two protocols do file utility programs use to copy and move files between remote sites?

15. Which protocol do remote-access programs use to directly connect to remote resources?

16. Describe the three key components of a SNMP network?

CCNA 1 Chapter 11

TCP/IP Transport and Application Layer

CCNA Exam Review Questions

1. Which of the following layers provides transport services from the host to the destination?
 - A. Application
 - B. Presentation
 - C. Session
 - D. Transport
2. Which of the following best describes the function of the transport layer?
 - A. It establishes, manages, and terminates applications.
 - B. It provides transport services from the host to the destination.
 - C. It supports communication among programs such as electronic mail, file transfer, and web browsers.
 - D. It translates between different data formats such as ASCII and EBCDIC.
3. Which of the following methods best describes flow control?
 - A. A method to manage limited bandwidth
 - B. A method of connecting two hosts synchronously
 - C. A method to ensure data integrity
 - D. A method to check data for viruses prior to transmission
4. Which of the following functions best describes flow control?
 - A. It checks data packets for integrity and legitimacy prior to transmission.
 - B. It avoids traffic backup by cycling hosts quickly through alternate send and receive modes during peak traffic periods.
 - C. It connects two hosts over an exclusive high-speed link for critical data transfer.
 - D. It avoids the problem of a host at one side of the connection, overflowing the buffers in the host at the other side.
5. Which of the following occurs in the transport layer when a connection is first established between computers in a network?
 - A. Acknowledgment and retransmission
 - B. Encapsulation and broadcasting
 - C. Synchronization and acknowledgment
 - D. Recovery and flow control
6. Which of the following occurs in the transport layer when data congestion occurs?
 - A. Broadcasting
 - B. Windowing
 - C. Error recovery
 - D. Flow control

CCNA 1 Chapter 11

TCP/IP Transport and Application Layer

7. Which of the following layers handles flow control and error recovery?
 - A. Application
 - B. Presentation
 - C. Transport
 - D. Network

8. Which of the following techniques allows multiple applications to share a transport connection?
 - A. Broadcasting
 - B. Synchronicity
 - C. Encapsulation
 - D. Segmentation

9. Which of the following best describes segmentation?
 - A. It breaks data into smaller packets for faster transmission.
 - B. It switches hosts from send to receive mode continuously during peak traffic periods.
 - C. It allows multiple applications to share a transport connection.
 - D. It transfers data from the presentation layer to the network layer for encoding and encapsulation.

10. Which of the following methods controls the amount of information transferred end-to-end and helps to enable TCP reliability?
 - A. Broadcasting
 - B. Windowing
 - C. Error recovery
 - D. Flow control

11. If the window size were set to 1, when would an acknowledgment of data packet receipt be sent back to the source?
 - A. After one packet
 - B. After two packets
 - C. After three packets
 - D. After four packets

12. If the window size were set to 3, when would an acknowledgment of data packet receipt be sent back to the source?
 - A. After one packet
 - B. After three packets
 - C. After six packets
 - D. After nine packets

CCNA 1 Chapter 11

TCP/IP Transport and Application Layer

13. Which of the following layers supports communication between programs, such as e-mail, file transfer, and web browsers?
 - A. Application
 - B. Presentation
 - C. Session
 - D. Transport

14. Which of the following is not a feature of UDP?
 - A. Unreliable delivery of datagrams
 - B. Connectionless service
 - C. Connection oriented service
 - D. Receives reliability for the upper layers of the OSI model

15. Which of the following is a network application?
 - A. E-mail
 - B. Word processor
 - C. Web browser
 - D. Spreadsheet

16. Which of the following is a computer application?
 - A. Remote access
 - B. File transfer
 - C. Web browser
 - D. E-mail

17. E-mail and file transfer are typical functions of which layer?
 - A. Transport
 - B. Network
 - C. Application
 - D. Presentation

18. What protocol is used to upgrade the IOS on a Cisco router?
 - A. TFTP
 - B. SMTP
 - C. QOS
 - D. PPP