

Appendix A

Internetworking Fundamentals

Review Questions

Unit 1: Lesson 1-1: Basic Network Types

Part A**Matching**

Colleges, community colleges, and universities often have campuses at several different locations. Each campus typically has several buildings; examples include the science building, the library, the administration building, and so on. Within each of the buildings are various departments and workgroups. The computer and biology departments have several labs, the administration has a dean's office, an accounting group, and so on. As a rule, university systems are networked to the Internet. Using this information, complete the matching questions.

1. ____	Wide Area Network	A.	The biology lab
2. ____	Metropolitan Area Network	B.	The Internet
3. ____	Workgroup LAN	C.	The south and north campuses of a college
4. ____	Departmental LAN	D.	The science department

True/False

1. ____	A Metropolitan Area Network is usually found in one building.
2. ____	Two computers connected together are considered a network.
3. ____	The most common type of network in small organizations is a WAN.
4. ____	Workgroup LANs connect 1000s of computer devices.
5. ____	Backbone networks create sub-networks using special devices called routers and switches.
6. ____	An enterprise network is owned and operated by the corporation using the network.

Short Essay

1. Name and define the two Local Area Network types.
2. What is the difference between a MAN and a WAN? Give an example of each type.

Part B

Network Design Questions

1. Draw a diagram of a Local Area Network. Label and show both a Workgroup LAN and a Departmental LAN.
2. Draw a diagram of a Wide Area Network. Label and include a LAN and a MAN in your diagram.
3. Draw a diagram of a Metropolitan Area Network. Label the networks.

Part C

Short Essay

1. Describe peer-to-peer networking and client/server networking. Include in your description which basic network types use peer-to-peer and/or client-server networking.

Part D

1. List at least 5 common resources shared over a network.

Unit 1: Lesson 1-2: Connectivity and Internetworking Devices

Part A

Identify each item as either a connectivity device or an internetworking device by placing a “C” or an “I” next to the item.

	1. Bridge		7. Switch
	2. Multistation Access Unit		8. Gateway
	3. Transceiver		9. Router
	4. Network Interface Card		10. Repeater
	5. Hub		11. Media Filter
	6. Media Dependent Adapter		

Part B

Identify which layer of the OSI model each device is assigned.

	1. Bridge
	2. Repeater
	3. Network Interface Card
	4. Router
	5. Transceiver
	6. Multistation Access Unit
	7. Hub
	8. Switch
	9. Media Dependent Adapter
	10. Media Filter
	11. Gateway

Part C

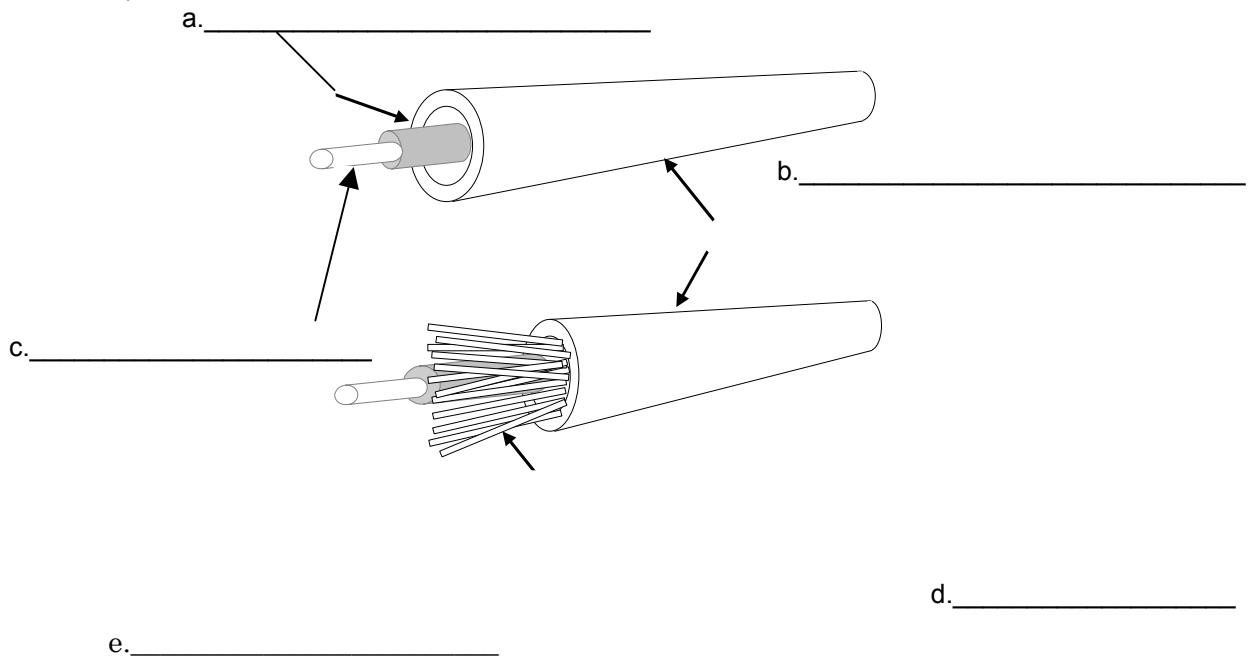
1. Compare the functions of bridges, hubs, repeaters, routers, and switches. Tell which layer of the OSI each device functions.

Unit 1: Lesson 1-3: Cabling

Part A

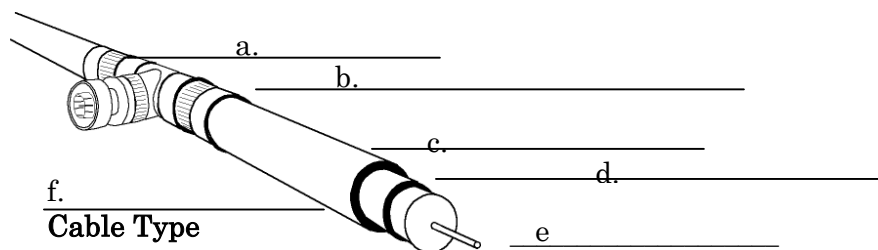
Identify each cable and label the structural components.

1.



Cable Type

2.



Cable Type

Part B

In the spaces provided, write the cable type (UTP Cat.5, Thin Coaxial, or Fiber Optic) that matches the specification or network.

Cable	Specification or Network Type
1.	Uses light to transmit information
2.	8 pairs of twisted wire
3.	Metal mesh protecting copper core
4.	The most expensive cable
5.	Departmental LANs
6.	Glass core
7.	High interference problems
8.	100 Mbps Bandwidth
9.	Least expensive cable
10.	Peer-to-peer workgroup LAN
11.	2 Gbps Bandwidth
12.	No interference problems
13.	10 Mbps Bandwidth
14.	Maximum distance 185 meters
15.	Maximum distance 100 meters

Part C

Describe how to crimp cable and discuss some of the problems you may encounter, including a discussion on the proper wiring sequences.

Unit 1: Lesson 1-4: Structured Cabling Systems

Part A

1. When planning a network, an administrator must
 - a. Anticipate the potential for future growth.
 - b. Take an inventory of existing hardware and software.
 - c. Determine the needs of the organization.
 - d. Determine the best physical and logical topology.
 - e. All of the above.

2. Cabling that carries the signals from equipment room to equipment room, between floors and the building entrance cabling.
 - a. Patch cable
 - b. Backbone cable
 - c. Horizontal cable
 - d. All of the above

3. What is the office space where computers are located called?
 - a. Work area
 - b. Equipment room
 - c. Building entrance
 - d. Horizontal cabling room
 - e. Backbone cabling room

4. The cabling that carries the signals from the equipment room to the various work areas.
 - a. Workstation cabling
 - b. Patch cabling
 - c. Horizontal cabling
 - d. Backbone cabling

5. Electromagnetic interference is not a problem for which cable?
 - a. Category 5 UTP
 - b. STP cable
 - c. Coaxial cable
 - d. Fiber optic cable

6. List five networking elements covered by the TIA/EIA 568 standards.

Part B

1. Diagram a bus network topology.

2. Diagram a star network topology.

3. Diagram a ring network topology.

Part C

1. List the advantages and disadvantages of bus network topology.

2. List the advantages and disadvantages of star topology.

3. List the advantages and disadvantages of ring topology.

Part D

1. You have been asked to create a network for five computers. Low cost is important and it is unlikely that the network will expand. Which network topology would you recommend and why?
2. Which topology would you recommend for a network that will be reconfigured frequently, must be very reliable, and is easy to troubleshoot without bringing down the entire network? Why?
3. You are designing a network for an automobile factory. There are lots of motors and fluorescent lights. Cost is not a factor. Each of the workstations must have equal access to the network. Which topology would you choose? Why?
4. Refer to question number 3. Which type of cable would you recommend for this network? Why?

Unit 2: Lesson 2-1: OSI Model

Part A

1. Explain why the OSI model is important.

Part B

1. List the seven layers of the OSI model in stacked order (Layer 7 at the top).
2. Describe how the layers of the OSI model communicate with each other.

Part C

1. Match the OSI layer with the appropriate function from the list below.

Layer				Function
7 – Application	_____		A.	Routes and addresses messages
6 – Presentation	_____		B.	Translates data so software applications can read it
5 – Session	_____		C.	Allows user software to access network services
4 – Transport	_____		D.	Enables network logins
3 – Network	_____		E.	Frames and controls data flow
2 – Data Link	_____		F.	Provides reliable transmission and confirmation
1 – Physical	_____		G.	Defines media specifications

Part D

1. Label network hardware elements and functions with the appropriate OSI layer.

Layer	Device and Function
	Repeater —a connector that filters, amplifies and retransmits information to allow signals to travel further along a network.
	Bridge —connects small numbers of similar LANs into an internetwork or splits an overloaded network into smaller parts without translation.
	Router —connects different networks together and directs information by best route (using algorithms) to destinations.
	NIC —provides connection of computer to transmission medium on the network.
	Gateway —links different network types together. Can be hardware or software that allows different protocols to exchange information.
	Hub —provides central location with ports where cables on a network come together for connection
	Modem —allows computers on a network to exchange information by translating into binary form for transmission over telephone lines.
	Cable —wires used to connect devices on a network.

Unit 2: Lesson 2-2: Data Transmission

Part A

1. Describe analog signals. How are they used to transmit data?
2. Describe digital signals.
3. Describe synchronous data transmission.
4. Describe asynchronous data transmission.

5. What is the difference between half-duplex and full duplex transmissions?
6. There is a timing process that signals the beginning and ending of data so it can be correctly measured. This process is called what?
 - a. Digital signaling
 - b. Analog signaling
 - c. Bit synchronization
 - d. Asynchronous
 - e. Synchronous
7. Which type of signaling scheme represents data sent as discrete signals?
 - a. Digital signaling
 - b. Analog signaling
 - c. Asynchronous
 - d. Synchronous
8. Which type of signaling scheme represents continuously changing data?
 - a. Digital signaling
 - b. Analog signaling
 - c. Asynchronous
 - d. Synchronous
9. Which type of bit synchronization transmission requires both a start bit and a stop bit for clocking purposes?
 - a. Digital signaling
 - b. Analog signaling
 - c. Asynchronous
 - d. Synchronous

10. Group of bits, including data and control signals, arranged in a specific format and transmitted as a whole, are called what?
 - a. Clocking
 - b. Sequencing
 - c. Synchronization
 - d. Packets

Part B

1. Describe the difference between analog and digital signaling waves/pulses.
2. What is binary notation and how is it used to transfer data signals over network media?
3. List three characteristics of waves that are used to encode data.

Part C

1. Use the OSI model as your reference and explain how data packets are structured. Give several examples of information that may be contained within headers. Draw a diagram showing packet addition at each layer.

Unit 2: Lesson 2-3: Ethernet Basics

Part A

1. Which type of transmission do all devices on the shared network hear and accept?
 - a. Singlecast
 - b. Multicast
 - c. Broadcast
 - d. Baseband

2. Which type of signaling uses the entire bandwidth of a cable for a single transmission and allows only one signal at a time?
 - a. Singlecast
 - b. Multicast
 - c. Broadcast
 - d. Baseband

3. When all devices have equal access to the network and no one device has priority over another device, what is this called?
 - a. Carrier Sense
 - b. Multiple Access
 - c. Collision Detection
 - d. Collision Domain

4. What is the term used to describe the ability of a device to sense simultaneous transmission attempts and wait a random amount of time before retransmitting data?
 - a. Carrier Sense
 - b. Multiple Access
 - c. Collision Detection
 - d. Collision Domain

5. What is the ability to listen for a jam signal before transmitting data called?
 - a. Carrier Sense
 - b. Multiple Access
 - c. Collision Detection
 - d. Collision Domain

6. Ethernet standards include specifications for which of the following?
 - a. Cabling
 - b. Frame format
 - c. Network access conventions
 - d. All of the above

7. What are the two IEEE Ethernet standards called?

8. What is the name for the Ethernet standards developed by Xerox, Intel, and Digital Equipment Corporation?

9. What type of topology configuration(s) does Ethernet employ?

10. List five reasons for the popularity of Ethernet LAN topology.

Part B

Matching: Match the part of the frame with its definition.

1. ___ Preamble	A	One byte code in the LLC field used to identify the protocol that will encapsulate the data field
2. ___ Start of Frame	B	Hardware address of the destination device
3. ___ Destination Address	C	Actual information being transmitted
4. ___ Source Address	D	Specifies the protocol used for sending the frame
5. ___ Type Field	E	Specifies the length of the data within the frame
6. ___ Length Field	F	Type of frame check that detects errors that occur in the frame during transmission
7. ___ Pad	G	Added to the data field of IEEE 802.3 when the data is less than 46 bytes
8. ___ Data	H	Establishes synchronization and transceiver conditions
9. ___ DSAP	I	Field with 10101011 sequence separate
10. ___ CRC	J	Hardware address of the sending device

Part C

- ◆ Name the two data link sublayers.

- ◆ Which sublayer of the OSI do the IEEE 802.2 standards control?

- ◆ Which sublayer of the OSI do the IEEE 802.3 standards control?

- ◆ What do the MAC sublayer protocols specify?

- ◆ Explain how the data link and physical layers are involved in the creation and transmission of frames.

Unit 2: Lesson 2-4: Ethernet Standards

Part A

1. In 10BASE5 Ethernet networks, what type of cable is specified?
 - a. 500-ohm thick coaxial cable
 - b. 50-ohm thick coaxial cable
 - c. 500-ohm thin coaxial cable
 - d. 50-ohm thin coaxial cable

2. In the 5-4-3 rule, the 5 indicates what?
 - a. Maximum number of taps
 - b. Maximum number of cable segments
 - c. Maximum number of repeaters
 - d. Maximum number of cable segments that can have transceivers

3. In 10BASE2 Ethernet networks, what type of cable is specified?
 - a. 500-ohm thick coaxial cable
 - b. 50-ohm thick coaxial cable
 - c. 500-ohm thin coaxial cable
 - d. 50-ohm thin coaxial cable

4. A straight tip connector is used with which Ethernet LAN?
 - a. 10BASE5
 - b. 10BASE2
 - c. 10BASE-T
 - d. 100BASE-T
 - e. 10BASE-F

5. A BNC-T connector is used with which Ethernet type?
 - a. 10BASE5
 - b. 10BASE2
 - c. 10BASE_T
 - d. 100BASE-T
 - e. 10BASE-F

6. The maximum number of devices on a 10BASE-T network is what?
 - a. 30
 - b. 100
 - c. 500
 - d. 1,024

7. The maximum number of devices on a 10BASE5 network is what?
 - a. 30
 - b. 100
 - c. 500
 - d. 1,024

8. What is an AUI connector?
 - a. A 15-pin connector used with an external transceiver
 - b. Device used only with a fan-out unit
 - c. The standard connector used for 100BASE-T connections
 - d. Device used for all Ethernet connections

9. A non-intrusive network tap can cause which of the following?
 - a. The cable to be cut
 - b. Does not cause the cable to be cut
 - c. Causes the cable to be cut, but linked back together
 - d. None of the above

10. The maximum number of devices per cable segment in 10BASE-F networks is what?
 - a. 1,024
 - b. 500
 - c. 2
 - d. 925

11. The maximum cable length for each segment in 10BASE-T networks is what?
 - a. 100 meters
 - b. 185 meters
 - c. 285 meters
 - d. 500 meters

12. A 10Base-T network may use which cable types?
 - a. Category 3
 - b. Category 4
 - c. Category 5
 - d. All of the above

13. The maximum number of devices per segment on a 10BASE-F network is what?
 - a. 30 devices
 - b. 1,024 devices
 - c. 2 devices
 - d. 500 devices

14. A fan-out unit is:
 - a. A single transceiver which allows multiple connections to the network
 - b. The same as a repeater
 - c. Multiple transceivers in a box
 - d. Provides cooling for the network

15. What is the difference between a physical bus and a logical bus/physical star topology?
 - a. The physical bus uses a hub
 - b. The logical bus, physical star is always used for Ethernet networks
 - c. The logical bus, physical star uses a hub
 - d. There is no difference

16. What is the topology of 10BASE-T networks?
 - a. Physical bus/logical star
 - b. Physical/logical star
 - c. Physical/logical bus
 - d. Physical star/logical bus

17. Which type of cabling is used to connect devices in a 10BASE-F network?
 - a. Category 5
 - b. UTP
 - c. STP
 - d. Fiber optic

18. The maximum number of repeaters/hubs per LAN allowed on a 10BASE-T segment is:
- a. 4
 - b. 100
 - c. 30
 - d. 925
19. Maximum fiber cable distances are:
- a. 550 meters
 - b. 250 meters
 - c. 2,000 feet
 - d. 2,000 meters
20. What is a MAU?
- a. A transceiver
 - b. A combination transceiver and tap
 - c. A cable
 - d. A NIC
21. What is an AUI?
- a. An external transceiver
 - b. An internal transceiver
 - c. A transceiver cable
 - d. An N-type connector

22. The 5-4-3-Ethernet rule means what?
- a. No more than 5 cable segments, 4 repeaters, and 3 segments with devices
 - b. No more than 5 repeaters, 4 cable segments, and 3 segments with devices
 - c. No more than 5 segments with devices, 4 repeaters, and 3 cable segments.
 - d. No more than 5 devices, 4 hubs, and 3 cable segments
23. Which cable type is used in LANs over 1,000 meters in length?
- a. UTS
 - b. STP
 - c. Category 5
 - d. Fiber Optic
24. Which type of Ethernet LAN uses a FOMAU transceiver?
- a. 10BASE5
 - b. 10BASE2
 - c. 10BASE-T
 - d. 10BASE-F
25. Which type of copper cable is most useful when EMI and distances of more than 1,000 meters are a concern?
- a. UTP
 - b. STP
 - c. Thick coaxial
 - d. Thin coaxial

Part B

- ◆ Complete the chart below that compares and contrasts four different Ethernet LANs.

Characteristics	10BASE5	10BASE2	10BASE-T	10BASE-F
Cable type				
Maximum cable segment length				
Maximum number of cable segments				

Part C

1. Name each of the 10BASE5 components and explain their function.
2. Name the 10BASE2 components and explain their function.
3. Name the 10BASE-T connectors and ports and explain their function.
4. Name the transceiver used in 10BASE-F networks and explain its function.
5. Describe the 10BASE-F ports.
6. How is 100BASE-T (Fast) Ethernet different from other Ethernet LANs?

Unit 2: Lesson 2-5: Other Networking Architectures

Part A

1. Token Ring networks operate at
 - a. 10, 100 or 1000 Mbps
 - b. 4, 16, 100 or 128 Mbps
 - c. 1 Gbps
 - d. 10, 16 or 1000 Mbps
 - e. 4 or 10 Mbps

2. A device may use the token frame to send data if
 - a. The Start Delimiter is 0
 - b. The End Delimiter is 1
 - c. The hardware addresses match
 - d. The Access Control signal is 0
 - e. The Start Delimiter is 1

3. The token frame size is
 - a. 16 bits
 - b. 24 bits
 - c. 32 bits
 - d. 48 bits
 - e. 64 bits

4. After copying data from the token frame, a receiving device
 - a. Releases the token
 - b. Reads error control information from the frame
 - c. Uses the token frame to send new data
 - d. Destroys the token frame
 - e. Send the frame back to the sending device

5. Token Ring networks
 - a. Fail more often than Ethernet networks
 - b. Fail more gracefully than Ethernet networks
 - c. Never fail
 - d. Cannot accept priority assignments
 - e. Must use fiber optic cabling

6. To detect and correct errors
 - a. Every device on a Token Ring network is an active monitor
 - b. Each device on a Token Ring network diagnoses its own errors
 - c. Each device gives control to its nearest active upstream neighbor
 - d. One device is designated as the active monitor
 - e. All devices send out a Claim Token

7. An MAU
 - a. Connects Token Ring devices into a ring
 - b. Turn off the ring when any connected device fails
 - c. Route power to connected devices
 - d. Switch traffic to neighboring networks
 - e. Cannot connect to other MAUs

Part B

1. FDDI operates at
 - a. 10 Mbps
 - b. 4 or 16 Mbps
 - c. 100 Mbps
 - d. 1000 Mbps
 - e. 4.5 Mbps

2. To transport streaming media data, FDDI
 - a. Opens a switched circuit
 - b. Can synchronize data with a clocking field
 - c. Can only transmit one frame when the token has been captured
 - d. Uses fiber optic cabling

3. When an FDDI sending device has captured a token
 - a. It can only transmit one frame
 - b. It can transmit as many frames as it wants
 - c. It can only transmit error diagnostics
 - d. It can transmit frames until a time limit expires
 - e. It releases the token

4. A secondary ring in FDDI
 - a. Automatically steps in if the primary ring fails
 - b. Allows priority communication to select devices
 - c. Doubles communication speed
 - d. Connects to Token Ring networks

Part C

1. Which computer manufacturer uses LocalTalk?
 - a. IBM
 - b. Digital Equipment Corporation
 - c. Intel Corporation
 - d. Motorola
 - e. Apple Computer

2. LocalTalk operates at
 - a. 230 Kbps
 - b. 1 Mbps
 - c. 10 Mbps
 - d. 100 Mbps
 - e. 1 Gbps

3. LocalTalk Node Id's are assigned
 - a. By the manufacturer
 - b. By the user
 - c. By the computer when the device is powered up
 - d. By the computer when the device is installed
 - e. By the server

4. LocalTalk connects using
 - a. Fiber optic cable
 - b. Coaxial cable
 - c. Twisted pair cable
 - d. Microwave radio
 - e. Photonic switches

Part D

1. ARCNet operates at
 - a. 230 Kbps
 - b. 1 Mbps
 - c. 2.5 Mbps
 - d. 10 Mbps
 - e. 1 Gbps

2. ARCNet tokens are passed by
 - a. nearest active upstream neighbor
 - b. nearest active downstream neighbor
 - c. Random walk
 - d. MAC address
 - e. NAUN computer device

3. ARCNet connects using
 - a. Twisted pair or coaxial cable
 - b. Fiber optic cable
 - c. Infrared light
 - d. Microwave radio

Unit 3: Lesson 3-1: WAN Configurations

Part A

1. Local area networks transmit data at speeds between
 - a. 20 Kbps and 56 Kbps.
 - b. 56 Kbps and 128 Kbps.
 - c. 128 Kbps and 1.5 Mbps.
 - d. 1.5 Mbps and 10 Mbps.
 - e. 10 Mbps and 100 Mbps.

2. Which type of transmission media would not be used for a WAN?
 - a. UTP
 - b. Microwaves.
 - c. Coaxial cable.
 - d. Optical fiber cable.
 - e. Radio waves.

3. Most Wide Area Networks use telephone lines because
- a. Phone lines go everywhere.
 - b. All phone lines are very fast.
 - c. It's less expensive than running new cables over long distances.
 - d. a and c.
 - f. All of the above.

Part B

◆ Matching

A. 8	1. ____ The speed of the least expensive kind of leased line.
B. T1	2. ____ The speed of data on an ISDN line when both channels are used.
C. T3	3. ____ A digital telephone line likely to be used by an Internet Service Provider.
D. 64 Kbps	4. ____ A digital telephone line that can carry data at 1.544 Mbps.
E. 7	5. ____ The speed of a single channel on a T1 line.
F. 6	
G. 128 Kbps	
H. 56 Kbps	

- ◆ What are some of the features of leased lines?

Part C

Label each statement as C for Circuit Switching or P for Packet Switching

- _____ A normal telephone call.

- ◆ _____ Only one user for an entire circuit.

- ◆ _____ Many users on a single circuit.

- ◆ _____ Pay only for data transmitted.

- ◆ _____ May transmit data as cells.

- ◆ _____ Pay for time on line.

- ◆ _____ Good for once-a-day data transmission.

- ◆ _____ Good for constant data transmission.

- ◆ _____ Connectionless service is possible.

- ◆ _____ Frame Relay.

Part D

1. Write a short paragraph explaining the advantages and disadvantages of using a leased line to connect two distant LANs.

2. Write a short paragraph that compares and contrasts the following three services:
 - X.25
 - Frame Relay
 - ATM
 -

Unit 3: Lesson 3-2: WAN Considerations

Part A

1. Which type of switching provides lowest delays?
 - a. ATM
 - b. Packet switching
 - c. Circuit switching
 - d. Open circuit leased line

2. Which type of switching introduces the greatest delays?
 - a. ATM
 - b. Packet switching
 - c. Circuit switching
 - d. Open circuit leased line

3. Which application requires the highest quality of service?
 - a. Electronic mail
 - b. Video conferencing
 - c. Audio broadcasting
 - d. Web browsing

4. Which application requires the least quality of service?
 - a. Electronic mail
 - b. Video conferencing
 - c. Audio broadcasting
 - d. Web browsing

5. Which switching method provides a flexible quality of service based on need?
 - a. ATM
 - b. Packet switching
 - c. Circuit switching
 - d. Open circuit leased line

Part B

1. If you pay for a Committed Information Rate on a WAN connection
 - a. You are guaranteed a certain available data rate
 - b. Attempts to send data at a greater rate will always fail
 - c. Data sent at a greater rate may be discarded
 - d. You have access to a private connection

2. A Committed Information Rate is used to select traffic when
 - a. The WAN is not busy
 - b. The WAN is congested
 - c. High-priority traffic is on the WAN
 - d. You send data slowly

3. Packets are marked as exceeding the Committed Information Rate by
 - a. The sending device
 - b. The receiving device
 - c. The company router
 - d. The switch which connects your network to the WAN

Part C

1. Network error rates are measured as
 - a. The number of good bits divided by the number bad bits
 - b. The number of good packets added to the number of bad packets
 - c. The number of bad bits divided by the number of good bits
 - d. The number of bad bits subtracted from the number of good bits

2. Which technique detects more kinds of errors?
 - a. Checksum
 - b. Cyclical redundancy check
 - c. Circuit switching
 - d. Authentication

3. X.25 networks detect and correct errors by
 - a. Checking the CRC and requesting a new copy of a bad packet from the sending switch
 - b. Using a checksum and discarding bad packets
 - c. Allowing the routers and devices on the sending and receiving LANs to detect and handle errors
 - d. Using the lowest level of the protocol stack

4. Frame relay networks detect and correct errors by
 - a. Checking the CRC and requesting a new copy of a bad packet from the sending switch
 - b. Using a checksum and discarding bad packets
 - c. Allowing the routers and devices on the sending and receiving LANs to detect and handle errors
 - d. Using the lowest level of the protocol stack

Part D

1. To verify that the sender of an encrypted message is who they say they are
 - a. Use the sender's public key to decrypt the message
 - b. Use the sender's private key to decrypt the message
 - c. Use your public key to decrypt the message
 - d. Use your private key to decrypt the message

2. To send an encrypted message that only the recipient can read
 - a. Use the recipient's public key to encrypt the message
 - b. Use the recipient's private key to encrypt the message
 - c. Use your public key to encrypt the message
 - d. Use your private key to encrypt the message

3. Which function is not provided by a firewall?
 - a. Encryption and authentication
 - b. Blocking connections to specific addresses
 - c. Blocking connections from specific addresses
 - d. Hiding the addresses of local computers when they connect to other networks

4. Which function does a proxy server provide?
 - a. Encryption and authentication
 - b. Blocking connections to specific addresses
 - c. Blocking connections to specific addresses
 - d. Hiding the addresses of local computers when they connect to other networks

5. A virtual private network (VPN)
 - a. Requires a private leased line
 - b. Uses encryption to make private network connections across the Internet
 - c. Requires users to connect to a dial-up server
 - d. Can only transport TCP/IP protocols

Unit 4: Lesson 4-1: TCP/IP Protocols

Part A

1. Create a diagram that illustrates the relationship of the TCP/IP protocol suite to the OSI model.

Part B

1. List the major protocols that reside in the application layer of TCP/IP.
2. List the major protocols that reside in the transport layer of TCP/IP.
3. List the major protocols that reside in the internet layer of TCP/IP.

Match the protocol to its corresponding services.

1.	IP	A.	A connectionless protocol that provides fast data delivery for applications that do not need error checking.
2.	TCP	B.	Used to copy files across a TCP/IP network regardless of the hosts' operating system.
3.	DNS	C.	Sends error messages and reports to the Internet Protocol.
4.	Telnet	D.	Transfers the HTML that is used to build web pages.
5.	ICMP	E.	Centralized directory service that equates a unique name with a host's IP address.
6.	UDP	F.	A best effort protocol that provides routing and network addressing functions.
7.	HTTP	G.	Provides services for sending and receiving emails across the Internet.
8.	FTP	H.	Provides the mechanism to send one message to a group of hosts on a network.
9.	IGMP	I.	A connection-oriented protocol that provides error checking, flow control, sequencing, and controls for lost or duplicated packets as part of its data delivery system.
10.	SMTP	J.	Supports remote login to a host from another host on a network.

Part C

1. What are the two components of an IP address?
2. Diagram the general configuration of an IP address.
3. What is the purpose of a MAC address?
4. Explain how the logical address of a network device is represented.
5. Create general diagrams that represent Class A, B, and C IP addresses.
Class A:
Class B:
Class C:
6. What is the network address range of a Class A address?
7. What is the network address range of a Class B address?
8. What is the network address range of a Class C address?
9. What are the natural masks for Class A, B, and C?
10. What solution has been developed to increase the number of IP addresses available? How does this solution work?

Part D

1. Explain why subnetting is necessary.
2. Briefly describe how a subnet is created.

Unit 5: Lesson 5-1: Networking Operating Systems

Part A

1. The main function of a Windows NT Domain is to
 - a. Provide shared disk space to a network
 - b. Control user credentials and security access for a network from a single location
 - c. Provide shared printer resources to a network
 - d. Connect to the Internet

2. List four major network services

Part B

1. Which protocol is not supported by Windows 95?
 - a. NetBEUI
 - b. IPX/SPX
 - c. TCP/IP
 - d. AppleTalk

2. Which protocol supports remote login sessions?
 - a. TELNET
 - b. X-Windows
 - c. RIP
 - d. SPX/IPX

3. Which protocol is not involved with file sharing?
 - a. NFS
 - b. AppleTalk
 - c. NetBEUI
 - d. SPX/IPX
 - e. X Windows

Part C

1. A network operating system
 - a. Supports application development
 - b. Support a single network protocol
 - c. Supports resource administration and network communication
 - d. Only supports servers
 - e. Does not require software drivers

2. Which processor does Windows NT not support?
 - a. Intel Pentium
 - b. DEC Alpha
 - c. IBM RISC
 - d. Sun SPARC

3. Windows 95
 - a. Can connect WAN's
 - b. Provides centralized security
 - c. Is a peer-to-peer Network Operating System
 - d. Is too expensive for small workgroups
 - e. Can not connect users with the Internet

4. Which of these network operating system provides the best security:
 - a. Windows for Workgroups
 - b. Windows 95
 - c. Windows NT Workstation
 - d. Windows NT Server

Part D

1. Peer-to-peer networks
 - a. Allow workstations to share and access resources
 - b. Are optimized for sharing resources from a single computer with many users
 - c. Do not share their own resources
 - d. Allow workstations to share their resources with others, but not access others' resources

2. Client/server networks
 - a. Share and access resources equally
 - b. Are purely database applications
 - c. Do not provide access security
 - d. Only support a single networking protocol
 - e. Support dedicated server computers which are optimized to share resources with many users

Unit 5: Lesson 5-2: Network Maintenance and Management

Part A

1. What are the four steps in the fault management process?
2. Name several hardware, software, and data transmission errors.
3. What are the five major elements to the maintenance and management of a network?
4. Network planning is driven by
 - a. The fastest hardware
 - b. Complete fault prevention
 - c. The cheapest solution
 - d. The requirements of the users
 - e. Absolute security

Part B

1. Network planning allows you to
 - a. Create a perfect network
 - b. Create the largest possible network
 - c. Meet current needs and anticipate maintenance and change
 - d. Guarantee error-free service
2. Describe how network planning can ensure smoother operation later.

Part C

1. What are dangers of running a network without management?

Part D

Name five hardware devices or software tools that are used to gather information for network management and planning

1. _____
2. _____
3. _____
4. _____
5. _____

Unit 6: Lesson 6-1: Internetworking Careers

Technical Review Bowl Rounds 1 & 2

From the technical interview questions and answers that class members have created, shared, and practiced, compile a quiz bank on index cards. Place questions on one side and answers on the other. Divide the class in half. In Round 1, one team will answer questions while the other critiques the answers and awards points. Make up your own rules. In Round 2 the roles reverse. You will be individually scored based on your own participation and performance according to criteria the class formulates in advance. Vary your questions as short answer, multiple choice, and true/false with justification. In some cases, you may choose to give an answer and challenge a team to compose a good interview question. Keep track of the topics that you personally need to review for optimum performance in a real technical job interview.

Here are two general questions you may wish to include for review of key career starting concepts:

1. A resume is used to
 - a. get a job
 - b. interest an employer in interviewing you
 - c. tell the employer what kind of job you want
 - d. present your personal history
 - e. all of the above

2. The primary objective of the job interview is to
 - a. negotiate salary
 - b. convince the employer you are right for the job
 - c. describe as much about yourself as possible
 - d. state what you are looking for in the job

Unit 6: Lesson 6-2: History of Internetworking

Part A

1. Diagram a simple timeline of the history of networking and write a summary about the milestones in networking history from the telegraph to modern computers.

Part B

1. In a short essay, describe Morse code, Baudot code, and ASCII code. Indicate in your essay the advantages of each code over the previously used code.

Part C

Place an “X” next to emerging technologies and an “O” next to existing and legacy technologies.

1.	Teletypewriters
2.	Circuit switching
3.	Unified Networks
4.	Gigabit Ethernet
5.	Telephones
6.	Baudot code
7.	Internet Call Centers
8.	Switches
9.	Ethernet
10.	Personal computers
11.	Router-switches
12.	Telegraph
13.	Modems
14.	World Wide Web
15.	Routers

Part D

1. Describe the concept of Unified Networks and how they will improve global communications.

Unit 6: Lesson 6-3

Part A

1. Describe the difference between a circuit switched network and a packet switched network.
2. Standard telephone service connections are provided by which network?
 - a. CACS
 - b. SONET
 - c. ATM
 - d. PSTN
3. Circuit switched networks
 - a. Send packets of data to all devices on the network
 - b. Use switches to select routes for data packets
 - c. Establish and maintain an exclusive connection between communicating devices
 - d. Use switches to select routes for fixed-length data cells
4. Photonic switches provide which advantage?
 - a. Fast switching of data between fiber optic cables
 - b. Fast switching of data between fiber optic cables and copper cables
 - c. Fast video performance because photonic switches operate directly with light
 - d. Low cost hardware

Part B

Match the definition with its networking term.

Networking Term		Definition
1. ____ Bandwidth	A.	Bandwidth greater than 45 Mbps
2. ____ Broadband	B.	1000 Mbps Ethernet
3. ____ Photonics	C.	A measurement of data transfer rate for network transmission systems
4. ____ Fast Ethernet	D.	Optical devices which replace electronic circuitry
5. ____ Gigabit Ethernet	E.	Access to voice, video, fax and email messaging through a single network.
6. ____ Convergence	F.	100 Mbps Ethernet

7. Which transmission system can support the highest bandwidth?
- Unshielded Twisted Pair
 - Fiber Optics
 - Coaxial Cable
 - Satellite Radio

Part C

- List two new applications that can be used on a high-speed data network.
- E-mail messages use MIME to
 - Provide videoconferencing
 - Broadcast audio and video
 - Format text and attach multimedia files and documents
 - Send messages by wireless transmission systems

3. Voice messaging systems can be integrated into desktop applications if
 - a. Messages are stored as video data files
 - b. Messages are stored on analog audio tape
 - c. Messages are stored as digitized audio files
 - d. Messages are stored as text files

4. Which function does a fax server not provide?
 - a. Send fax images to standard telephones
 - b. Route incoming faxes to personal software mailboxes
 - c. Send fax images as email attachments
 - d. Create fax images from any software application which is capable of printing

5. Voice communication over IP networks requires
 - a. Circuit switched connections
 - b. Unpredictable delays
 - c. Fast switching of data packets
 - d. A T1 or faster connection

Part D

1. Name the two industries competing to provide high-speed network connections to the home.

2. ADSL service is offered by
 - a. Telephone companies
 - b. Cable Television Companies
 - c. SONET
 - d. Networking companies

3. Why do cable television and telephone companies offer competing options for high-speed Internet access?
 - a. To minimize their profits
 - b. To provide slower service
 - c. To create confusion
 - d. To take advantage of existing cabling which they already own