Chapter 1: Introducing TCP/IP

Student: _____

1. When two or more RFCs cover the same topic, they usually also share the same title.
True False

2. RFC 3300 describes how an RFC is created and what processes it must go through to become an official standard, adopted by the IETF.
True False

3. A divide and conquer approach permits concerns related to networking hardware to be completely separated from those related to networking software.
True False

PDUs typically include “envelope information” in the form of specific headers and trailers.
True False

The Session layer is equipped to request retransmission of all erroneous or missing PDUs when reassembly is underway, so that it can guarantee reliable delivery of data from sender to receiver.
True False

The term ____ refers to a single logical network composed of multiple physical networks, which may all be at a single physical location, or spread among multiple physical locations.
A. internetwork
B. session
C. connection-oriented
D. checksum

The ____ is the parent organization for all the various Internet boards and task forces.
A. ICANN
B. Internet Engineering Task Force
C. Internet Architecture Board
D. Internet Society

The ____ is the group responsible for drafting, testing, proposing, and maintaining official Internet Standards, in the form of RFCs, through the agencies of multiple working groups under its purview.
A. ICANN
B. Internet Engineering Task Force
C. Internet Architecture Board
D. Internet Society

The ____ is responsible for the more forward-looking activities of the ISOC, and handles research and development work for topics too far-out or impractical for immediate implementation, but which may (or may not) have a role to play on the Internet some day.
A. ICANN
B. Internet Engineering Task Force
C. Internet Research Task Force
D. Internet Society

The ____ is ultimately responsible for managing all Internet domain names, network addresses, and protocol parameters and behaviors.
A. ICANN
B. Internet Engineering Task Force
C. Internet Research Task Force
D. Internet Society

The ____ includes the physical transmission medium (cables or wireless media) that any network must use to send and receive the signals that constitute the physical expression of networked communications.
A. Data Link layer
B. Physical layer
C. Network layer
D. Transport layer

It is the job of the ____ to enable reliable transmission of data through the Physical layer at the sending end, and to check such reliability upon reception at the receiving end.
A. Data Link layer
B. Physical layer
C. Network layer
D. Transport layer

The ____ is where notions of network location are addressed and where the intricacies involved in directing a PDU from sender to receiver are handled.
A. Data Link layer
B. Application layer
C. Network layer
D. Transport layer

The ____ is where ongoing communications between a sender and a receiver, somewhat like a telephone conversation, are set up, maintained, and then terminated, or torn down,as needed.
A. Session layer
B. Physical layer
C. Network layer
D. Presentation layer

The ____ manages the way data is presented to the network (on its way down the protocol stack), and to a specific machine/application combination (on its way up the protocol stack).
A. Session layer
B. Physical layer
C. Network layer
D. Presentation layer

The ____ defines an interface that applications can use to request network services, rather than referring directly to applications themselves.
A. Application layer
B. Physical layer
C. Session layer
D. Presentation layer

The TCP/IP Application layer also is known as the ____ layer because this is where the protocol stack interfaces with applications or processes on a host machine.
A. Session
B. Network
C. Process
D. Transport

Combining the various sources of outgoing data into a single output data stream is called ____.
A. segmentation
B. demultiplexing
C. protocol analysis
D. multiplexing

____ assign a series of numbers to represent a sizable collection of TCP/IP-based network services, such as file transfer (FTP), terminal emulation (Telnet), and e-mail.
A. Well-known protocols
B. Daemons
C. Data frames
D. Datagrams

TCP/IP application processes are sometimes called ____ and are identified by port numbers.
A. well-known protocols
B. hosts
C. network services
D. display filters

Many PDUs include a characteristic closing component called a ____ that provides data integrity checks for the data portion of the PDU, known as the payload.
A. well-known protocol
B. trailer
C. network service
D. host

____ is the process of tapping into the network communications system, capturing packets that cross the network, gathering network statistics, and decodingthe packets into readable form.
A. Segmentation
B. Multiplexing
C. Encapsulation
D. Protocol analysis

A(n) ____ is a holding area for packets copied off the network.
A. trace buffer
B. payload
C. packet
D. layer

____ are applied to the packets that are captured into the trace buffer.
A. Ports
B. Runts
C. Filters
D. Decodes

Many analyzers have configurable ____ that indicate unusual network events or errors.
A. ports
B. alarms
C. sockets
D. sessions

Remote Monitoring (RMON) uses the ____ to collect traffic data at a remote switch and send the data to a management device.
A. Simple Network Management Protocol
B. User Datagram Protocol
C. Virtual Private Network
D. Wide Area Information Service

The _____ layer also coordinates the sending and receiving of signals across the networking medium, and determines what kinds of cables, connectors, and network interfaces must be used to access a specific area on a network.
_____

The primary function of the _____ layer is to provide a globally unique address to every host on the Internet and paths to and from hosts.
_____

_____ involves cutting up a big message into a numbered sequence of chunks, called segments, in which each chunk represents the maximum data payload that the network media can carry between sender and receiver.
_____

The Session layer includes mechanisms to maintain reliable ongoing conversations, called _____.
_____

The most important TCP/IP Network Access layer protocol is _____.

_____

Match each item with a statement below.

1. devices that operate on the Internet	NSFNET ____
2. PDUs at the TCP/IP Network Access Layer	Data link layer ____
3. Internet Protocol version 4 came into existence	Packet ____
4. manages point-to-point transmission across the networking medium, from one computer to another on a single logical or physical cable segment	1978 ____
5. a long-haul, high-speed network launched in 1986 by the NSF	Hosts ____
6. the Defense Communications Agency took over operation of the ARPANET from DARPA	TCP/IP Network Access layer ____
7. the PDU associated with the Network layer	1983 ____
8. the layer where LAN technologies, such as Ethernet, token ring, and wireless media and devices, come into play	Datagrams ____
9. Data Link layer PDUs	Frames ____

What is the purpose of the Internet Architecture Board?

What is the purpose of the Internet Engineering Task Force (IETF)?

The reference model described in ISO Standard 7498 breaks network communication into seven layers. List each layer from top to bottom.

Provide brief descriptions of the following protocols: High-level Data Link Control (HDLC) protocol and frame relay.

Briefly describe the three primary tasks that the Internet layer handles for TCP/IP.

What is the purpose of the following protocols: Internet Protocol, Internet Control Message Protocol, and Address Resolution Protocol.

What is the difference between the Open Shortest Path First protocol and the Border Gateway Protocol?

Briefly discuss two elements that TCP/IP services depend on to operate.

List five basic elements found on most protocol analyzers.

Briefly describe three options for analyzing switched networks.

Chapter 1: Introducing TCP/IP Key

1. TRUE

2. FALSE

3. TRUE

TRUE

FALSE

A

D

B

C

A

B

A

C

A

D

A

C

D

A

C

B

D

A

D

B

A

Physical

Network

Segmentation

checkpoints

PPP *or* Point-to-Point Protocol *or* point-to-point protocol *or* point to point protocol

a long-haul, high-speed network launched in 1986 by the NSF :: NSFNET *and* manages point-to-point transmission across the networking medium, from one computer to another on a single logical or physical cable segment :: Data link layer *and* the PDU associated with the Network layer :: Packet *and* Internet Protocol version 4 came into existence :: 1978 *and* devices that operate on the Internet :: Hosts *and* the layer where LAN technologies, such as Ethernet, token ring, and wireless media and devices, come into play :: TCP/IP Network Access layer *and* the Defense Communications Agency took over operation of the ARPANET from DARPA :: 1983 *and* PDUs at the TCP/IP Network Access Layer :: Datagrams *and* Data Link layer PDUs :: Frames

The Internet Architecture Board (IAB), a.k.a. Internet Activities Board, is the arm of the ISOC that is the parent organization for the standards-making and research groups that handle current and future Internet technologies, protocols, and research. As such, the IAB's most important task is to provide oversight for the architecture for all Internet protocols and procedures, and to supply editorial oversight over the documents known as *Requests for Comments (RFCs)*, wherein Internet Standards are stated, and so forth.

The **Internet Engineering Task Force (IETF)** is the group responsible for drafting, testing, proposing, and maintaining official Internet Standards, in the form of RFCs, through the agencies of multiple working groups under its purview. The IETF and the IAB use a process accurately described as "rough consensus" to create Internet Standards. This means that all participants in the standards-making process, a type of peer review process, must more or less agree before a standard can be proposed, drafted, or approved. Sometimes that consensus can be pretty rough indeed! For more information about the IETF, visit *www.ietf.org*.

The seven layers, from top to bottom, are:

Application layer
Presentation layer
Session layer
Transport layer
Network layer
Data Link layer
Physical layer

High-level Data Link Control (HDLC) protocol: Based on IBM's original SNA Data Link Control (SDLC) protocol. HDLC uses data frames to manage network links and data transmission.

Frame relay: A telecommunications service designed to support intermittent data transmission between local area networks and wide area network end points. Frame relay uses data frames to manage network links and data transmission.

MTU fragmentation:When a route carries data from one type of network to another, the largest chunk of data that the network can carry, an MTU, can vary. When data moves from a medium that supports a larger MTU to a medium that supports a smaller MTU, that data must be reduced to smaller pieces to match the smaller of the two MTUs involved.

Addressing:This defines the mechanism whereby all network interfaces on a TCP/IP network must be associated with specific, unique bit patterns that identify each interface individually, and also identify the network (or even network locale) to which that interface belongs.

Routing:This defines the mechanism that forwards packets from sender to receiver, in which numerous intermediate relays may be involved in achieving delivery from sender to receiver.

Internet Protocol (IP): Routes packets from sender to receiver.
Internet Control Message Protocol (ICMP): Handles information about IP-based routing and network behavior, especially as they relate to "traffic conditions" and errors.
Address Resolution Protocol (ARP): Address Resolution Protocol (ARP) converts between numeric IP network addresses and Media Access Control (MAC) addresses on a specific cable segment (always used for the final step of packet delivery).*Routing*:This defines the mechanism that forwards packets from sender to receiver, in which numerous intermediate relays may be involved in achieving delivery from sender to receiver.

Open Shortest Path First (OSPF): Defines a widely used, link-state routing protocol for local or interior routing regions within local internetworks.

Border Gateway Protocol (BGP): Defines a widely used routing protocol that connects to common Internet backbones, or other routing domains within the Internet where multiple parties jointly share responsibility for managing traffic.

In UNIX terminology, a special "listener process," called a daemon, operates on a server to handle incoming user requests for specific services. On Windows Server 2008, a process called INETINFO.EXE appears in the Task Manager's Processes tab whenever the Web server, IIS, or FTP server is running.

Each TCP/IP service has an associated port address that uses a 16-bit number to identify a specific process or service. Addresses in the range from 0 to 1024 are often called well-known port addresses and associate a specific port address with a specific service.

The basic elements are:

Promiscuous mode card and driver
Packet filters
Trace buffer
Decodes
Alarms
Statistics

Hubbing out: By placing a hub between a device of interest (such as a server) and the switch, and connecting the analyzer to the hub, you can view all traffic to and from the server.

Port redirection: Many switches can be configured to redirect (actually, to copy) the packets traveling through one port to another port. By placing your analyzer on the destination port, you can listen in on all the conversations that cross the network through the port of interest.

Remote Monitoring (RMON): Uses Simple Network Management Protocol (SNMP) to collect traffic data at a remote switch and send the data to a management device.