

I. Multiple Choice

- 1.1 In the following options, which does not define in protocol? ()
- A the format of messages exchanged between two or more communicating entities
 - B the order of messages exchanged between two or more communicating entities
 - C the actions taken on the transmission of a message or other event
 - D the transmission signals are digital signals or analog signals
- 1.2 In the following options, which is defined in protocol? ()
- A the actions taken on the transmission and/or receipt of a message or other event
 - B the objects exchanged between communicating entities
 - C the content in the exchanged messages
 - D the location of the hosts
- 1.3 Which of the following nodes belongs to the network core?
- A. a Web Server
 - B. a Host with Win2003 Server
 - C. a Router with NAT service
 - D. a Supernode on Skype Network
- 1.4 In the Internet, the equivalent concept to end systems is ().
- A hosts
 - B servers
 - C clients
 - D routers
- 1.5 In the Internet, end systems are connected together by ().
- A copper wire
 - B coaxial cable
 - C communication links
 - D fiber optics
- 1.6 End systems access to the Internet through its ().
- A modems
 - B protocols
 - C ISP
 - D sockets
- 1.7 In the following options, which belongs to the network core? ()
- A end systems
 - B routers
 - C clients
 - D servers

1.8 End systems, packet switches, and other pieces of the Internet, run () that control the sending and receiving of information within the Internet.

- A programs
- B processes
- C applications
- D protocols

1.9 The protocols of various layers are called ().

- A the protocol stack
- B TCP/IP
- C ISP
- D network protocol

1.10 In the OSI reference model, the upper layers of the OSI model are, in correct order

- a) Session, application, presentation
- b) Session, presentation, application
- c) Session, application, presentation, physical
- d) Application, presentation, session

1.11 The lower layers of the OSI model are, in correct order

- a) physical, system, network, logical
- b) physical, logical, network, system
- c) physical, transport, network, data link
- d) physical, data link, network, transport

1.12 Which of the following protocol layers is not explicitly part of the Internet Protocol Stack? _____

- | | |
|----------------------|--------------------|
| A. application layer | B. session layer |
| C. data link layer | D. transport layer |

1.13 The 5-PDU is called ____

- | | |
|-------------|------------|
| A. message | B. segment |
| C. datagram | D. frame |

1.14 The Internet's network layer is responsible for moving network-layer packets known as () from one host to another.

- A frame
- B datagram
- C segment
- D message

1.15 Transport-layer packets are called:

- | | | | |
|------------|------------|-------------|----------|
| A. message | B. segment | C. datagram | D. frame |
|------------|------------|-------------|----------|

1.16 The units of data exchanged by a link-layer protocol are called ().

- A Frames
- B Segments
- C Datagrams
- D bit streams

1.17 There are two fundamental approaches to building a network core, () and packet switching.

- A electrical current switching
- B circuit switching
- C data switching
- D message switching

1.18 There are two classes of packet-switched networks: () networks and virtual-circuit networks.

- A datagram
- B circuit-switched
- C television
- D telephone

1.19 () means that the switch must receive the entire packet before it can begin to transmit the first bit of the packet onto the outbound link.

- A Store-and-forward transmission
- B FDM
- C End-to-end connection
- D TDM

1.20 In () networks, the resources needed along a path to provide for communication between the end system are reserved for the duration of the communication session.

- A packet-switched
- B data-switched
- C circuit-switched
- D message-switched

1.21 In () networks, the resources are not reserved; a session's messages use the resources on demand, and as a consequence, may have to wait for access to communication link.

- A packet-switched
- B data-switched
- C circuit-switched
- D message-switched

1.22 Which of the following option belongs to the circuit-switched networks? ()

- A FDM
- B TDM
- C VC networks
- D both A and B

1.23 In a circuit-switched network, if each link has n circuits, for each link used by the end-to-end connection, the connection gets () of the link's bandwidth for the duration of the connection.

- A a fraction $1/n$
- B all
- C $1/2$
- D n times

1.24 For (), the transmission rate of a circuit is equal to the frame rate multiplied by the number of bits in a slot.

- A CDMA
- B packet-switched network
- C TDM
- D FDM

1.25 The network that forwards packets according to host destination addresses is called () network.

- A circuit-switched
- B packet-switched
- C virtual-circuit
- D datagram

1.26 The time required to propagate from the beginning of the link to the next router is ().

- A queuing delay
- B processing delay
- C propagation delay
- D transmission delay

1.27 Processing delay does not include the time to ().

- A examine the packet's header
- B wait to transmit the packet onto the link
- C determine where to direct the packet
- D check bit-error in the packet

1.28 In the following four descriptions, which one is correct? ()

- A The traffic intensity must be greater than 1.
- B The fraction of lost packets increases as the traffic intensity decreases.

- C If the traffic intensity is close to zero, the average queuing delay will be close to zero.
- D If the traffic intensity is close to one, the average queuing delay will be close to one.

1.29 Suppose, a is the average rate at which packets arrive at the queue, R is the transmission rate, and all packets consist of L bits, then the traffic intensity is (),

- A LR / a
- B La / R
- C Ra / L
- D LR / a

1.30 and it should no greater than ().

- A 2
- B 1
- C 0
- D -1

1.31 Suppose there is exactly one packet switch between a sending host and a receiving host. The transmission rates between the sending host and the switch and between the switch and the receiving host are R_1 and R_2 , respectively. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay to send a packet of length L ? (Ignore queuing delay, propagation delay, and processing delay.) ()

- A $L/R_1 + L/R_2$
- B L/R_1
- C L/R_2
- D none of the above

1.32 We are sending a 30 Mbit MP3 file from a source host to a destination host. Suppose there is only one link between source and destination and the link has a transmission rate of 10 Mbps. Assume that the propagation speed is $2 * 10^8$ meters/sec, and the distance between source and destination is 10,000 km. Also suppose that message switching is used, with the message consisting of the entire MP3 file. How many bits will the source have transmitted when the first bit arrives at the destination?

- A. 1 bit B. 30,000,000 bits C. 500,000 bits D. none of the above

1.33 Access networks can be loosely classified into three categories: residential access, company access and () access.

- A cabled
- B wireless
- C campus
- D city area

1.34 The following technologies may be used for residential access, except

A. HFC

B. DSL

C. Dial-up modem

D. FDDI

1.35 Which kind of media is not a guided media? ()

A twisted-pair copper wire

B a coaxial cable

C fiber optics

D digital satellite channel

II. True or False

1.36 There is no network congestion in a circuit switching network.

1.37 Consider an application that transmits data at a steady rate, and once this application starts, it will stay on for a relatively long period of time. According to the characteristic, a packet-switched network would be more appropriate for this application than a circuit-switched network.

III. Please Answer Following Questions Briefly

1.38 How many layers are there in the Internet protocol stack? What are they? What are the principal responsibilities of each of these layers?

1.39 If the unit exchanged at the data link level is called a frame and the unit exchanged at the network level is called a packet, do frames encapsulate packets or do packets encapsulate frames? Explain your answer.

1.40 When two applications communicate over the Internet, which one is the server?

1.41 What is circuit switching, and what are its chief characteristics?

1.42 In a packet switching system, how does a sender transfer a large file?

1.43 Give four types of delay along with an explanation of each.

1.44 (a) Suppose N packets arrive simultaneously to a link at which no packets are currently being transmitted or queued. Each packet is of length L and the link has transmission rate R . What is the average queuing delay for the N packets?

(b) Now suppose that N such packets arrive to the link every LN/R seconds. What is the average queuing delay of a packet?

1.45 Consider sending a packet of 3000 bits over a path of 5 links. Each link transmits at 1000bps. Queuing delays, propagation delay and processing delay are negligible.

(1) Suppose the network is a packet-switched datagram network and a connectionless service is used. Now suppose each packet has 200 bits of header. How long does it take to send the file?

(2) Suppose that the network is a circuit-switched network. Further suppose that the transmission rate of the circuit between source and destination is 200bps. Assuming

0.02s setup time and 200 bits of header appended to the packet, how long does it take to send the packet?

1.46 In modern packet-switched networks, including the Internet, the source host segments long, application-layer messages (for example, an image or a music file) into smaller packets and sends the packets into the network. The receiver then reassembles the packets back into the original message. We refer to this process as message segmentation. The Figure below illustrates the end-to-end transport of a message with and without message segmentation. Consider a message that is $8 \cdot 10^6$ bits long that is to be sent from source to destination in the figure. Suppose each link in the figure is 2 Mbps. Ignore propagation, queuing, and processing delays.

- Consider sending the message from source to destination without message segmentation. How long does it take to move the message from the source host to the first packet switch? Keeping in mind that each switch uses store-and-forward packet switching, what is the total time to move the message from source host to destination host?
- Now suppose that the message is segmented into 800 packets, with each packet being 10,000 bits long. How long does it take to move the first packet from source host to the first switch? When the first packet is being sent from the first switch to the second switch, the second packet is being sent from the source host to the first switch. At what time will the second packet be fully received at the first switch?
- How long does it take to move the file from source host to destination host when message segmentation is used? Compare this result with your answer in part (a) and comment.
- In addition to reducing delay, what are reasons to use message segmentation?
- Discuss the drawbacks of message segmentation.

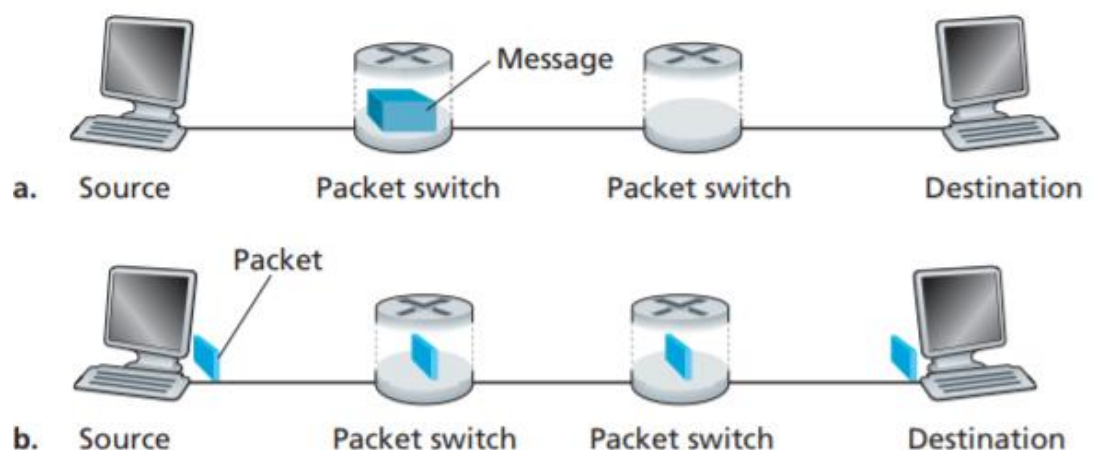


Figure 1.27 ♦ End-to-end message transport: (a) without message segmentation; (b) with message segmentation