

# 四川大学期末考试试题（闭卷）

(2017~2018 学年第 1 学期)

B 卷

课程号: 311015040 课程名称: 计算机网络 任课教师: \_\_\_\_\_

适用专业年级: 软件工程 2015 级 学号: \_\_\_\_\_ 姓名: \_\_\_\_\_

## 考生承诺

我已认真阅读并知晓《四川大学考场规则》和《四川大学本科学生考试违纪作弊处分规定（修订）》，郑重承诺：

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- 2、不带手机进入考场；
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考生签名:

题 号	1(30%)	2(20%)	3(30%)	4(20%)
得 分				
卷面总分		教师签名		阅卷时间

注意事项: 1. 请务必本人所在学院、姓名、学号、任课教师姓名等信息准确填写在试题纸和添卷纸上；

2. 请将答案全部填写在本试题纸上；
3. 考试结束，请将试题纸、添卷纸和草稿纸一并交给监考老师。

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评阅教师	得分

## 1. Multiple Choice (30 points, 1.5 points for each question)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

- (1) In the following four descriptions, which one is correct? (C) C
- 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. — X ∞
- (2) In the following options, which does not define in protocol? (D) D
- 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 —
- (3) 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 R1 and R2, 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 )

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

(4) The time required to examine the packet's header and determine where to direct the packet is part of the ( B ).

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

(5) Suppose a web page consists of a base HTML file, 5 JPEG images and a java applet, and also suppose HTTP uses persistent connection without pipelining, the total response time is ( B ).

- A 2RTT    B 8RTT    C 12 RTT    D 14RTT

$$2+5+1$$

(6) Suppose A (with a Web-based e-mail account) sends a message to B (who accesses his mail server using POP3), which application-layer protocol is not used? ( D )

- A HTTP    B SMTP    C POP3    D IMAP

(7) In the four following options, which application is organized as hybrid of C/S and P2P architecture? ( B )

- A E-mail    B OICQ    C File transfer    D Web application

(8) Which one is not defined by an application-layer protocol? ( D )

- A the types of messages exchanged  
B the syntax of various message types  
C the semantics of the fields  
D rules for determining when and how to translate the socket

(9) The default mode of HTTP uses ( C ).

- A non-persistent connection with pipelining  
B non-persistent connection without pipelining  
C persistent connection with pipelining  
D persistent connection without pipelining

(10) In the following four options about web cache, which one is not correct? ( C )

- A A web cache is both a server and a client at the same time.  
B A web cache is purchased and installed by an ISP.  
C A web cache can raise the response time for a client request. X  
D A web cache can reduce traffic on an institution's access link to the Internet.

(11) Which of the following services is not provided by TCP? ( A )

- A Delay guarantees and bandwidth guarantees  
B Reliable data transfers and flow controls  
C Congestion controls  
D In-order data transfers

(12) Which of the following about TCP connection is not correct? ( A )

- A It is a broadcast connection  
C It is a pipelined connection ✓

- B It is a point-to-point connection  
D It is a full duplex connection ✓

(13) There are two 16-bit integers: 1110 0110 0110 0110, 1101 0101 0101 0101. Their checksum is A.

- A 0100010001000011  
C 1111111111111111

1101010101010101

- B 10110110111100  
D 1000000000000000

1011011011110101

(14) Provided RcvBuffer=20,LastByteRcvd=20,LastByteRead=15, then RcvWindow=B.

- A 14      B 15      C 16      D 10

20 - (20-15)

(15) Suppose you receive an IP datagram from one link and check your forwarding table to determine the outgoing link, but this outgoing link has an MTU that is smaller than the length of IP datagram. Which technology will be used? C

- A resend      B. discard      C.fragment      D.none

(16) IP addressing assigns an address to 223.10.198.250/29, the network address for this network is A.

- A.223.10.198.248      B.223.10.198.250      C.223.10.198.0      D.223.10.0.0

223.10.198.1

(17) Datagram networks and virtual-circuit networks differ in \_\_\_\_\_. C

- A Datagram networks are circuit-switched networks, and virtual-circuit networks are packet-switched networks.  
B Datagram networks are packet-switched networks, and virtual-circuit networks are circuit-switched networks.  
C Datagram networks use destination addresses and virtual-circuit networks use VC. Numbers to forward packets toward their destination.  
D Datagram networks use VC. Numbers and virtual-circuit networks use destination addresses to forward packets toward their destination.

1111  
1011  
101010000

(18) Consider CRC error checking approach, the four bit generator G is 1011, and suppose that the data D is 10101010, then the value of R is A.

- A 010      B 100      C 011      D 110

1011  
1100

(19) In the following four descriptions about random access protocol, which one is not correct?

- A In slotted ALOHA, nodes can transmit at random time.  
B In pure ALOHA, if a frame experiences a collision, the node will immediately retransmit it with probability p.

- C The maximum efficiency of a slotted ALOHA is higher than a pure ALOHA.  
D In CSMA/CD, one node listens to the channel before transmitting.

1111  
1110

1011  
1010

(20) In CSMA/CD, the adapter waits some time and then returns to sensing the channel. In the following four times, which one is impossible? D

- A 0 bit times      B 512 bit times      C 1024 bit times      D 1028 bit times

评阅教师	得分

**2. True or False ( 20 points, 2 point for each statement ).**

1	2	3	4	5	6	7	8	9	10

- T (1). Circuit switching networks require signaling and control for establishing circuits.
- F (2). An Internet router connecting N subnetworks requires N-1 IP addresses.
- F (3). Suppose Host A sends to Host B one segment with sequence number 54 and data size is 8 bytes over a TCP connection. In the acknowledgment message that Host B will send in response, the acknowledgment is necessarily 54. **62**
- F (4). The Selective Repeat ARQ protocol is more efficient than the Go-Back-N ARQ protocol.
- F (5). A receiver reduces the advertised window size in response to congestion at routers along the path.
- F (6). CSMA/CD is an appropriate MAC protocol for ad-hoc wireless networks
- F (7). Switches decree the TTL field in the IP header.
- T (8). Ethernet is a LAN so it is placed in the second layer of the OSI reference model.
- F (9). BGP uses a distance vector protocol to improve route stability
- T (10). The Slow - Start algorithm increases a source's rate of transmission faster than "additive increase".

评阅教师	得分

**3. please answer following questions briefly (20 points, 4 points for each question)**

( 1 ) Assume an IP packet carrying an HTTP request is going from a local (i.e.home) area network onto the wider Internet through a NAT router. Name all header fields that the NAT router needs to change in the given packet? Explain your answer.(Hint: encapsulation as well as the syntax/semantics of all involved protocols must be taken into consideration.)

(2) We saw that TCP and UDP provide two very different service models. Suppose that an application wants all of the functionality provided by UDP but only some of the functionality provided by TCP (e.g., the application wants reliable message transfer and flow control, but not congestion control). How would an application get this different service in today's Internet?

(3) Compare IPv4 with IPv6. List the major differences between the two protocols. Briefly explain the design rationale for each difference.

(4) Suppose that we want to change the IP address of gaia.cs.umass.edu from 128.119.40.186 to 128.119.40.187 and change this mapping in the DNS authoritative name server for gaia.cs.umass.edu. Once this mapping is changed in the authoritative name server, will all future references (generated anywhere in the Internet) to gaia.cs.umass.edu then be sent to 128.119.40.187? Explain briefly (in two or three sentences).

(5) What is the key difference between distance-vector and link-state routing protocols in terms of how protocol messages are sent? Give the names of a distance-vector algorithm and protocol. Give the names of a link-state algorithm and protocol.

评阅教师	得分

#### 4. Calculation (14 points).

(1) Consider sending a packet of 3000bits over a path of 5 links. Each link transmits at 1000bps. Queuing delays, propagation delay and processing delay are negligible. (6 points)

① Suppose the network is a packet-switched virtual circuit network. VC setup time is 0.1 seconds. Suppose the sending layers add a total of 500 bits of header to each packet. How long does it take to send the file from source to destination?

② 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?

③ 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?

(2) Suppose a network runs RIP, the routing table in router B shown as below:

Destination network	distance	Next hop
N1	7	A
N2	2	C
N6	8	F
N8	4	E
N9	5	F

Now, router B received D-V vectors from C, shown as below

Destination network	distance
N2	4
N3	8
N6	4
N8	5
N9	3

What is C's new routing table? ( 8 points )

评阅教师	得分

**5. Analytic (16 points).**

Consider the network presented in Figure 1. A MAC address is represented in a short form on 2 bytes (e.g. 44:33). We assume that all devices have been rebooted so that their ARP caches are empty. The routing table of the router is correctly initialized. All hosts are correctly configured with the default router and the DNS server (18.1.3.1). A user executes the following command on pc.mit.edu: pc.mit.edu# ssh www.mit.edu

You monitor all the frames passing through Ethernet switches. Give the chronological sequence of the frames and their contents by filling the table below. Columns correspond to the relevant information of the Ethernet header, the IP header, and other PDUs, e.g. source and destination Ethernet addresses, type of the frame, source and destination IP addresses, protocol, any other detail on the PDU encapsulated in an Ethernet frame or in an IP packet (e.g. ARP, DNS query, TCP segment etc.). Stop after the TCP connection establishment phase. Hint: the number of entries in the table corresponds to the exact number of monitored frames.

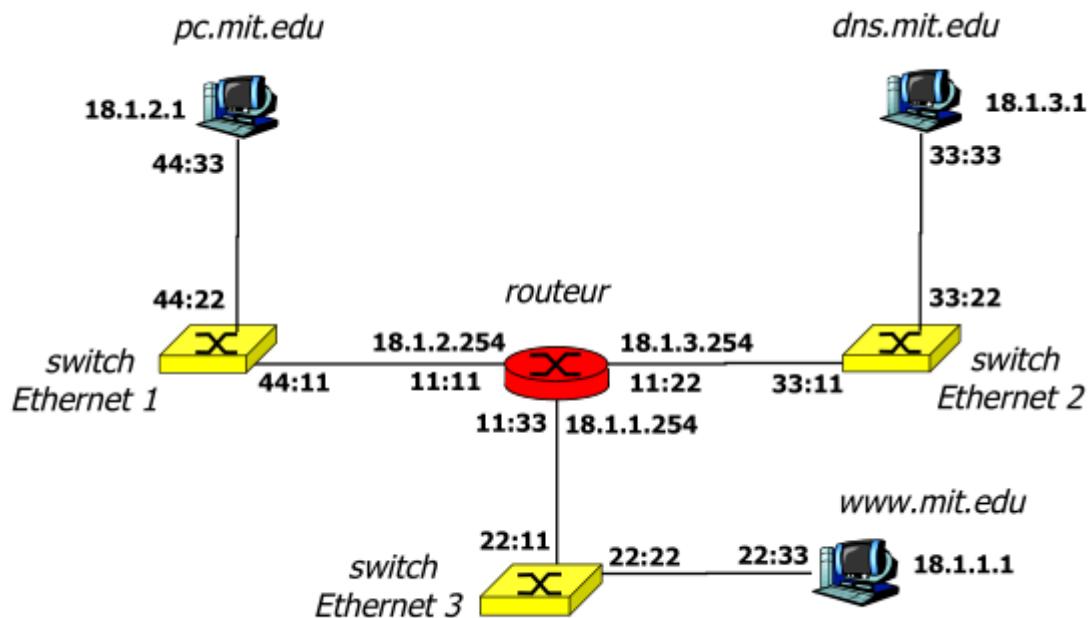


Figure 1: IP network under study

No.	Ethernet header			IP header			Other details
	Adr.src	Adr.dst	type	Adr.scr	Adr.dst	protocol	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							