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东　北　大　学　考　试　试　卷

2017　—2018　学年　第 一 学期

课程名称：Computer Networks（Test 1）

总分	一	二	三	四	五	六	七	八

I. Multiple Choices (20 points, 2 for each)

(　) 1. Services provided by data link layer protocols do not include:
A. framing　B. transparent transmission　C. congestion control　D. error control

(　) 2. Ethernet switches forward packets according to:
A. destination IP address　B. destination port number
C. destination MAC address　D. destination host domain name

(　) 3. According to the mechanism of CSMA/CD protocol, which of the following situation need to increase the shortest length of frames:
A. keep the network transmission rate, and shorten the maximum distance of collision domain.
B. keep the maximum distance of collision domain, and increase the network transmission rate.
C. extend the coverage of network using bridges.
D. increase the number of hosts.

(　) 4. Ethernet switches are:
A. multi-port repeaters at Layer 1.　B. multi-port bridges at Layer 2.
C. multi-port switches at Layer 2.　D. multi-port routers at Layer 3.

(　) 5. The service that Ethernet doesn't provide is:
A. framing　B. reliable delivery　C. error detection　D. medium access

(　) 6. Which of the following is not a component of network protocols:
A. syntax　B. semantics　C. synchronization　D. architecture

(　) 7. The MAC protocol used by 802.11 WLAN is:
A. CSMA/CA　B. CSMA/CD　C. CSMA　D. CDMA

(　) 8. The transmission media below which is not affected by electromagnetic interference is:
A. STP　B. coax　C. fiber　D. UTP

(　) 9. When a host is moved from one network to another, which of the following is correct:
A. Both the IP address and MAC address should be changed.
B. The IP address may be changed, and the MAC address should not be changed.
C. The MAC address must be changed, and the IP address should not be changed.
D. Neither the IP address nor MAC address should be changed.

(　) 10. Concerning 100BASE-T, which of the following is wrong:
A. The transmission rate is 100Mbit/s.
B. The signal is baseband signal.
C. The media takes Type 5 UTP, and the maximum distance is 185m.
D. Both sharing and switching networking approaches are supported.

II. Fill in the Blanks (10 points, 1 for each blank)

1. The MTU of Ethernet is of length_____ bytes.
2. Computer networks take_____ switching approach, while the traditional telephone networks take _____ switching approach.
3. The minimum length of frame transmitted by 802.3 Ethernet is_____ bytes.
4. ARP tables keep the mapping from_____ addresses to _____addresses.
5. In computer networks, the two communication parties must obey some common rules or conventions, which are called_____.
6. From the point that two communication parties exchange information of view, there are three basic ways, i.e. _____, _____, and _____.

III. True or False (10 points, 1 for each)

(　) 1. Ethernet switches can separate collision domains, so it can control broadcast storm.
(　) 2. CSMA/CD protocol can only work in half-duplex mode.
(　) 3. Ethernet provides connectionless, unreliable data transfer.
(　) 4. Twisted-pairs is a kind of transmission media which has broadest bandwidth, least signal transmission attenuation and best anti-jamming capability.
(　) 5. The basic concept of network architecture is layering, and the core is the communication between entities. In order to make the entities commnicatable, they must obey some common regulations, which are protocols.
(　) 6. TCP/IP can be used for communication between different processes on the same host.
(　) 7. Eight broadcast domains are created when you segment a network with an 8-port switch.
(　) 8. The basic principle of ISO network protocol layering is that different nodes have different layers and the same layer of different nodes provides the same functions.
(　) 9. As in Ethernet, access collisions may also happen in token ring networks.
(　) 10. The most commonly used WAN topology is star topology.

IV. Terminology (10 points, 2 for each)

1. ARP

2. CSMA/CD

3. ISP

4. PPP

5. PDU

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V. Comprehensive Questions (25 point)

1. Consider the TCP/IP protocol suite, provide the name of each layer and list the name of protocol data unit corresponding to each layer. (5 points)

2. Consider two nodes A and B on the same Ethernet segment, and suppose the propagation delay between the two nodes is 225 bit times. Suppose at time t=0 both nodes A and B begin to transmit a frame. At what time (in bit times) do they detect the collision? Assuming both nodes transmit a 48-bit jam signal after detecting a collision, at what time (in bit times) do nodes A and B sense an idle channel? How many seconds is this for a 10 Mbps Ethernet? (8 points)

3. Consider delays with multiple links. (12 points)

a. Consider a packet of length L which begins at end system A, travels over one link to a packet switch, and travels from the packet switch over a second link to a destination end system. Let d_i, s_i and R_i denote the length, propagation speed, and transmission rate of link i, for i = 1, 2. The packet switch delays each packet by d_{proc}. Assuming no queuing delays, in terms of d_i, s_i, R_i, (i = 1, 2) and L, what is the total end-to-end delay for the packet? Suppose the packet is 1,000 bytes, the propagation speed on both links is 2.5 * 10^8 m/s the transmission rates of both links is 1 Mbps, the packet switch processing delay is 1 msec, the length of the first link is 4,000 km, and the length of the last link is 1,000 km. For these values, what is the end-to-end delay?

b. Now suppose R_1=R_2=R and d_{proc} = 0.Furthermore, suppose the packet switch does not store-and-forward packets but instead immediately transmits each bit it receives before waiting for the packet to arrive. What is the end-to-end delay?

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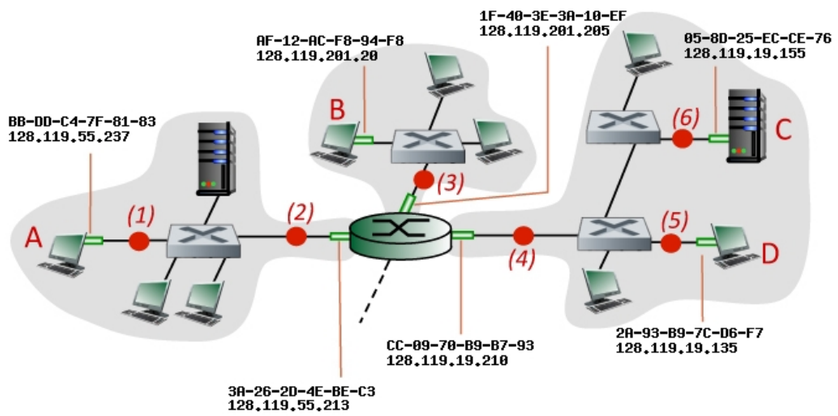
VI. Analysis and Design (25 points)

1. Consider the figure below. The IP and MAC addresses are shown for nodes A, B, C and D, as well as for the router's interfaces. (10 points)



Consider an IP datagram being sent from node **D** to node **A**. Give the source and destination Ethernet addresses, as well as the source and destination addresses of the IP datagram encapsulated within the Ethernet frame at points *(5), (4),(2),* and *(1)* in the figure above.

2. In the data link layer, we studied a number of multiple access protocols, including TDMA, CSMA, slotted Aloha, token passing, etc. (15 points)

a. Suppose you were charged with putting together a large LAN to support IP telephony (only) and that multiple users may want to carry on a phone call at the same time. Recall that IP telephony digitizes and packetizes voice at a constant bit rate when a user is making an IP phone call. How well suited are these four protocols for this scenario? Provide a brief (one sentence) explanation of each answer.

b. Now suppose you were charged with putting together a LAN to support the occasional exchange of data between nodes (in this part of this question, there is no voice traffic). That is, any individual node does not have data to send very often. How well suited are these four protocols for this scenario? Provide a brief (one sentence) explanation of each answer.

c. Now suppose the LAN must support both voice and data and you must choose one of these multiple access strategies in order to support both applications on the same network, with the understanding that voice calls are more important than data. Which would you choose and why? How would voice and data be sent in this scenario? That is, which access protocol would you use, or adapt/modify, and why?