中山大学软件学院 **2010** 级软件工程专业 (2012 学年秋季学期)

《SE-301 计算机网络》期末试题答案(A)

1. (12 points)
   a) Call setup required. Dedicated resources, no sharing. Circuit-like performance. (6 points)
   b) 4n(3 points)
   c) 2n (3 points)
2. (16 points)
   a) (8 points)

The total amount of time to get the IP address is

$$RTT_1 + RTT_2 + \cdots + RTT_n .$$

Once the IP address is known, RTT_O elapses to set up the TCP connection and another RTT_O elapses to request and receive the small object. The total response time is

$$2RTT_o + RTT_1 + RTT_2 + \cdots + RTT_n$$

   b) (4 points) RTT1+...+RTTn+2RTT0+4*2RTT0
   因为使用 4 个 TCP 连接传 4 个 object
   c) (4 points) RTT1+...+RTTn+2RTT0+RTT0
   Persistent HTTP：Subsequent HTTP messages between same client/server sent over open connection
3. (8 points) : (a)true (b)false (c)true (d)false

4. (10 points)
   a) (5 points) It takes 1 RTT to increase CongWin to 6 MSS; 2 RTTs to increase to 7 MSS; 3 RTTs to increase to 8 MSS; 4 RTTs to increase to 9 MSS; 5 RTTs to increase to 10 MSS; and 6 RTTs to increase to 11 MSS.
   b) (5 points) In the first RTT 5 MSS was sent; in the second RTT 6 MSS was sent; in the third RTT 7 MSS was sent; in the fourth RTT 8 MSS was sent; in the fifth RTT, 9 MSS was sent; and in the sixth RTT, 10 MSS was sent. Thus, up to time 6 RTT, 5+6+7+8+9+10 = 45 MSS were sent (and acknowledged). Thus, we can say that the average throughput up to time 6 RTT was (45 MSS)/(6 RTT) = 7.5 MSS/RTT.
5. (16 points)
   a) DV algorithm. see text book. (6 points)
   b) (4 points)

Dest. sub.	Next router	#hops
t	-	16
u	-	1
v	-	1
w	-	1
x	-	16
y	-	16
z	-	16

c) (6 points)

Dest. sub.	Next router	#hops
t	A	2
u	-	1
v	-	1
w	-	1
x	C / E	2
y	-	16
z	E	2

6. (10 points)

The maximum size of data field in each fragment = 680 (because there are 20 bytes IP header). Thus the number of required fragments $= \left\lceil \frac{2400-20}{680} \right\rceil = 4$

Each fragment will have Identification number 422. Each fragment except the last one will be of size 700 bytes (including IP header). The last datagram will be of size 360 bytes (including IP header). The offsets of the 4 fragments will be 0, 85, 170, 255. Each of the first 3 fragments will have flag=1; the last fragment will have flag=0.

7. (16 points)

a) (8 points)

No. E can check the subnet prefix of Host F's IP address, and then learn that F is on the same LAN. Thus, E will not send the packet to the default router R1.

Ethernet frame from E to F:

Source IP = E's IP address

Destination IP = F's IP address

Source MAC = E's MAC address

Destination MAC = F's MAC address

b) (8 points)

Switch S1 will broadcast the Ethernet frame via both its interfaces as the received ARP frame's destination address is a broadcast address. And it learns that A resides on Subnet 1 which is connected to S1 at the interface connecting to Subnet 1. And, S1 will update its forwarding table to include an entry for Host A.

Yes, router R1 also receives this ARP request message, but R1 won't forward the message to Subnet 3.

B won't send ARP query message asking for A's MAC address, as this address can be obtained from A's query message.

Once switch S1 receives B's response message, it will add an entry for host B in its forwarding table, and then drop the received frame as destination host A is on the same interface as host B (i.e., A and B are on the same LAN segment).

8. (12 points)
   a) 6 points: 见书本。关键词：监听、冲突检测、冲突后退让；退让算法需提及：随机、指数级增长的上界。
   b) 6 points: After the 6th collision, the adapter chooses from {0, 1, 2,…, 63}. The probability that it chooses 5 is 1/64. It waits K*512*bit time = 5*512*0.1 ms = 256 microseconds.