TDTS06 Computer networks, January 15, 2010

Sketched answers to the written examination, provided by Juha Takkinen, IDA, juhta@ida.liu.se. ("Sketched" means that you, in addition to the below answers, need to show your calculations, assumptions and justifications.) The answers are given "as is", with no guarantees.

Question 1.

a) Error detection, flow control, congestion control, and reliable delivery

b) Yes, e.g., reliable delivery can be found both in the transport and the link layers.

c) Lan switch: layers 1 and 2. Host: layers 1–5.

Question 2.

a) Processing delay and queueing delay.

b)

i) 500 kbps

ii) 64 s (or 112 s if assuming store-and-forward nodes)

iii) 100 kbps and 320 s (or 416 s if assuming store-and-forward)

Question 3.

a) Http is used by the web browser to display the e-mail inbox contents and to compose a new message. Smtp is used by Alice's ISP to transport the e-mail to Bob's e-mail server. Bob then needs IMAP/POP3 to download and subsequently read his e-mail.

b) Name, type, value, and ttl.

For example: www.gmail.com, A, 74.125.39.18, 3600

Question 4.

a) Yes, it would, because DATA as well as ACK packets can be lost so the timer is required in order to unlock the protocol form the deadlock that would occur when waiting for the ACK for a DATA packet.

b)

i) The ACK no. will be 90.

ii) 300 bytes (all segments)

c) The cw determines the amount of data that a TCP entity can send into the network without it becoming congested.

Question 5.

a)

i) 8 interfaces

ii) 3 forwarding tables (A has a default gateway)

iii) 4 subnets

b)

A: S:128.119.40.186, 80
   D: 138.76.29.7, 5001

B: S: 10.0.0.1, 3345
   D: 128.119.40.186, 80

Question 6.

a) OSPF can divide an AS into areas. There must be at least one backbone area to which other areas are connted via area border routers.

b)

		Cost to				
		u	v	x	y	z
From	v	∞	∞	∞	∞	∞
	x	∞	∞	∞	∞	∞
	z	∞	6	2	∞	0

		Cost to				
		u	v	x	y	z
From	v	1	0	3	∞	6
	x	∞	3	0	3	2
	z	7	6	2	5	0

		Cost to				
		u	v	x	y	z
From	v	1	0	3	3	5
	x	4	3	0	3	2
	z	6	5	2	5	0

Cost to					
		u	v	x	y	z
From	v	1	0	3	3	5
	x	4	3	0	3	2
	z	6	5	2	5	0

Question 7.

a) Assume 802.11b, which consists of stations that communicate using a CSMA/CA-based MAC protocol with an access point (AP). The AP can be connected to a distribution system (another LAN) and have a gateway to the Internet via a router.

b) ARP translates from IP to MAC address. Since the MAC address of the receiver is not known in the query (only the IP address), the ARP query must be broadcast in the link layer.

The response can be sent directly to the querying station because the MAC address of the sender has been given in the ARP query.

c) The maximum value for K after three collisions is extracted from the interval $0–2^m – 1$, where m i the number of collisions. That is, $K = 2^3 – 1 = 7$. The backoff time will be 7 x 512 bit times = 3584 bit times. On a 10-Mbps link this will correspond to 3584 / 10 x 10^6 seconds = 0.3584 ms

Question 8.

a) No, it will not accept it.

SSL puts its own sequence numbers into each SSL record and this sequence number is included in the calculation of the MAC of each record. The receiver B will be tracking the sequence numbers that Alcie is using in her SSL records and will be able to detect wrong ones.

b) Known-plaintext attack, because she will be able to construct the decryption key from it.

c) False. (She must use her own private key.)