Net Centric Systems

Summer Term 2011

http://www.p2p.tu-darmstadt.de/teaching/summer-term-2011/ncs-net-centric-systems/

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Exercise 9

Submit from 27/6/2011 to 1/7/2011 in your exercise group
or until 1/7/2011, 18:00 in moodle (as pdf file).

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Task 9.1: Protocol overhead (8 P.)

In a local network, two clients are connected to a server via Ethernet using the IP v4 protocol. Both clients send an 8400 byte request message to the server. Machine A uses UDP, machine B uses TCP.

Assume the following:

Network MTU[1]:	1500 bytes
Ethernet header size:	38 bytes
IP header size:	20 bytes
TCP header size:	20 bytes
UDP header size:	8 bytes

Traffic from other sources on the network can be neglected.

a) Calculate the number of packets and the protocol overhead (actual data bytes/total bytes sent) (6 P.)
   1) for machine A (UDP),
   2) for machine B (TCP).

b) What packet size causes a particularly large difference (in protocol overhead)? (2 P.)

[1] The MTU is the maximum transfer unit, i.e. the size of the largest chunk of data that can be transferred at once

Task 9.2: UDP (13P.)

A Sender wants to transmit the text “All your base are belong to us!” using a UDP connection. The text will be encoded using UTF-8. The connection is established on port# 7531 (source) and the port# 5533 (destination).

Generate a complete UDP segment as described in the lecture (please describe the necessary intermediate steps briefly). Missing bytes for a 32bit alignment can be padded with zeros.

Please write down your answer in HEX code (NOT binary code!).

Hint: A free Hex editor is available at: http://mh-nexus.de/ ; you may also use online services.

Task 9.3: TCP/Flow control (16 P.)

a) A sender transmits 15 frames to a receiver (sequence number 1 – 15) using the sliding window method. The parties have agreed on a window size of 5. Frames are acknowledged by adding the corresponding sequence number to the ACK messages (each frames is acknowledged individually). The time to transmit one frame (as well as one ACK) is defined as 1. Sending and receiving of frames generally has higher priority than producing or receiving ACKs. One station cannot send and receive at the same time.

   Complete the following table, assuming all frames are transmitted correctly and without errors.

t	Sender Window	Frame(s) Ready	Sender Sending	Sender Receiving	Receiver Receiving	Receiver Sending	Receiver Window
0	0 – 0	-	-	-	-	-	0 – 5
1	0 – 1	F1	F1	-	-	-	0 – 5
2	0 – 1	-	-	-	F1	-	1 – 6
3	0 – 2	F2	F2	-	-	ACK1	1 – 6
4	0 – 3	F3					
5		F4, F5					
6		-					
7		-					
8		F6, F7					
9		-					
10		-					
11		F8					
12		-					
13		-					
14		-					
15		-					
16		-					
17		-					
18		-					
19		-					
20		-					