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Communication Systems Group (CSG)

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Exercises in PMMC

Exercise 10

Hand out date: Wednesday Nov 30, 2016
Submission until and discussion: Dec 7, 2016 9:45

1) Various

1.1) Tick a cell, if the characteristic in the top row of the respective column is a characteristic of the peering structure in the left most column of the respective row.

Peering Structure	Scales with the number of connected ISPs	Selective Peering
Fully Meshed		
Exchange Router		
Exchange Switch		

1.2) A 50 MBit/s network link needs to be shared by five customers of an ISP. Each of them requests a network connection and has a priority/weight according to the table below. Distribute the available bandwidth to these customers according to the "max-min fairness" algorithm. Show each step of your solution.

Client	c_1	c_2	c_3	c_4
Requested Bandwidth	20	10	16	14
Weight	2	3	7	13

1.3) Tick a cell, if the delay type of the respective row depends on the attribute of the respective column.

	Packet Size	Network Load	Protocol
Queuing Delay			
Processing Delay			
Transmission Delay			
Propagation Delay			

1.4) Assume two people communicate over a VoIP connection over a network with a propagation delay of 100 ms. The packet loss probability of the network is 1% but the network has no other deficiencies, i.e., the network neither corrupts packets nor does it suffer from congestion. Also, assume that the devices used by the people used are reasonably fast, i.e., (i) none of these devices needs to perform flow control in order to not overload the other and (ii) the processing delay caused by TCP's flow-, congestion-, and error control mechanisms is so small that it cannot be noticed.
What is the main reason that the experienced QoS will be higher, if UDP instead of TCP is used for the VoIP connection?

a) TCP's error correction mechanism is unneccessary and causes too much delay in the devices used.
b) TCP's error congestion control mechanism is unneccessary and causes too much delay in the devices used
c) TCP's flow control mechanism is unneccessary and causes too much delay in the devices used
d) TCP's retransmission of lost packets causes all subsequent packets to be delayed, until the packet loss is detected and the lost packet successfully retransmitted.

1.5) Assume that a PPPoA (PPP over ATM/AAL5) packet of x>0 Byte has to be send and that the underlying ATM layer adds 8 Byte of overhead. Define a formula in dependency on x that calculates the number of padding bytes p that will be included in the last cell that transports the packet.