

Uppsala Universitet

Avd. för Datorteknik (DoCS)

Omtenta

Augusti 2001

DatorSystem II (del 1)

Datakommunikation

INSTRUCTIONS TO CANDIDATES

- This is a FIVE (5) hour examination
- Answer all questions
- All questions to be answered in English or Swedish.
- Dictionaries are Permitted
- Marks total 50.
- Grade allocation, 30–36 = 3, 37–43= 4, 44–50= 5.

Question 1

a. What basic facilities and guarantees does the IP protocol provide to the transport layer? Discuss in a few sentences how TCP and UDP build on these basic facilities, and what extra services TCP and UDP provide to applications in comparison to IP.

[5]

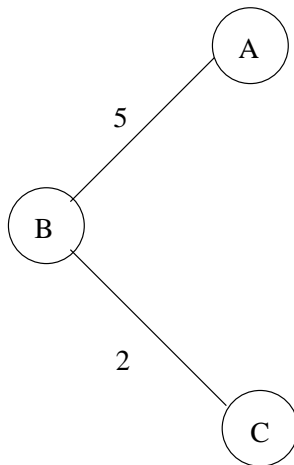
b. Draw a diagram of a protocol stack and discuss why layering is important.

[4]

c. What is framing? Why is it used? What is bit or byte stuffing and why is it used when sending data in frames?

[6]

Question 2



	A	B	C
A		5 A	7 B
B	5 B		2 B
C	7 B	2 C	

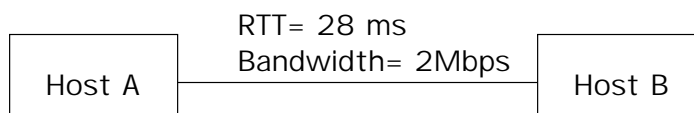
Describe how distance vector routing works and given the example network and stable routing table shown in the picture above compute the routing table contents at the next three (3) update cycles after the link between B and C fails. Assume that routing vectors are exchanged synchronously between the nodes that can communicate. Thus the routing table at cycle X+1 is based on the data in the routing table for cycle X.

Explain the significance of the changes that you observe in the routing tables for traffic destined for node C.

[6]

Question 3

Assume two hosts are connected by a wireless communication link as shown below. Assume that host A is sending data frames that are 1K bytes to host B over the link.



Give the formula for the capacity of the communication pipeline between hosts A and B. [1]

Calculate the capacity of the pipeline using the formula that you gave above. [2]

If the communication over the link depicted here is managed using the "stop and wait" protocol what is the efficiency of the data transfer over the link as a fraction or percentage of total capacity? Explain the reasoning that leads to your answer. Just giving a fraction or percentage gains **ZERO POINTS**

Assume no packets are lost when computing your answer to this question. [3]

Windowing must be added to the stop and wait protocol to allow 100% utilization of the link between A and B. What window size is needed? [2]

Comment on the number of sequence numbers that might be needed in the situation where the sending and receiving window sizes are equal. [2]

Question 4

Describe the physical structure of optical fibre cables for data transmission and the common methods of joining optical fibre cables. What sorts of signal loss are associated with the types of joining techniques you have described? [4]

Question 5

Draw a diagram that describes a method used to implement mobile IP using home and foreign agents. Explain the stages required in order for the network to setup a direct connection between two mobile hosts that are not at home. [9]

Question 6

A firewall can be constructed using two routers, one on either side of an application gateway. Describe how each of the routers and the application gateway function to protect a local network, and the hosts on that network.

[3]

List three factors that can compromise firewall security and indicate how they affect the security of the internal network.

[3]