HELSINKI UNIVERSITY OF TECHNOLOGY
Networking Laboratory
S-38.188 Computer Networks, Spring 2002

Examination
10.05.2002
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Write on each paper
– S-38.188 Computer Networks, Examination 10.05.2002
– your student identification number
– your name
– signature

Write ypur solutions to problems 1–3 and 4–7 on separate answer sheets. Label the sheets (A and B).

1. Explain briefly:(3p)
   (a) MCAW
   (b) TTL
   (c) DHCP
2. IP forwarding and ARP
   (a) How does IP packet forwarding work in routers? Discuss differences between IP routers and LAN bridges? (3p)
   (b) What is the role of ARP? Why do we need ATMARP? (3p)
3. Internet routing: What are the two primary classes of intra-domain routing algorithms? Briefly explain the main idea(s) in these methods and their respective differences. Give examples of actual protocol implementations of these algorithms. (3p)

Write your answers on problems 4–7 on a separate answer sheet (label as B sheet)!

4. Explain briefly:(3p)
   (a) IPSEC
   (b) public key cryptography
   (c) SCTP
5. Discuss the resource allocation in computer networks. In what parts of the network it can be done and how? (3p)
6. (a) Compare the requirements that so called traditional and multimedia applications pose on the computer network. (3p)
   (b) What are the two philosophies/approaches that can be applied to meet the quality of service demands of, say, multimedia applications? Compare these two approaches. (3p)
7. Assume that a TCP sender always has segments to send. ACKs are sent by the receiver immediately after receiving a segment. Assume that the TCP connection has an initial window size of 1 segment and an RTT of 200 ms. Assume that segments number 15, 30 and 52 are lost and must be retransmitted. Study and compare what happens during the first 16 RTTs. Sketch what happens (congestion window and packets transmitted) when (6p)
   (a) the TCP sender uses a slow start/congestion avoidance TCP algorithm and a timeout value of 400 ms. Exponential backoff is also in use.
   (b) the TCP algorithm used is an ideal additive increase multiplicative decrease algorithm, where the congestion window is increased by one segment every RTT and halved upon loss of packet(s). Assume a perfect timeout mechanism detecting a loss exactly 1 RTT after transmission.