HELSINKI UNIVERSITY OF TECHNOLOGY
Communications Laboratory

S-72.1130 Telecommunication Systems

Exam 7.3.2006

1. ***Answer the following questions "true(/yes)" or "false(/no)" (correct answer: 1p, wrong answer: -1p, no answer: 0p):***

   a) 802.2 LLC's connection oriented service supports uni- and multicasting.
   b) Ethernet's access protocol follows token bus – principle.
   c) HDLC-protocol takes care of routing.
   d) In contrast to MPLS, Diff Serv-principle follows hop-by-hop based routing.
   e) Triple-play (or III Play) refers to the service combination of VoIP+Internet+DVB-H.
   f) Up to 64 E1 signals can be carried in a single STM-1 system.
   g) Common channel signalling can be used for signalling to/from a database.
   h) The OSI Transport layer takes care of end-to-end flow and error control.
   i) MSISDN numbers are based on the ITU E.164 numbering plan.
   j) Message Transfer Part (MTP) level 3 takes care of user-to-network signalling.

2. ***Please answer the following questions using <u>not more than 40 words</u> per topic (subsequent words will be disregarded) and/or a figure: (2.5 p each)***

   a) List the six steps in developing of ISO standard from first proposal to actual publication standard.
   b) List the basic services of IEEE 802.2 LLC standard.
   c) List the physical level options of 802.11 standard.
   d) What is meant by packet encapsulation?

3. ***Please answer the following questions using <u>not more than 40 words</u> per topic (subsequent words will be disregarded) and/or a figure: (2.5 p each)***

   a) What is meant by "regulatory use of voluntary standards"?
   b) Why guard interval is used in DMT?
   c) List the functions of Line Interface Circuit.
   d) List the functionalities of Digital Circuit Multiplexing Equipment.

4. ***Please answer the following questions using <u>not more than 40 words</u> per topic (subsequent words will be disregarded) and/or a figure: (5 p each)***

   a) Explain the concepts handover, random access, paging, location updating, cell, and location area in a mobile network.
   b) Describe the basic architecture of the core network part of a mobile network (the description should include both the circuit-switched and packet-switched core network).

5. ***Please answer the following questions using <u>not more than 40 words</u> per topic (subsequent words will be disregarded) and/or a figure: (2.5 p each)***

   a) What does Network Address Translation (NAT) mean? (Where & why it is used and how it works?)
   b) Where and why is RTP (Real Time Protocol) being used?
   c) Explain the main difference between the protocols HTTP and SIP.
   d) What does MPLS (MultiProtocol Label Switching) mean?