

## Homework #1

**(Due on 12:00am, Thursday, Nov. 4h, 2010)**

1. In the Internet, what are the five layers, from top to bottom, in the Internet protocol stack? Till which layer does a switch process? Please make sure you understand the concept of layering and also think about advantages and disadvantages of layering.
2. A protocol defines the format and order of messages exchanged between two or more communication entities, as well as the actions taken on the transmission and/or receipt of a message or other event. Using the service “FTP over the Internet using TCP/IP and Ethernet”, please describe the protocols for downloading a file from B. Please note that the description is on a very high level. (FTP: RFC 959)
3. Circuit switching versus packet switching: Assume all traffic sources to be bursty: what switching technology is preferable? What are the advantages of the other technique?
4. How long does it take to transmit a packet of length  $L$  bytes over a link of distance  $d$  km, propagation speed  $P$  m/s, and transmission rate  $T$  Mbps? Does this delay depend on the propagation speed of the link? Please calculate an example using  $L=4kB$ ,  $d=1.500km$ ,  $P=2.5*/s$ ,  $R=1MBit/s$ .
5. Please install Wireshark <http://www.wireshark.org/> on your PC and observe a bit what's going on if you listen to your network port. In the “filter” field just type http. It should get green. Browse to a website and observe the high level traffic.