



12th Assignment: Network Protocols and Architectures WS 07/08

Question 1: (8 + 8 + 8 + 8 = 32 points) *Packet Delays and Link Layer*

- What is the difference between end-to-end delay and packet jitter? What are the causes of packet jitter?
- Why is a packet that is received after its scheduled playout time considered lost?
- Are the TCP receive buffer and the media player's client buffer the same thing? If not, how do they interact? If yes, what are the implications?
- Suppose we send two IP packets, each carrying a different UDP segment, into the Internet. The first packet has source IP address A1, destination IP address B, source port P1, and destination port T. The second packet has source IP address A2, destination IP address B, source port P2, and destination port T. Suppose that A1 is different from A2 and P1 is different from P2. Assuming that both packets reach their final destination, will the two UDP segments be received by the same socket? Why or why not?

Question 2: (5 + 5 + 5 + 5 = 20 points) *Multimedia Streaming*

State true or false. Justify your answer.

- If a stored video is streamed directly from a Web server to a media player, then the application is using TCP as the underlying transport protocol.
- When using RTP, it is possible for a sender to change the encoding in the middle of a session.
- All applications that use RTP must use port 87.
- The popular website YouTube uses RTP to transfer multimedia content to the users.

Question 3: (16 + 16 + 16 = 48 points)

Discuss these questions in detail.

- Give your opinion whether it is better to stream stored audio/video on top of TCP or UDP?
- If all the links in the Internet were to provide the reliable delivery service, would the TCP reliable delivery service be completely redundant? Why or why not?
- What are some of the possible services that a link-layer protocol can offer to the network layer? Which of these link-layer services have corresponding services in IP? In TCP?

Due Date: Wednesday, January, 30rd 2008, 10:05 a. m. s. t. on paper in the lecture. (Look out for the solution box!) Or in our postbox in the Telefunkenbuilding at latest 09:50 a. m. s. t.

Please ensure to put your name, student ID number (Matrikelnummer) and the name of your tutor on your solution.