



3rd Assignment: Network Protocols and Architectures WS 07/08

Question 1: (15+15=30 points) *Networking Concepts*

- FTP is said to send control information “out-of-band”, why? Discuss the advantages and disadvantages of doing so.
- Compare the concept of “stateless service” against “stateful service” in the context of FTP and HTTP. Which of the protocols is stateless, which is stateful? What are the advantages and disadvantages of the concepts?

Question 2: (30 points) *Peer-to-Peer (P2P)*

Suppose you are downloading MP3s using some P2P file-sharing system. The bottleneck is your residential access link, which is a 1 Mbit/s full-duplex link. While you are downloading MP3s, all of a sudden 10 other users start uploading MP3s from your computer. Assuming that your computer is very powerful, and all of these downloads and uploads are not putting any strain on your computer (CPU, disk I/O, and so on), will the simultaneous uploads—which are also passing through your bottleneck link—slow down your downloads? Why or why not? Also answer the same question for when you have 1 Mbit/s upstream and 4 Mbit/s downstream as part of an ADSL connection.

Question 3: (7+7+10+7+9=40 points) *Review: Application Layer*

- List three nonproprietary Internet applications and the application-layer protocols that they use.
- In what way is instant messaging a hybrid of client-server and Peer-to-Peer architectures?
- For a communication session between a pair of processes, the roles of client and server is defined as follows: The process that initiates the communication (that is, initially contacts the other process at the beginning of the session) is labeled as the client. The process that waits to be contacted to begin the session is the server.

Alternative definitions might be:

- The server is the one that sends more bytes.
- The server is always up.

Give an example why these do not work.

- Suppose there are N active peers in the Gnutella network, and each pair of peers has an active connection. Additionally, suppose that these connections pass through a total of M routers. How many nodes and edges are there in the corresponding Gnutella overlay network?
- What information is used by a process running on one host to identify a process running on another host? (Hint: there are three relevant parts.) Explain why each of them is required.

Due Date: Wednesday, November, 14th 2007, 10:05 a. m. s. t. on paper in the lecture. (Look out for solutions boxes!)

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