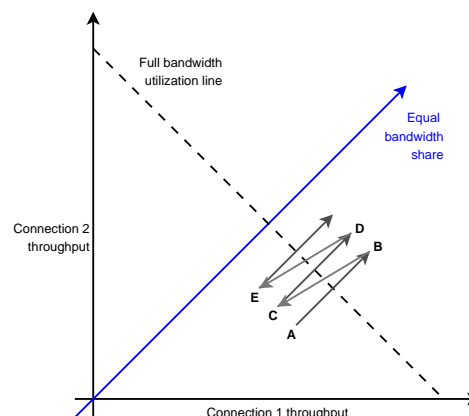


## 11th Assignment: Network Protocols and Architectures, WS 11/12

### Question 1: (30 points) Resource Allocation / Fairness of TCP: AIMD vs. AIAD

Refer to the figure on the right which illustrates the convergence of TCP's additive-increase, multiplicative-decrease (AIMD) algorithm. The figure shows the throughput by the two TCP connections 1 and 2. Suppose that instead of a multiplicative-decrease TCP decreases the window size by a constant amount. Would the resulting additive-increase, additive-decrease converge to an equal share algorithm? Justify your answer using a diagram similar to the figure on the right.



### Question 2: (20 + 10 + 10 = 40 points) Interaction of Layers

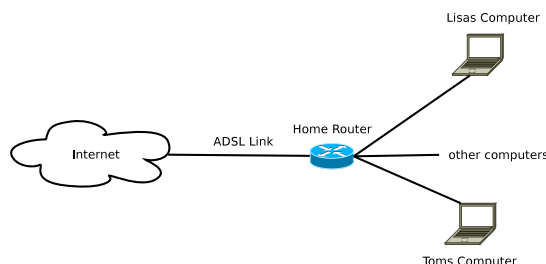


Figure 1: Topology

Assume a student flat where a single DSL line is shared by multiple computers. The bottleneck is the full-duplex, symmetric DSL line having a bandwidth of 1 Mbit/s. Lisa is downloading a large file from the Internet via HTTP. All of a sudden, the DSL uplink is fully utilized by 10 other users uploading large files to the Internet. Assuming that all computers are very powerful, and all of the downloads and uploads are not putting any strain on any computer (CPU, disk I/O, and so on).

- Will the simultaneous uploads slow down Lisas downloads? Why or why not? Justify your answer!
- How does your answer change when you have 1 Mbit/s upstream and 4 Mbit/s downstream as part of an ADSL connection. Discuss your thoughts.
- How could QoS help in this situation? How would you design a simple QoS scheme that would help in this situation? (Hint: you don't need to consider complex approaches such as IntServ or DiffServ.)

**Question 3:** (10 + 10 + 10 = 30 points) *QoS in the Internet*

Assume a Voice-over-IP telephone call over the Internet.

- (a) Assume the call's data transfer stays within a single AS. Describe briefly how Quality of Service (QoS) can be enabled for this call.
- (b) Assume that the data transfer of the VoIP call spans over multiple ASes now. How can QoS be implemented?
- (c) A QoS-enabled Internet does not yet exist. Briefly discuss difficulties in establishing an Internet-wide QoS.

**Due Date: Thursday, January, 26th 2012 only until 13:55 h s. t.**

- **As PDF files (no MS Office or OpenOffice files):** Uploaded via ISIS (<https://www.isis.tu-berlin.de/course/view.php?id=5258>)
- **On paper:** Postbox in the Telefunkenhochhaus (basement, behind the doorman right)
- Put your name, StudentID number (Matrikelnummer) **and** the name of your tutor on your solution.