TECHNISCHE UNIVERSITÄT BERLIN
Fakultät IV – Elektrotechnik und Informatik
Fachgebiet Intelligente Netze
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11th Assignment: Network Protocols and Architectures WS 10/11

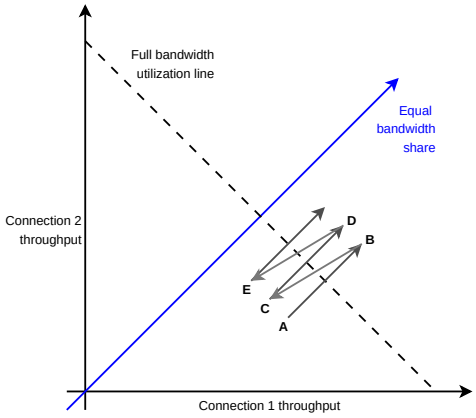
Question 1: (10 + 20 = 30 points) *Communication Principles: Unicast, Multicast, Broadcast, Anycast*

(a) First understand the differences between unicast, multicast, broadcast and anycast. Draw a topology for each variant with a small fictional network containing potential sender and receiver nodes.

(b) Where are these four variants most used in practice? Give one example application per variant and constitute why the other principles are not suitable for this scenario.

Question 2: (20 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 3: (30 points) *Design for Scale: Distributed vs. Centralized Systems*

Discuss the advantages and disadvantages of a centralized vs. a distributed system. Consider on one hand the case of a centralized system that hosts HTTP servers in a single location and on the other hand a distribution of servers in a CDN network.

Question 4: (20 points) *Design Philosophy*

If the links in the Internet are reliable, would the TCPs mechanism for reliable delivery service be completely redundant? Discuss your answer!

Due Date: Thursday, January, 27th 2011 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=3584`)
- **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.