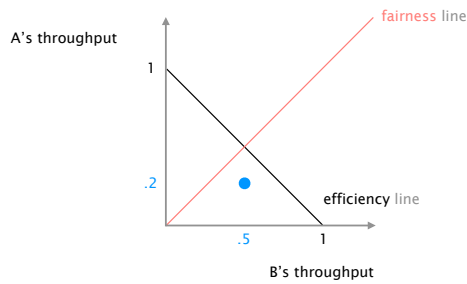


Communication Networks

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Exercise 7 - Congestion Control

7.1 Fairness



Are you getting a fair share?

Consider the situation in which two hosts, A and B, are concurrently using a 1 Mbps link with a Maximum Segment Size (MSS) of 100 kb.

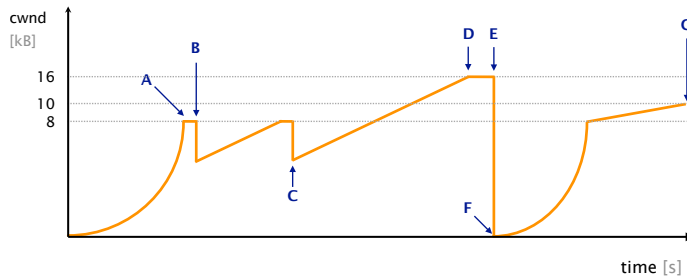
Assuming that B starts with 500 kbps and A with 200 kbps (see left picture). Describe the evolution of the throughput of the two hosts when:

- a) A and B rely on Additive Increase Multiplicate Decrease (AIMD).
- b) A and B rely on Multiplicative Increase Additive Decrease (MIAD).

Assume now that only A is malicious, and wants to cheat congestion control to get more throughput. Describe two distinct ways A could do so and what would be the net effect on B's throughput.

7.2 Congestion Window

Consider the following plot which depicts the evolution of the size of the TCP congestion window of the sender.



What kind of network conditions is this flow seeing?

Describe briefly:

- What happens at point B?
- Does the event happening at point B require the network to discard packets? Why or why not?
- What happens at point E?
- Does the event happening at point E require the network to discard packets? Why or why not?

Consider that the Maximum Segment Size (MSS) of the connection is 1 kB and the Round-Trip Time (RTT) between the two end points is 100 milliseconds. The sender opens the connection at time $t = 0$. Transmission delay in this network is negligible, so you should only consider the propagation delay in the following.

- How much time has elapsed at point A?
- How much time has elapsed *between* point C and D?
- How much time has elapsed *between* point F and point G?

Briefly explain how come point D is higher than point B. Would you expect this to happen often?