TCP + BUFFERING INTERACTIONS and INTUITIONS

This is primarily a test of your TCP and queuing intuitions. While it is possible to calculate these numbers, merely being within +/- 10% will suffice for a correct answer. Guesses are *required*, but should be marked with a “G” to indicate you did that.

For reference, a 1500 byte data packet takes 13ms to transmit at 1Mbit/sec. An ack packet takes 1ms (for purposes of this test), and is sent once in the opposite direction every other data packet.

The network topology consists of a server connected to a switch at 10Gbit, an output port from that switch running at 1Gbit, with 30MBytes of output buffering, connected to another switch also running at 1Gbit with 30Mbytes of output buffering – managed either by a FIFO or by FQ_Codel.

SERVER → 10Gbit → SWITCH → 1GBIT → SWITCH – 10Gbit → clients A,B,C

You can assume an infinite SSTHRESH, an initial window of 10 (IW10), and a reno-like TCP congestion control algorithm.

Question	FIFO	FQ_CODEL
1) Client A starts a download from Server A. How long will it take until the first packet is dropped?		
2) After Client A has been downloading for long enough to have that first drop, Client B also starts a download from Server A. How long will it take before the two clients are getting a roughly equal share of the network?		
3) Client B kills its download, Client C starts an upload. After Client C has been uploading for long enough to have its first drop, how long will it take for client B, after starting a fresh connection, before it gets a roughly equal share of the network?		
4) After that, what is the average latency experienced by a packet in any flow?		
5) With a 10Mbit link between the two links, instead of 1Gbit, and the same amount of buffering, client A starts a new download and runs until the first drop, then client B starts a new download. How long will it take before client B can get roughly equal share of the network from client A?		
How confident are you that you are right?		

If you are willing to be called on, please put your name here: _____

Please feel free to explain your answers below.