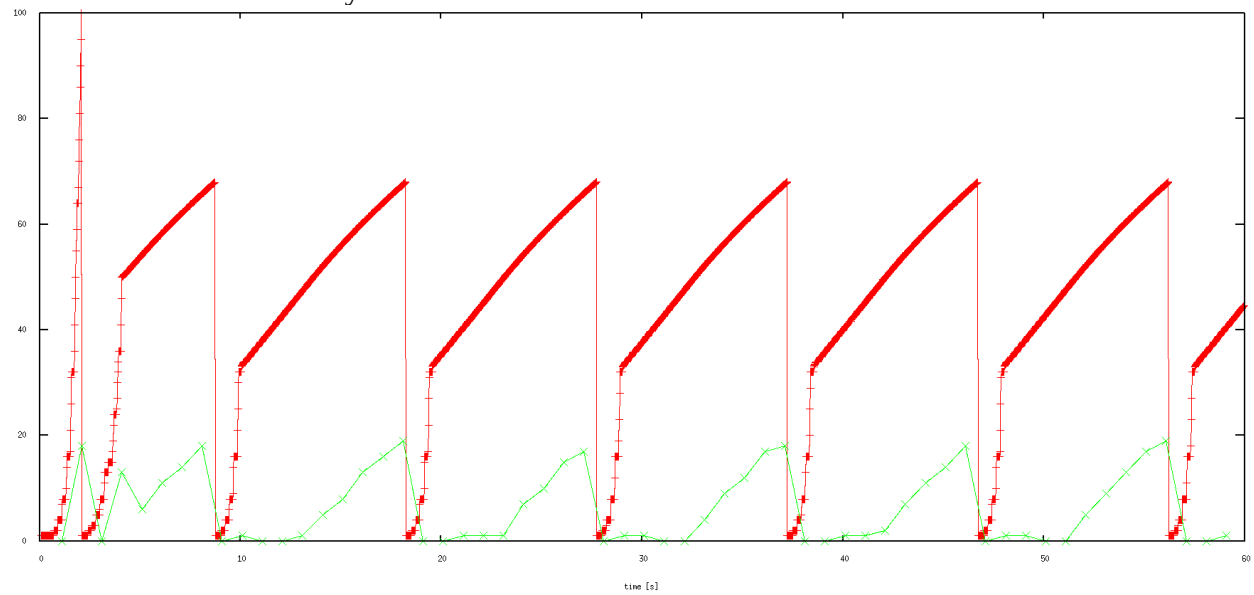
Z5115499 – Lab 5

Exercise 1

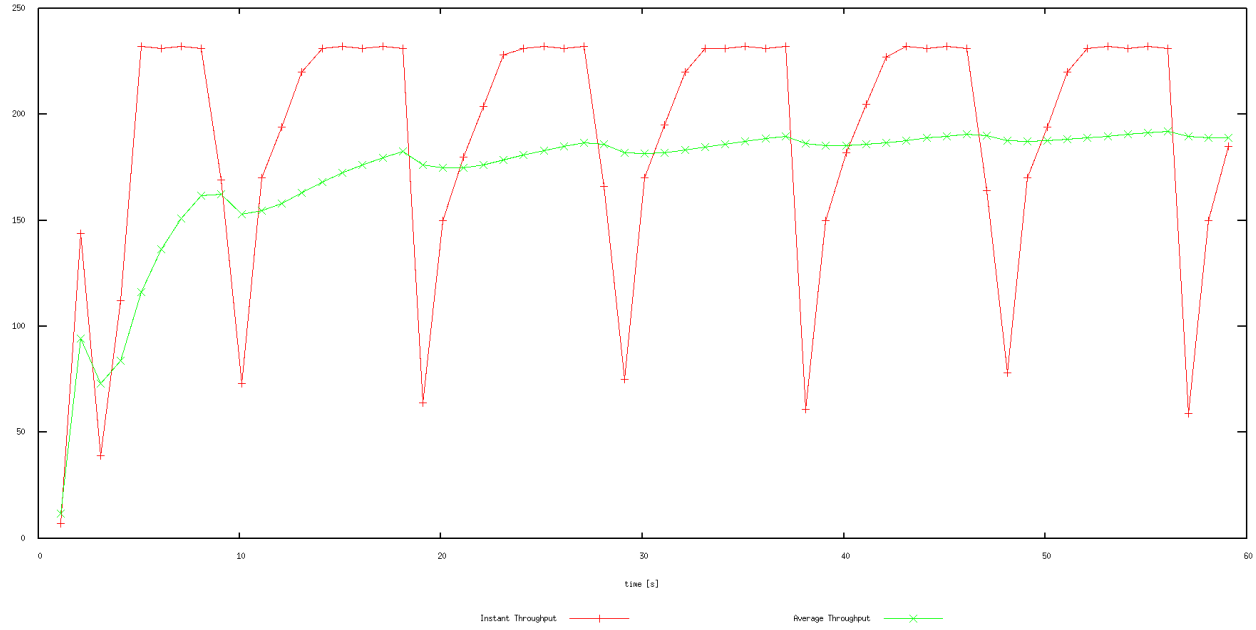
Q1

Maximum size of the congestion window is that the TCP flow reaches is 100 packets. There was either a timeout or a triple ack received. When this happens, the threshold/congestion window is set to half (50 packets). Up until the threshold we have a slow start phase (but increase exponentially) – after that we increase linearly.



Q2

Average throughput is 190 packets per second or 150*540bytes = 102.6K bytes per second (500+20+20) 20 bytes for ip and another 20 for TCP headers.

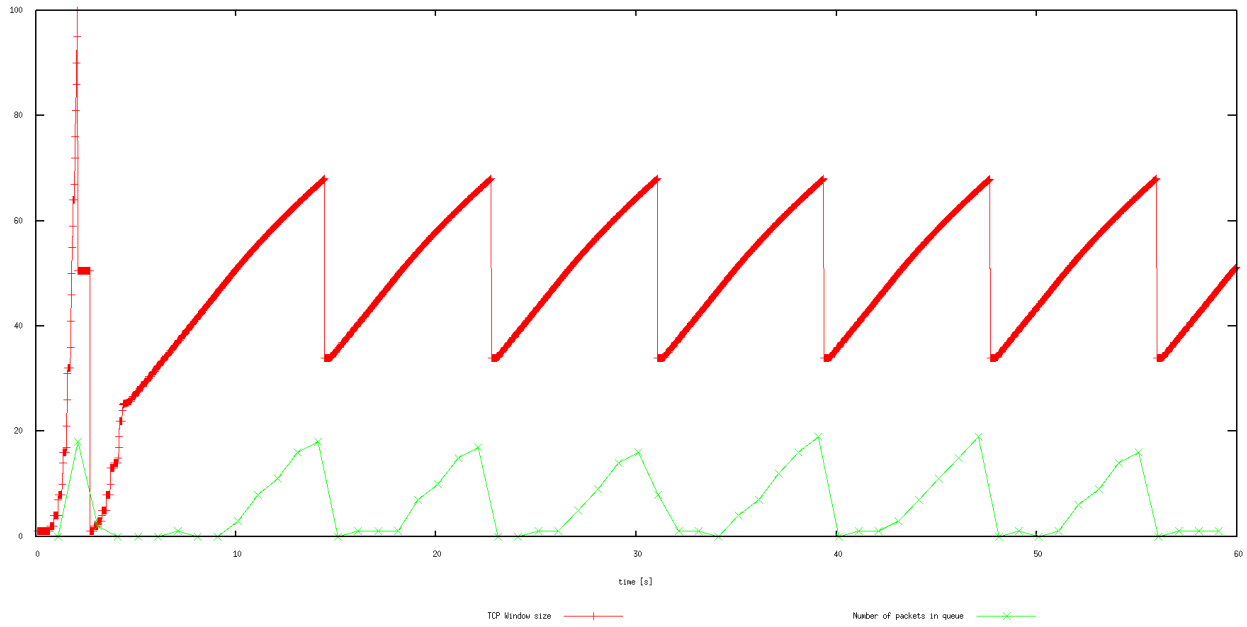


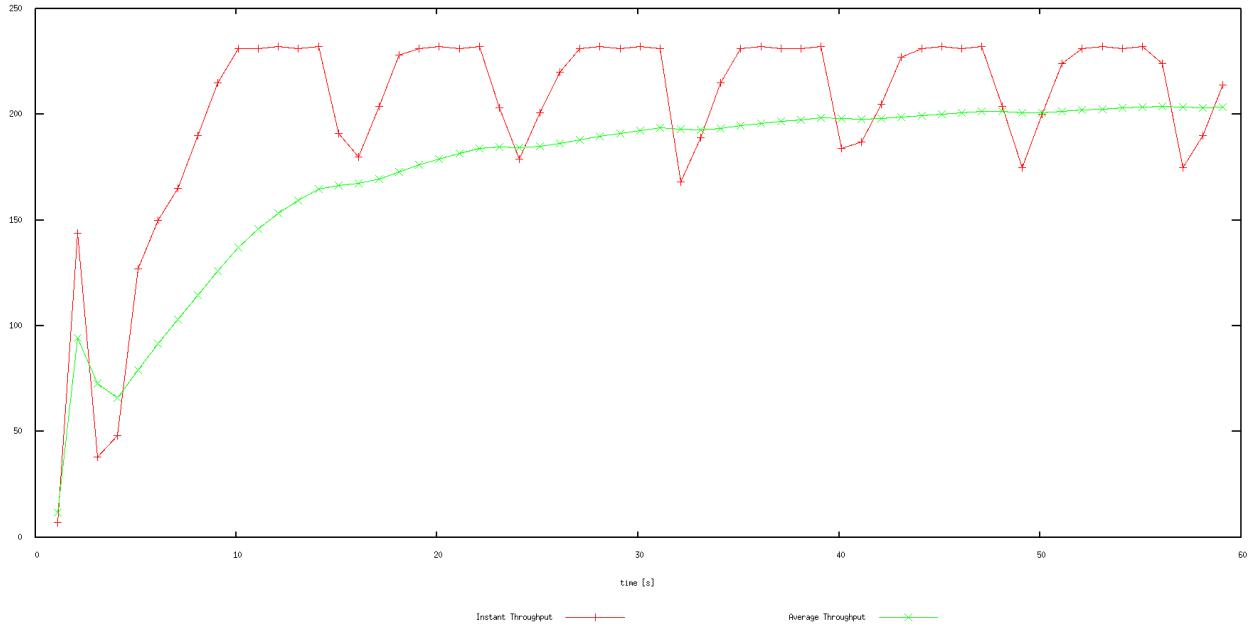
Q3

Maximum size window without oscillating is 66.

The average throughput is 212 packets or 212*540*8 = 915.8K bits per second → this is almost at the capacity of the link. (It pretty much uses the entire capacity of the link

Q4 (from exercise 1 continued)
Reno will have higher average throughput. Reno's congestion window will only go to zero once.
Reno graphs:





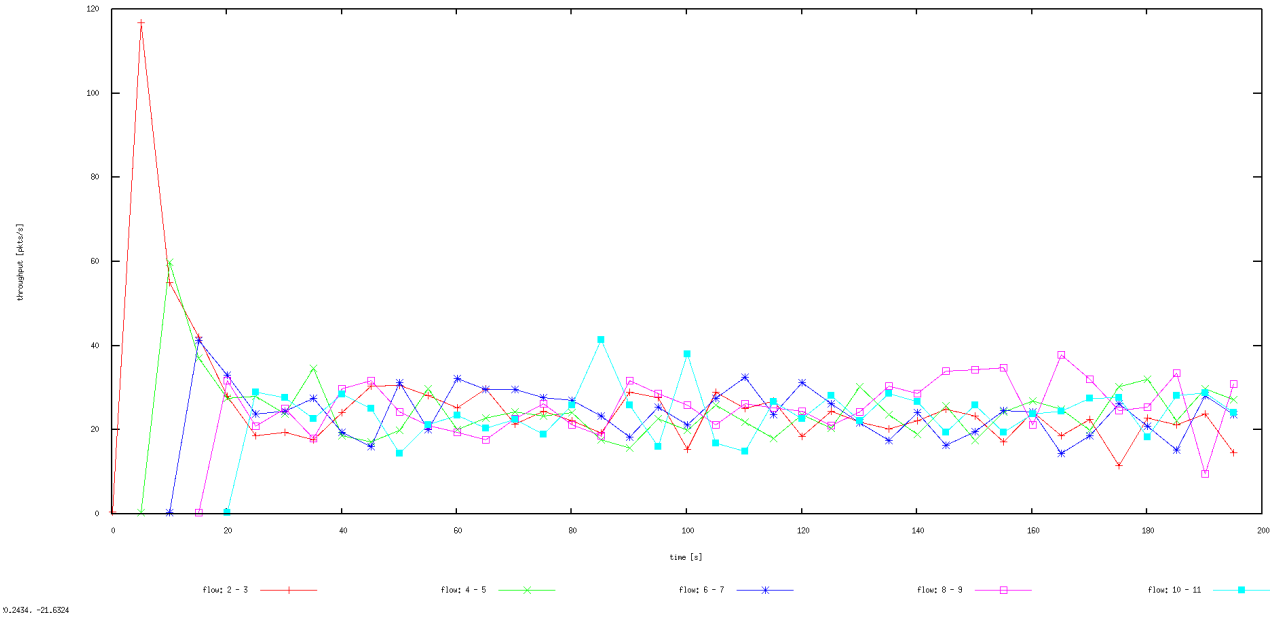
Exercise 2

Q1

Each flow roughly gets an equal share of the capacity of the common link. This is because the highest TCP flow is halved when a new TCP flow enters the common link. It is fair once they all start sending packets.

Q2

Each time a new connection comes in, throughput drops (roughly by half). This is similar to a timeout and halves the congestion window. This is fair for all TCP connections.



Exercise 3
Q1
I expect the UDP will flood the link as much as possible while TCP will be using little bandwidth.

Q2
UDP has a higher flow than TCP – This is because UDP does not have a congestion control like TCP – TCP needs to check if the packets has been received by the remote end (by receiving an ack). UDP does not care if the remote end received the packet or not.

Q3
Advantages of using UDP:
- less delay when transferring the file.

Disadvantages of using UDP:
- No guarantee that the file was transfer over successfully.

If everyone used UDP – then the link will always be flooded – and likely no one will get their packets.