

1) The first 10 congestion windows:

For port 43498 is [8, 9, 10, 11, 12, 13, 14, 13, 12, 11]

It has to be estimated from the sender side

Initial congestion window size is 8

As we can see, the congestion window size grows initially but then later on it decreases.

For port 43500 is [10, 11, 10, 13, 14, 13, 12, 14, 15, 14]

It has to be estimated from the sender side

Initial congestion window size is 10

As we can see, the congestion window size grows initially but then later on it decreases and then increases

For port 43502 is [10, 11, 10, 9, 8, 7, 6, 5, 4, 3]

It has to be estimated from the sender side

Initial congestion window size is 10

As we can see, the congestion window size decreases gradually

To calculate the congestion window sizes, I have first stored all the seq numbers of the packets departing from different ports and also the ack numbers of all the packets arriving at different ports. Then whenever I receive the an acknowledgement to a port, I subtract the length of ack numbers list from the length of seq numbers list for that corresponding port and I keep on storing the first ten values in a list.

2) Triple Duplicate ack for 43498 is 2

Retransmission due to time out for 43498 is 1

Triple Duplicate ack for 43500 is 36

Retransmission due to time out for 43500 is 59

Triple Duplicate ack for 43502 is 0

Retransmission due to time out for 43502 is 1

To calculate the above, first I have calculated the number of times a particular seq number occurs in the seq list and stored their counts in a separate dictionary and now if the count of any sequence is greater than 1, I put those numbers in a separate list. Now I calculate the counts of each ack numbers and store them in a different dictionary. Now I iterate over the previously stored list and check if the count of those sequences is ≥ 3 and if it is then I increment the count of triple duplicate ack else i increment the count of retransmitted due to timeout.