CS3205: Introduction to Computer Networks
Simulation of the TCP Congestion Control Algorithm

T.Bhanu Shashank ,CS19B043

Introduction:

TCP is a protocol that is used to transmit information from one computer on the internet to another.For every segment of data that is sent from sender to receiver, receiver sends an “acknowledgement” segment back to sender indicating that it got that message.It Functions using congestion window which limits the flow of data using parameters ki,km,kn,kf,Ps.

Factors influence the CW change over the duration of the session.

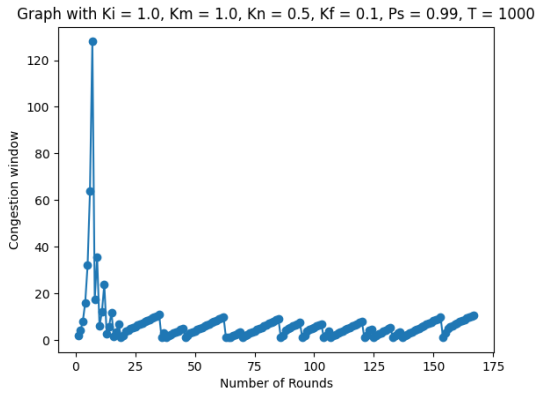
Ki : initial congestion window(CW)

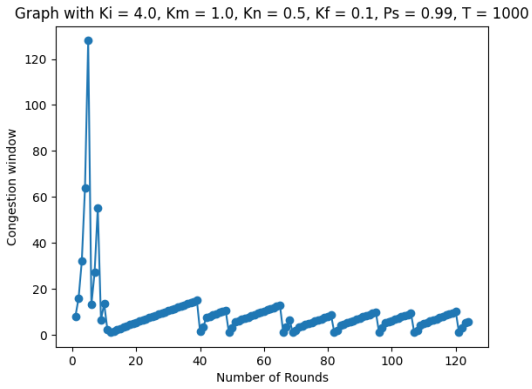
Initial exponential phase will be quicker

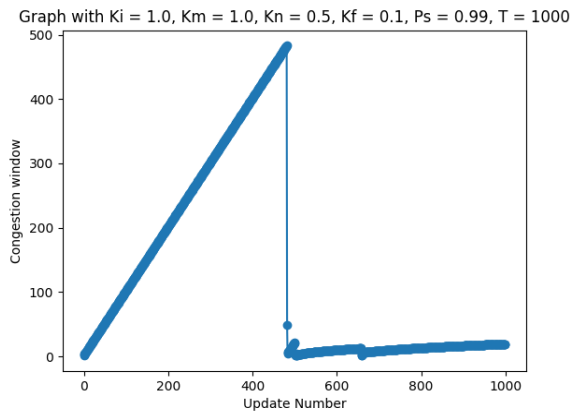
The initial CW is given by **CWnew = Ki * MSS**

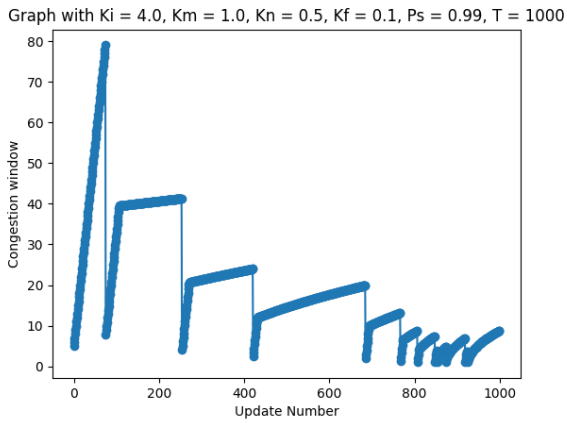
The value of CW starts from a proportionately larger value for larger values.

The initial starts at higher in case of larger Ki from below diagrams.









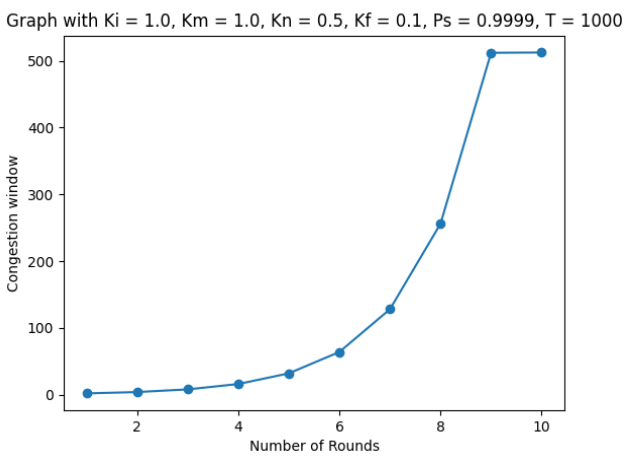
Km : Multiplier of the CW during exponential growth

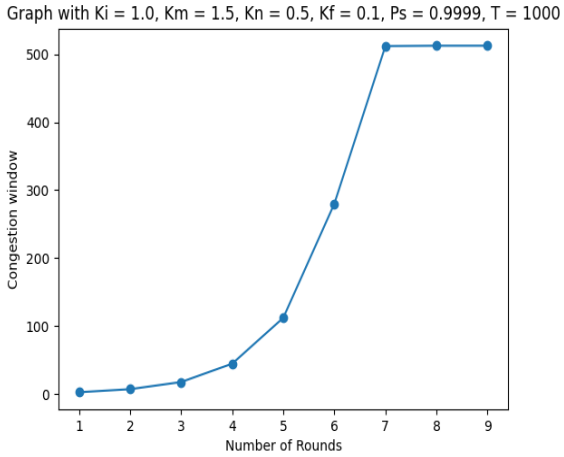
Steeper will be the exponential phases

When a segment's ACK is successfully received,CW is updated as follows

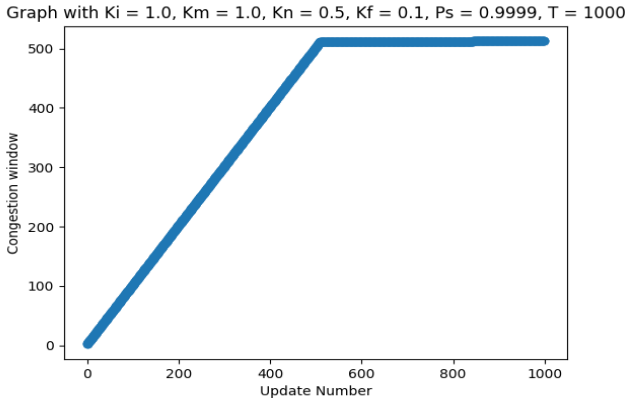
CWnew = min(CWold + Km*MSS ,RWS)

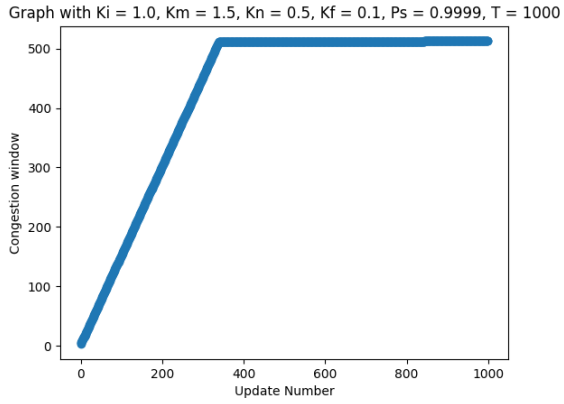
Km affects the increment of congestion window size in the exponential growth phase. This can be observed that km = 1.5(5 rounds) reaches 100 faster when compared km = 1.0(6 rounds).





Plots for different values of Km w.r.to rounds





Plots for different values of Km w.r.to update Number

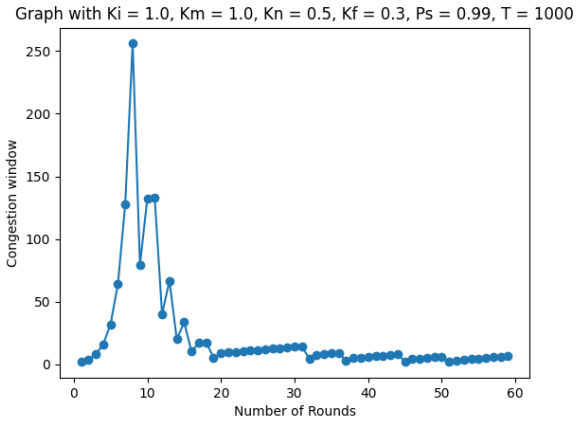
Kn : Multiplier of the CW during linear growth

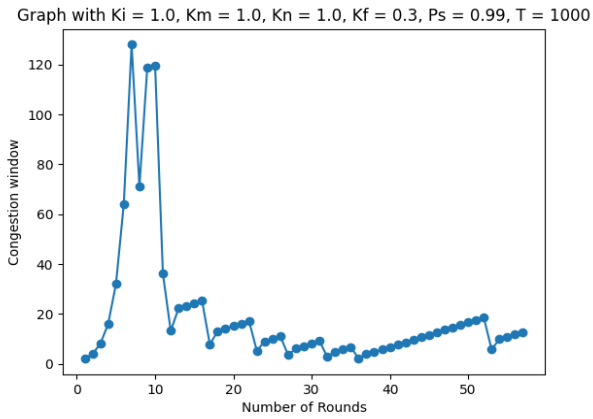
Slope of linear phase will be high

When a segment's ACK is successfully received,CW is updated as follows

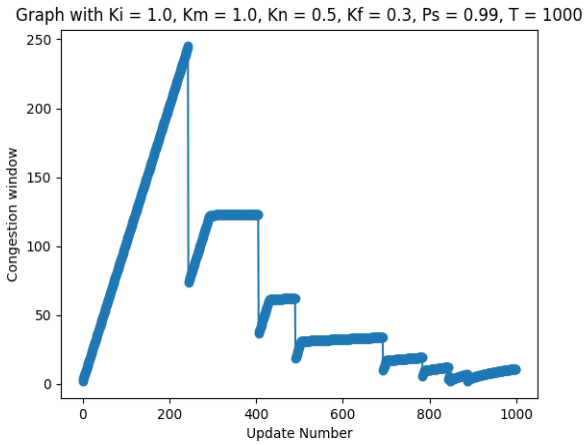
CWnew = min(CWold + Kn * MSS∗MSS CWold ,RWS)

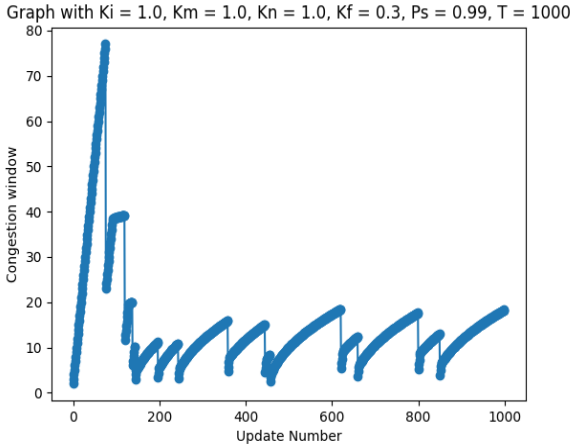
Kn affects the increment of congestion window in linear growth phase. This can be seen from the diagrams that slopes are higher at regions around 30 rounds in case of higher Kn.





Plots for different values of Kn w.r.to rounds





Plots for different values of Kn w.r.to update Number

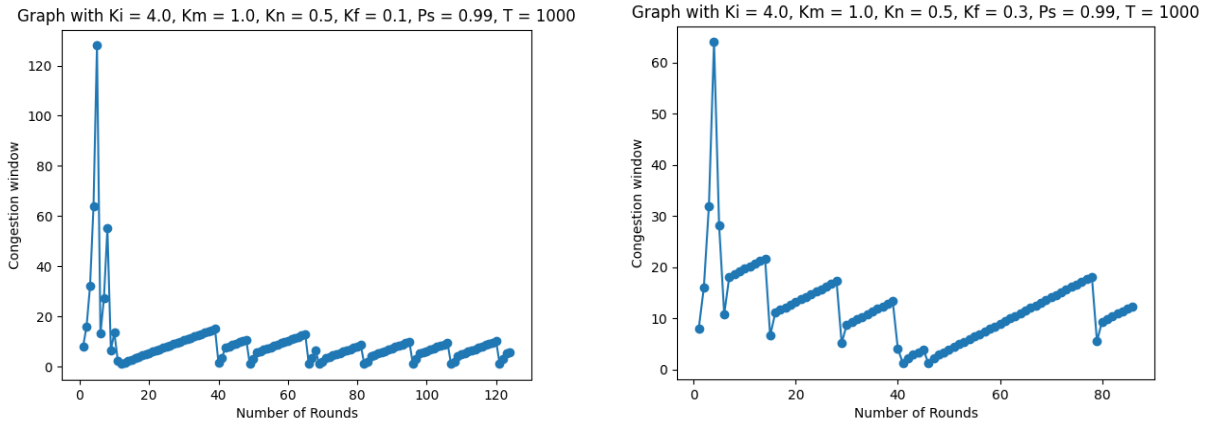
Kf : Multiplier when a timeout occurs

Drop at time out will be higher

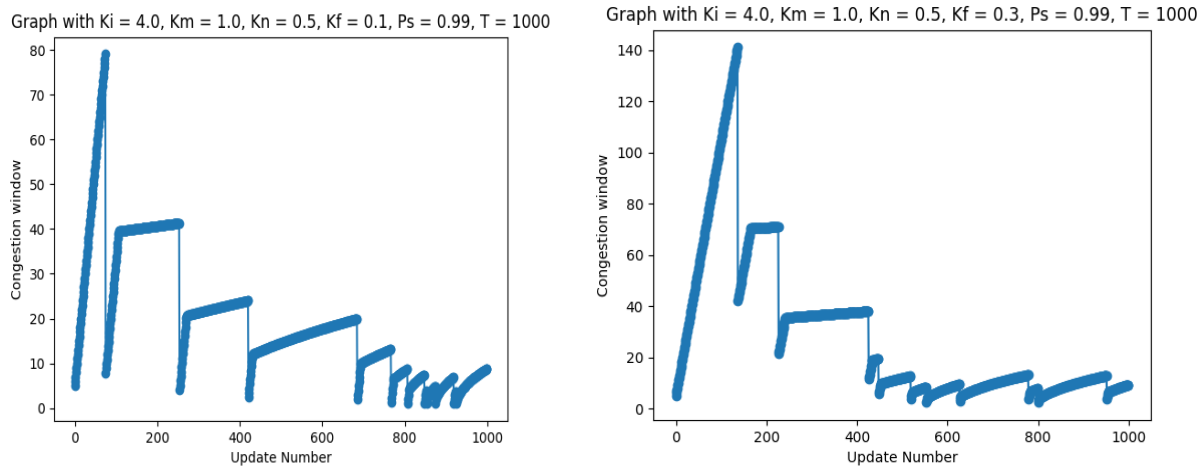
Updating the CW when timeout occurs

CWnew = max(1,Kf * CWold)

The sudden drop in congestion window size implies that there is an occurrence of timeout,which can be seen that drop is higher in case of kf = 0.3 when compared kf = 0.1.



Plots for different values of Kf w.r.to rounds

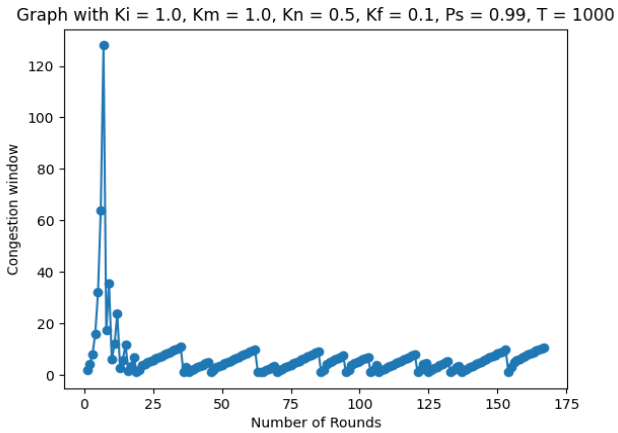


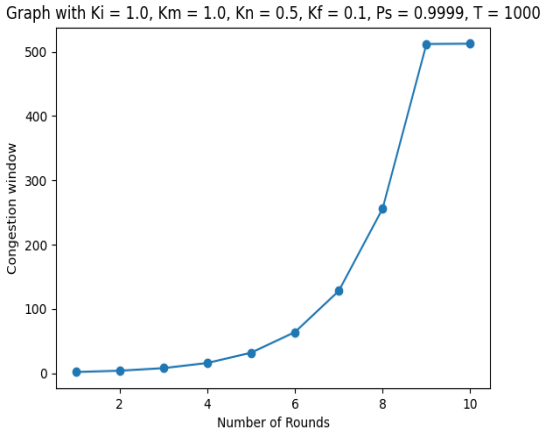
Plots for different values of kf w.r.to update number

Ps : Probability of ACK before timeout

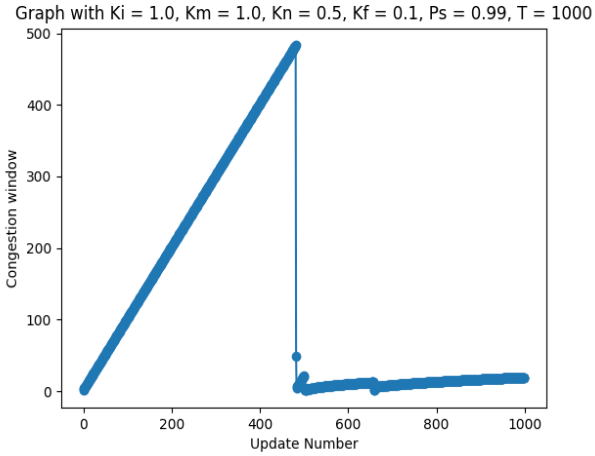
Less chance of getting timeout,so less rounds to send T segments

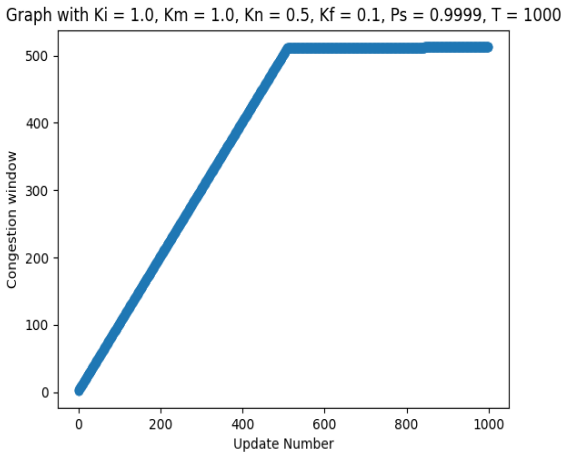
Ps affects the probability of timeout. When Ps = 0.99, we can observe the drastic decrement of cw value at many instants compared to that of Ps = 0.9999. When Ps = 0.9999, the chance for timeout is very less which can be easily observed from below diagrams.





Plots for different values of Ps w.r.to rounds





Plot for different values of Ps w.r.to update number