CS544
Topics in Network

Topic:-
Assignment 2 - Report

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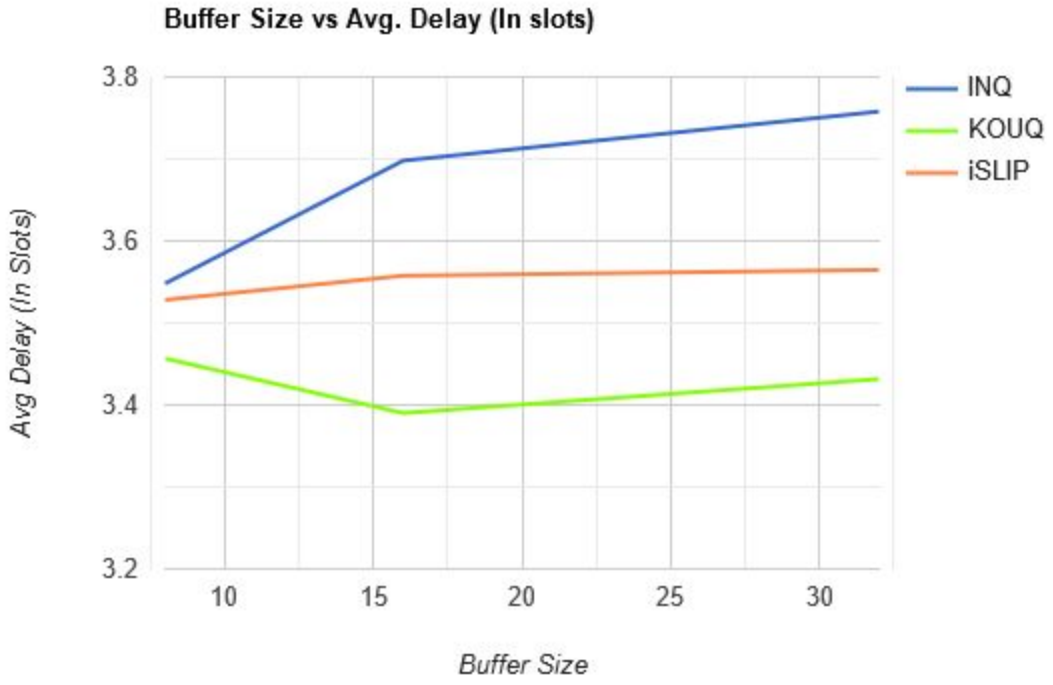
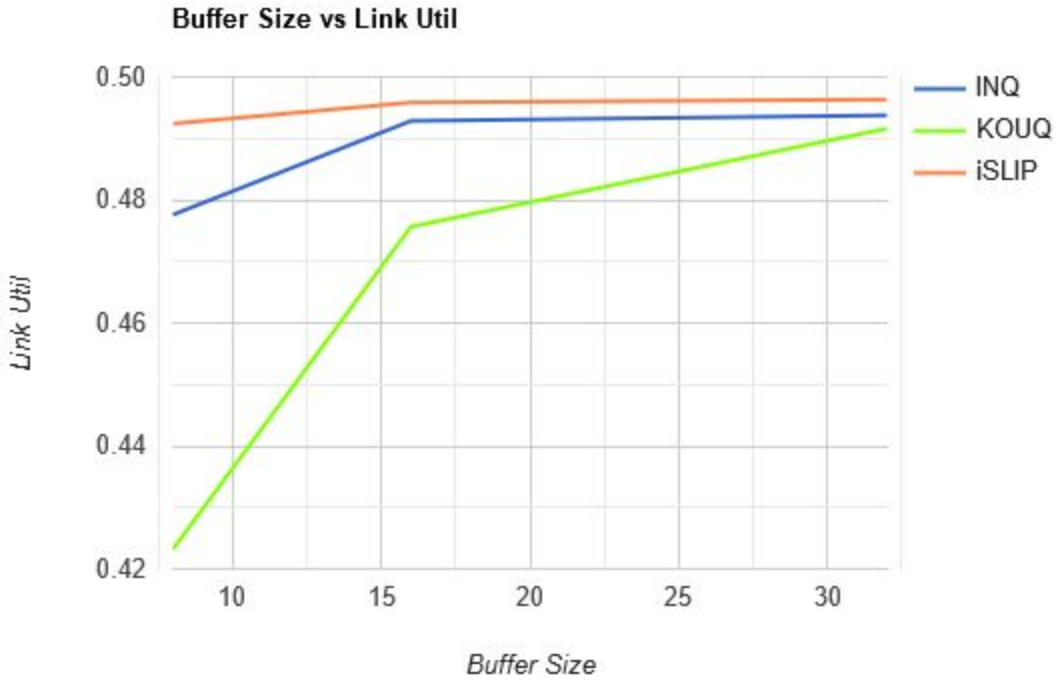


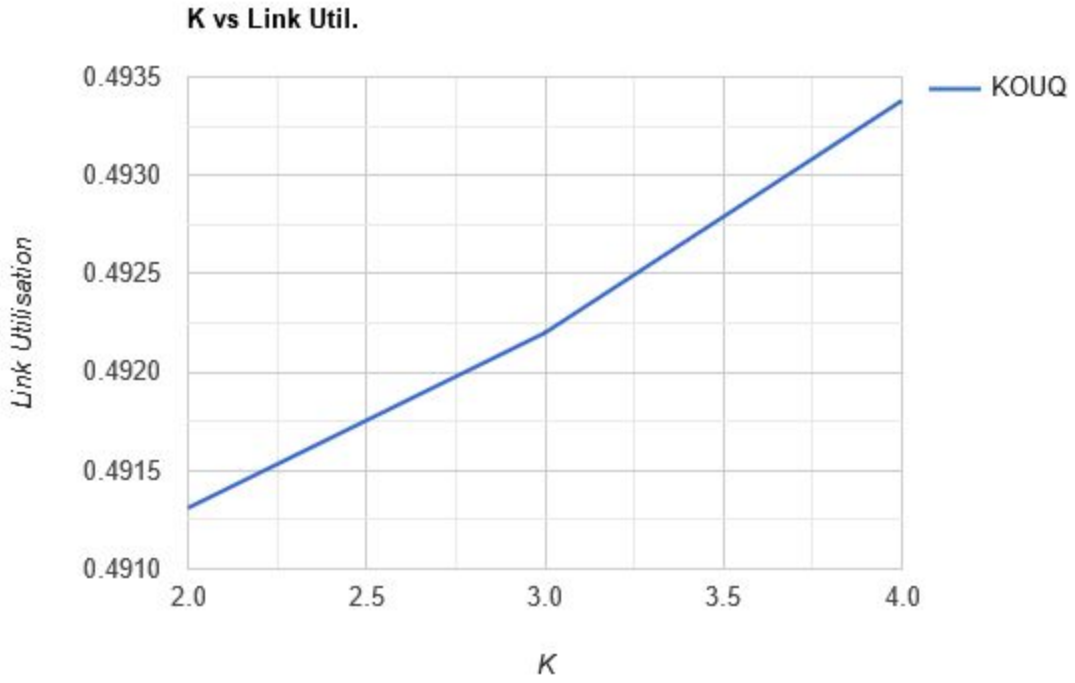
INQ - As can be seen by the graph Average packet transmission delay is increasing with increase in Buffer size the reason for the same is HOL BLOCKING leads to more wait and less transmission in a given time slot hence there is delay in packet transmission.

KOUQ- The delay in KOUQ is relatively less than in INQ and iSLIP, the reason for the same is its ability to send packets directly to output port without waiting in input port hence reducing the wait time for those packets which is not possible in case of the other two.

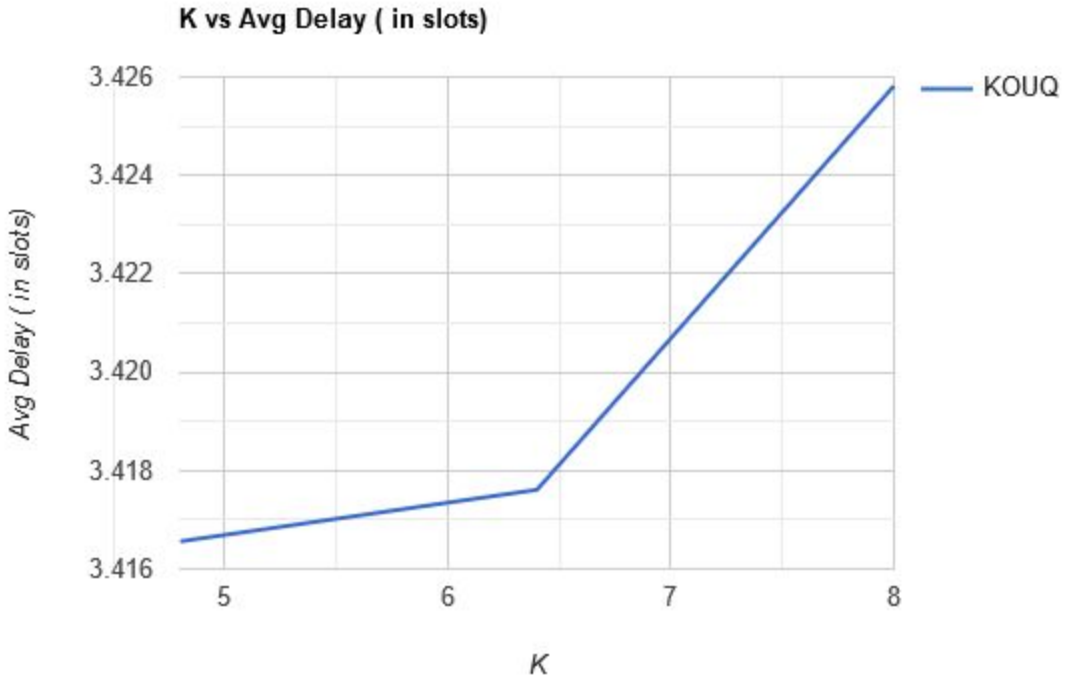
iSLIP - The delay in iSLIP is more than KOUQ the reason for the same is if two packets in the input buffer are destined to different output ports then only one could be sent while the other packet will wait but in KOUQ both can be transmitted hence there is more delay in iSLIP than KOUQ.



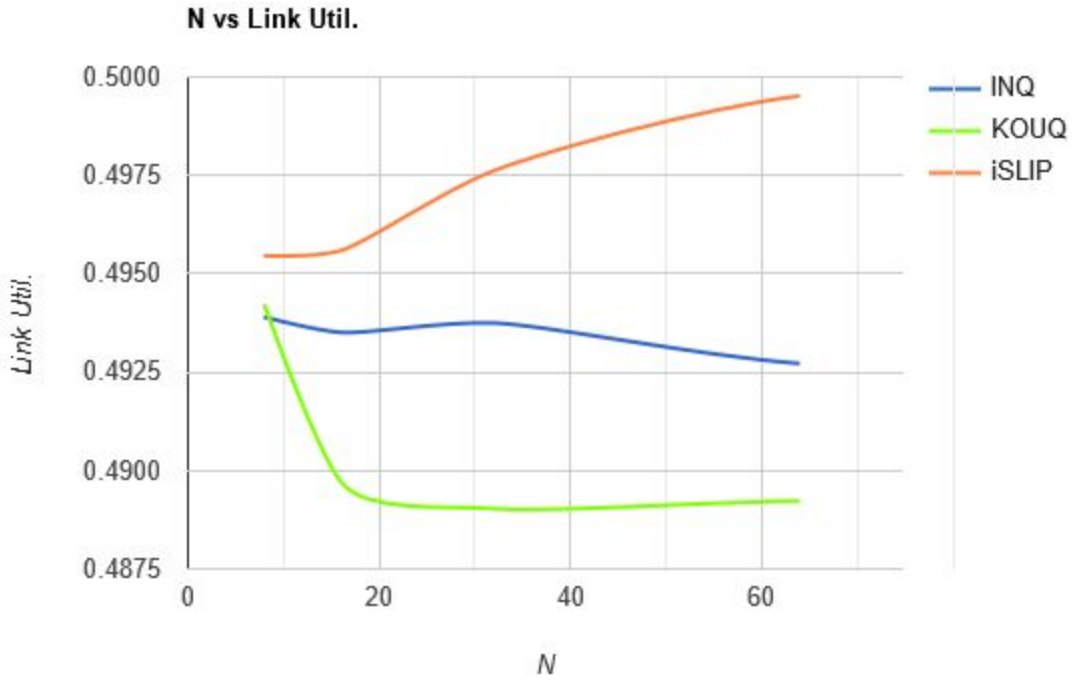
As can be observed from the above plot with increase in buffer size, link utilisation increases more in KOUQ, as more packets can be transferred to output buffer, and hence drop of packet will decrease, So link utilisation increases. Similarly in iSLIP Link Utilisation is highest as it gets packets from the whole input buffer to select in each time scheduling.
While in INQ it is almost constant as it only takes the first packet of queue into consideration for transferring.



KOUQ : As K increases, drop probability decreases because more no. of packets are allowed to get transfer and more number of packets get transferred so link utilisation increases as link utilisation is directly proportional to number of packets transferred hence there is increase in Link Utilisation.



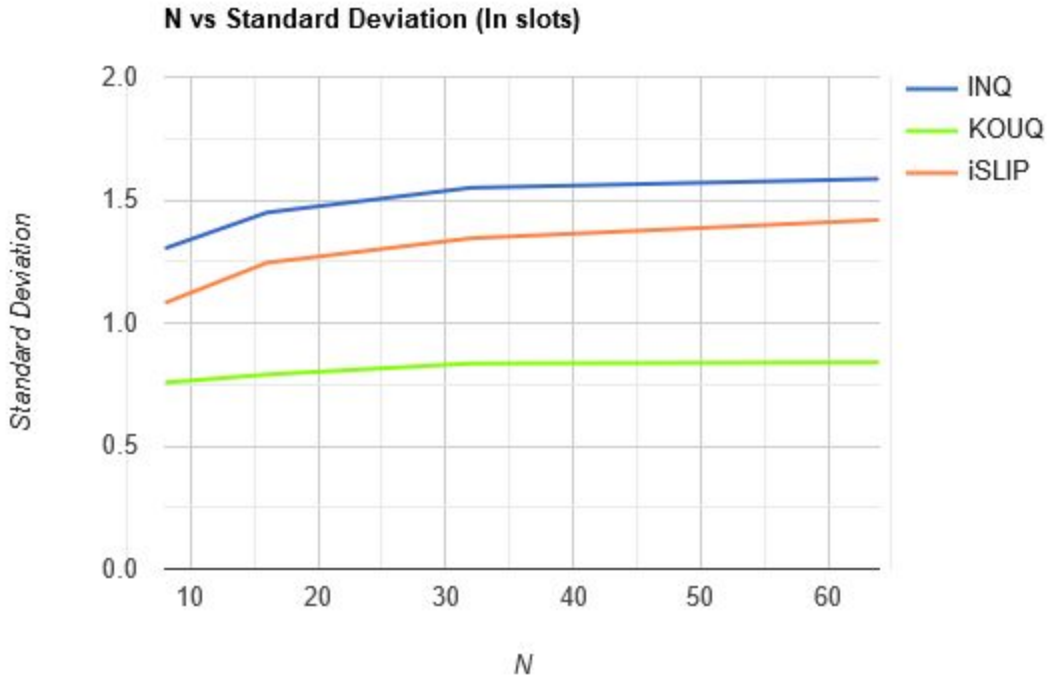
We can observe that with increase in K, average delay almost remains constant and it increases little the little increase because if in a given time slot there are many packets destined to get transfer to the same output port but only K no. of packets can be transferred and so in a given time slot queue is not filled by more packets which have to wait for almost k time period. So as K increases in a given time more packets are queued which make their delay time more.



The above plot indicated that with increase in N (No. of ports) value of link utilisation remains constant almost between 0.49 to 0.5. This can be understood as with increase in number of ports the number of packets transmitted increases and link utilisation is proportional to number of packets transferred / number of ports. So this is almost constant.

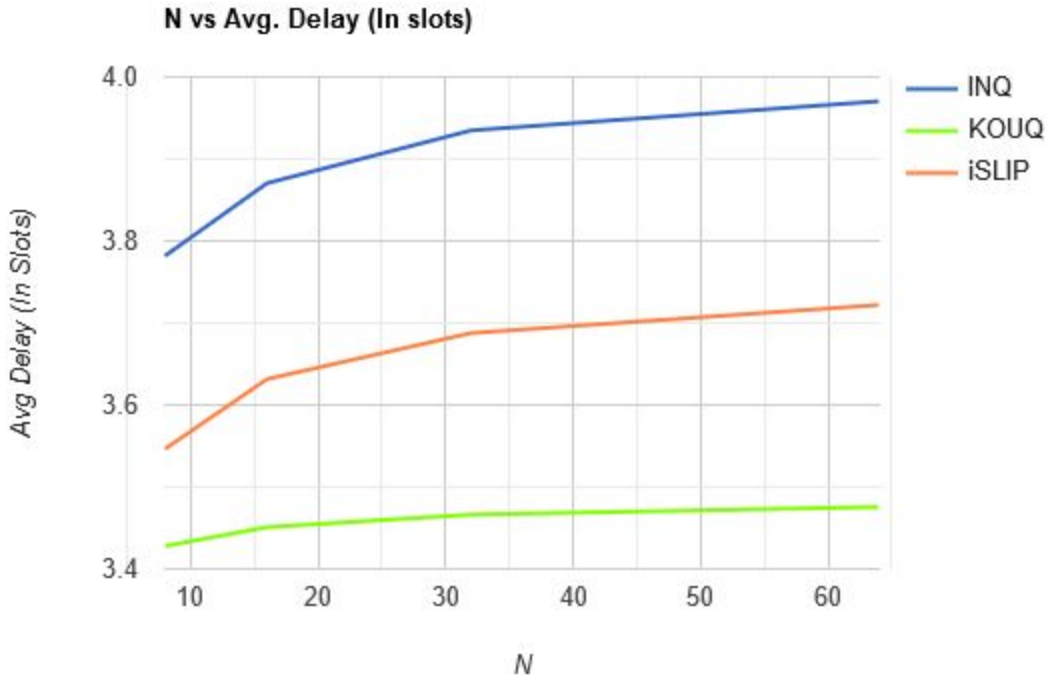
iSLIP is highest and slightly increasing as with increase in number of ports , it gets more options to select output port from input buffer.

KOUQ is almost constant at higher N as there can be drop of packets going to the same output port which cannot be seen in INQ. So INQ seems little better than KOUQ for higher N.



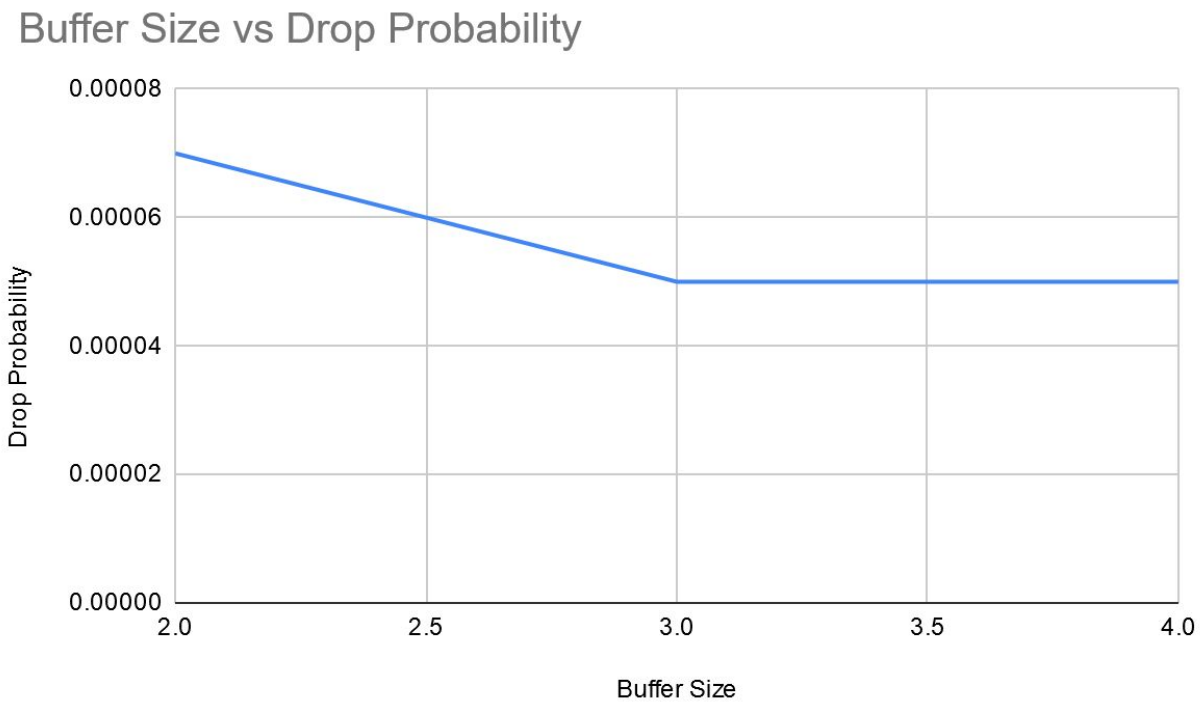
With N standard deviation almost remains constant. Standard deviation means a quantity expressing by how much the members of a group differ from the mean value for the group.

So KOUQ differs least as most packets get transmitted without waiting in input queue, and very few packets take more time. In iSLIP also most packets are transmitted without much waiting in input queue but in INQ some time some packets are blocked in queue due to head of queue not getting transmitted, which makes delay of all packets in queue very high.



INQ - HOL Blocking leads to more wait and less transmission in a each time slot so most packets need to wait more in INQ.
iSLIP - If two packets in input buffer are destined to different output ports then only one will be transferred while the other packet will wait but in KOUQ both can be transmitted. Hence less delay in KOUQ than iSLIP.

With N, average delay increases as the number of packets to the same output port can be more which lead to increase in wait and so delay increases.



KOUQ drop probability depends on K, if K is larger than KOUQ drop probability is very low. Like here where K is 0.6*N which is large so we have very low drop probability. So there doesn't seem much difference in drop probability with buffer size but if we keep constant K too low, we can see that drop probability decreases with buffer size for constant K as more packets can be held in the output buffer hence less no. of dropped packets.

Conclusion

These three queuing techniques seem to perform differently in terms of different performance metrics. But KOUQ seems to perform best while INQ seems to be worst due to HEAD-OF-LINE Blocking. In terms of avg. delay KOUQ is best as the packets are directly queued at the output port. In iSLIP they are blocked at the input port but the whole buffer is scanned for possibility of transfer so it performs better than INQ as INQ only looks at the head of queue at each input port. In terms of Link utilisation iSLIP seems little better than KOUQ as KOUQ performance depends on value of K. while INQ performs less better than iSLIP as in a given time slot for same input buffer more links can be formed in iSLIP.