

Assignment 2

CS:544 Topics in Network

Question : To understand the performance of different scheduling Algorithm in Packet Switching

- i. INQ
- ii. KOUQ
- iii. iSLIP

we've made the analysis of the performance of every scheduling scheme based on the parameters like

- N : Number of Ports.
- B : Buffer Size.
- P : Packet Generation Probability
- K : knockout value for KOUQ
- Type of scheduling used.

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Traffic Generation :

In this phase packets were generated by the given probability i.e. $\text{packetgenprob}(p)$, number of ports.

For that a random number is generated between 0-1 so as to pick up the probability randomly, if the number is less than given “p” then packet is generated for that input port followed by generating a random number between ‘1 to n-1’ to choose the output port randomly.

Data structure Used : `vector<queue<packet>>;`

For this we used a vector which will store the queues for each port i.e. “N” port then the vector will hold N queues, each queue will have members as object of struct packet.

Here each packet consists of members:

Input Port : to store the input port where packet is generated,

Output Port : to store the destined port of the packet,

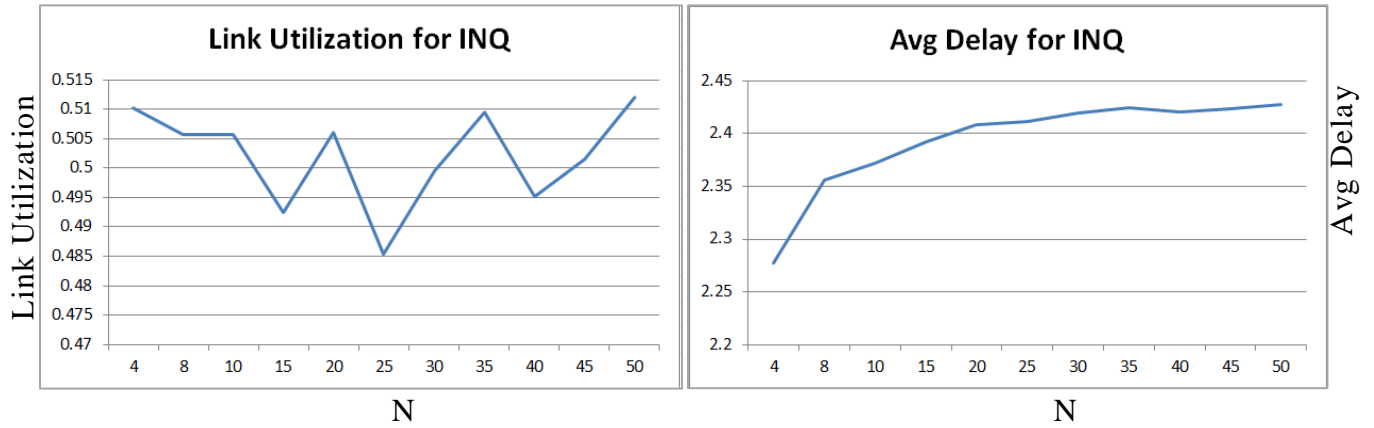
Generation Time : to store the generation time of the packet,

Completion Time :to store the overall completion time.

Performance Analysis :

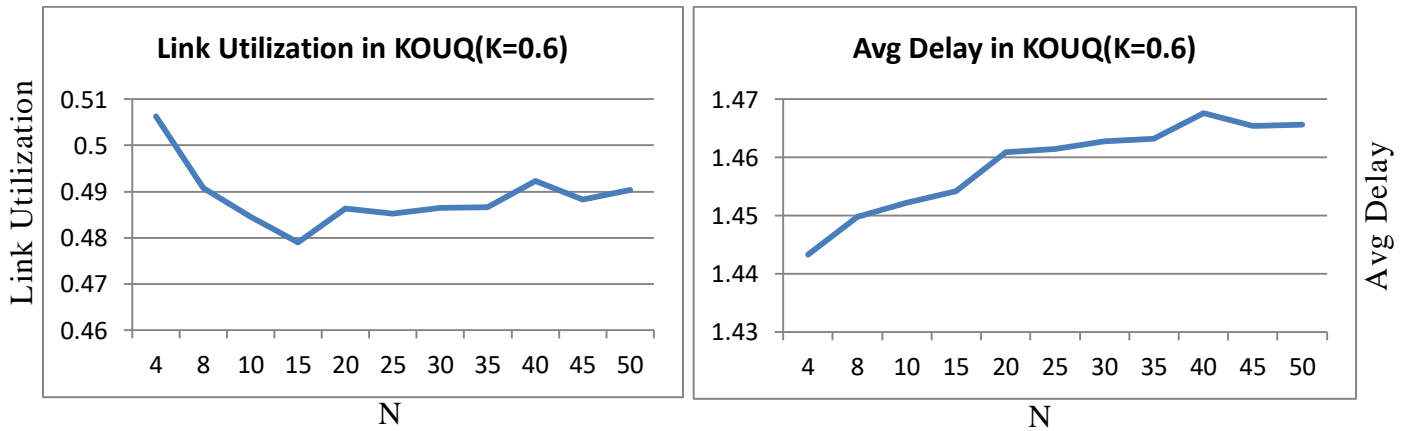
For default values :

1. Plotting N/Link Utilization and N/Avg Packet delay for INQ



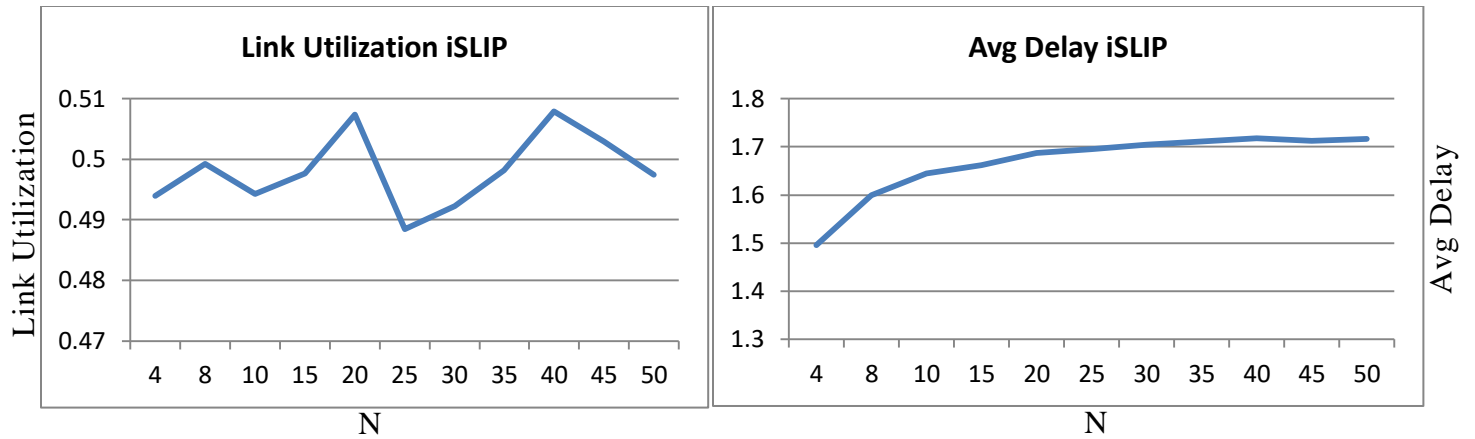
INQ :: buffer size :4
Packet gen prob : 0.5

2. Plotting N/Link Utilization and N/Avg Packet delay for KOUQ



KOUQ :: buffer size :4
Packet gen prob : 0.5
 $K=0.6*N$

3. Plotting N/Link Utilization and N/Avg Packet delay for iSLIP



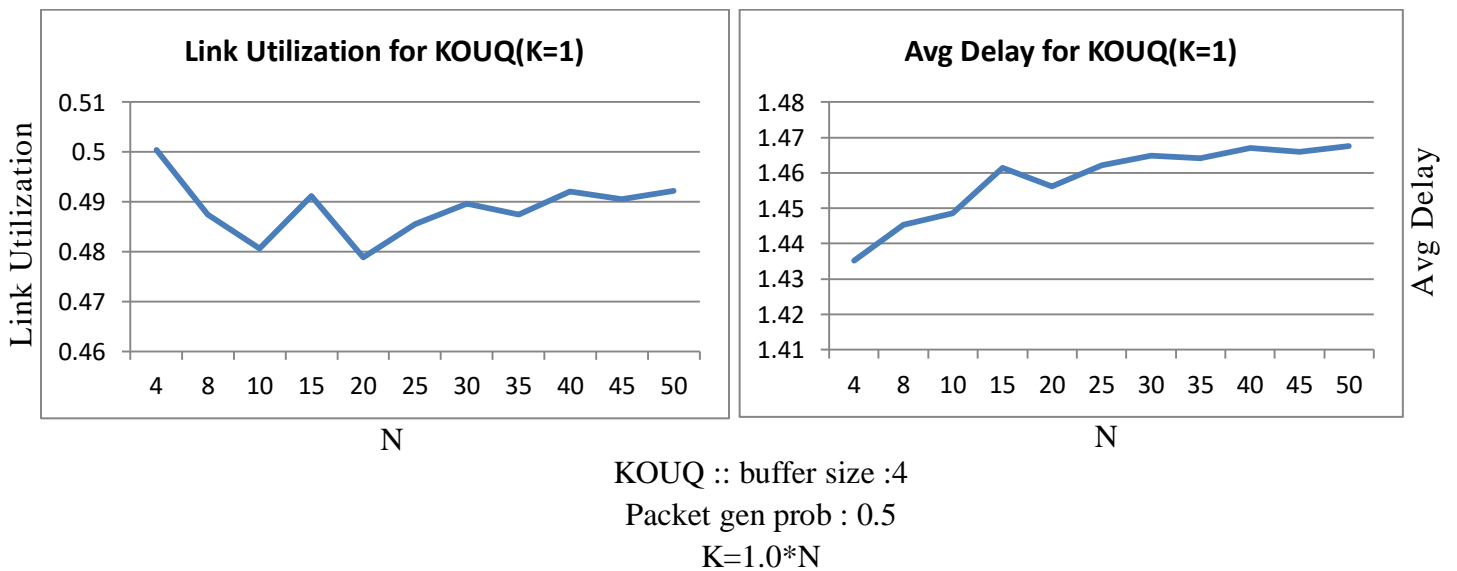
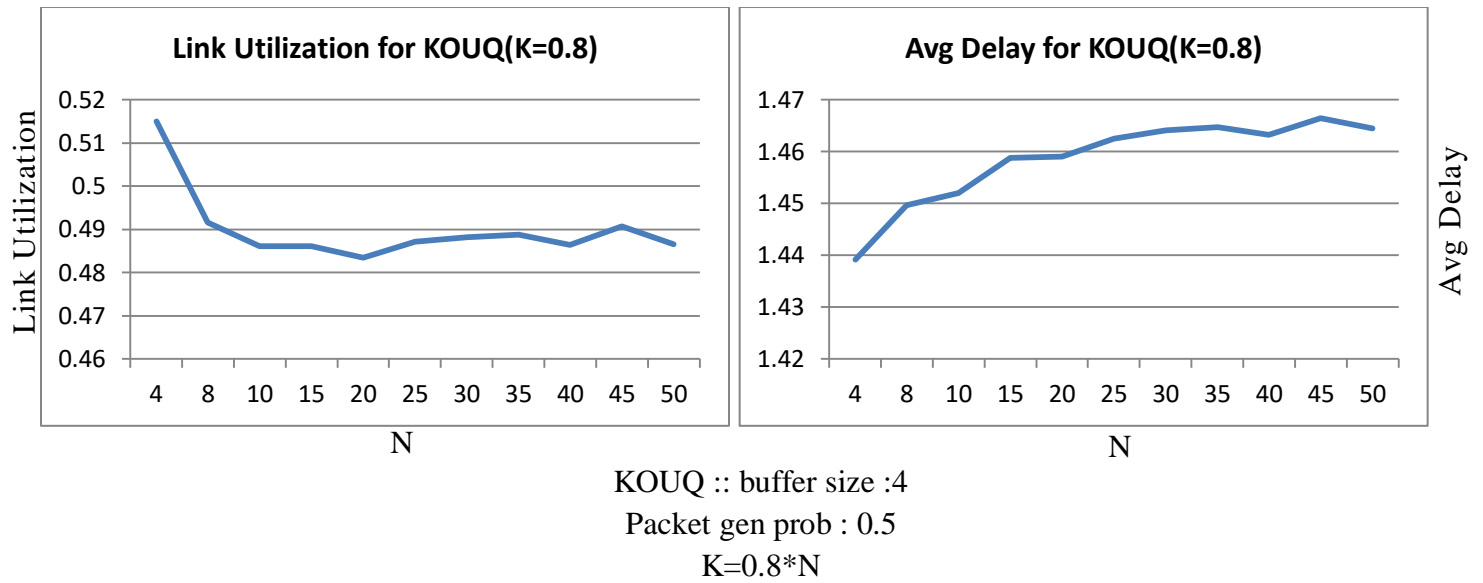
iSLIP :: buffer size :4

Packet gen prob : 0.5

Analysis :

- For $p = 0.5$ we saw that KOUQ has least avg packet delay, which is slight less than that of iSLIP but significant difference to that of INQ, as INQ has maximum delay among all of them with great margin.
- Link Utilization of iSLIP is best among all of them.
- As value of N i.e. number of ports increases Link Utilization decreases in all of them, but in case of KOUQ and INQ the difference is significant than that of iSLIP, where difference is quite less as compare of other two.

For KOUQ different values of Knockout :



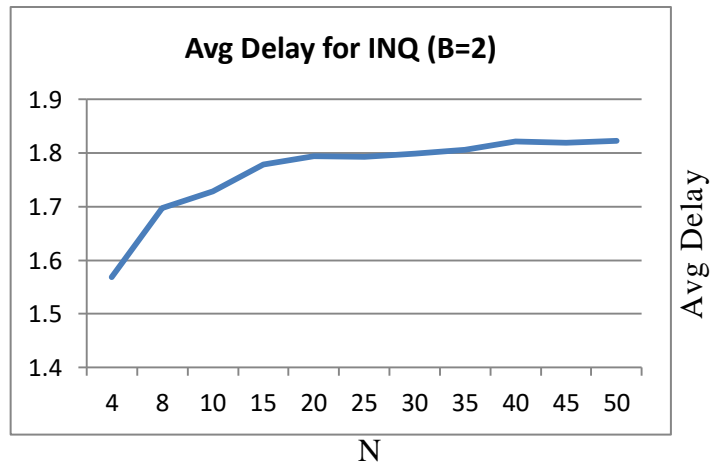
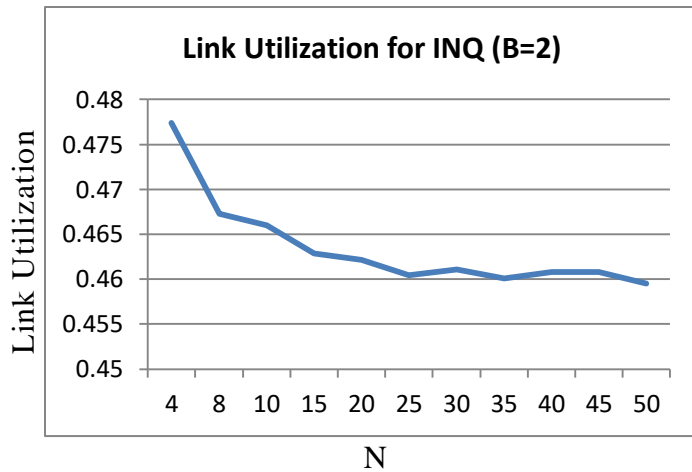
Analysis :

- For different values of knockout the avg packet delay is near about the same for larger values of N.
- In case of link utilization for $K=1*N$ it changes significantly as compare to $K=0.8*N$, though maximum utilization is almost the same but for $K=1*N$ the overall performance is good for larger values of N.

For different values of the size of buffer i.e. $B=2,3$:

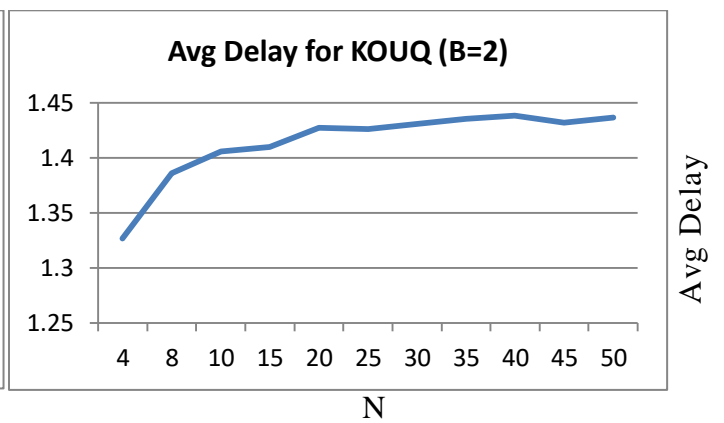
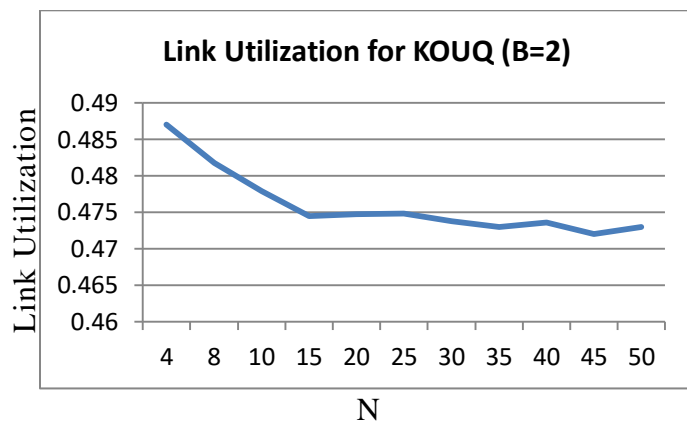
For Buffer Size :: $B : 2$

$T : 10000$



INQ :: Buffer size : 2

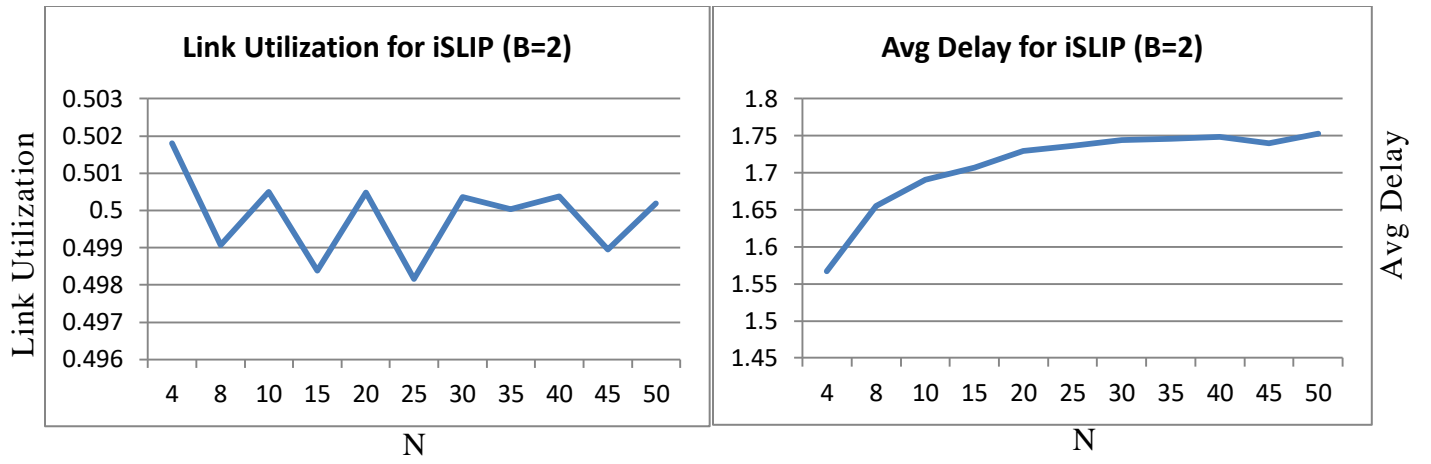
Packet gen prob : 0.5



KOUQ :: Buffer size : 2

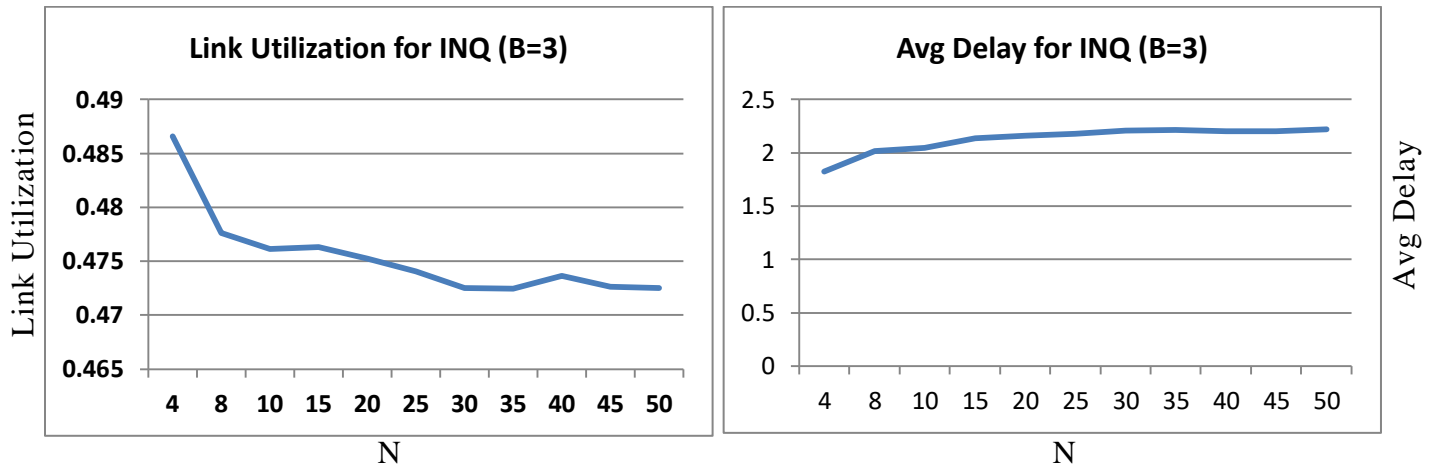
Packet gen prob : 0.5

$K=0.6*N$

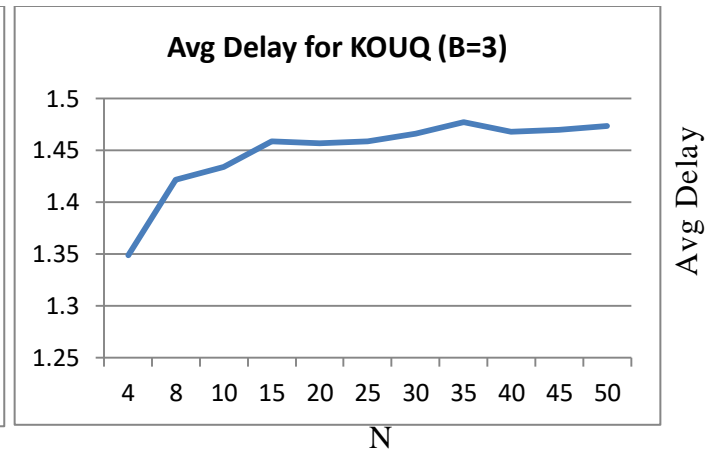
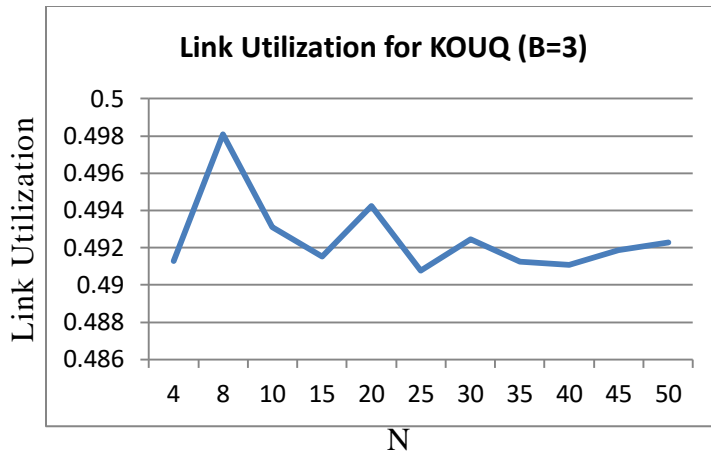


iSLIP:: Buffer size : 2
Packet gen prob : 0.5

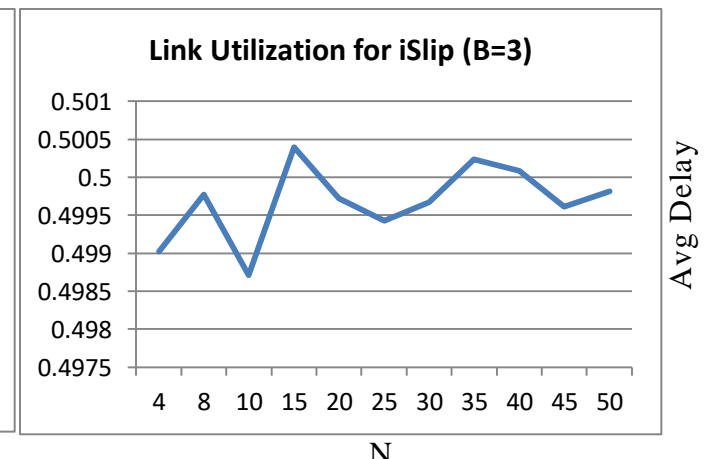
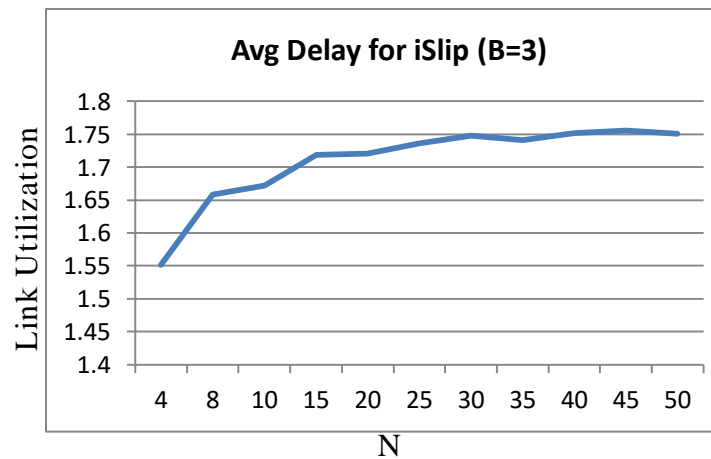
For Buffer Size :: B : 3
T : 10000



INQ :: Buffer size : 3
Packet gen prob : 0.5



KOUQ :: Buffer size : 3
 Packet gen prob : 0.5
 $K=0.6*N$



iSLIP:: Buffer size : 3
 Packet gen prob : 0.5

Analysis :

- For INQ :
 - With decrease in the Buffer size (B) there is a significant decrease in the Average Packet delay.
 - In terms of Link Utilization w.r.t. decrease in Buffer Size (B) there's only little decrement in the Utilization.
- For KOUQ :
 - With decrease in the Buffer size (B) there is a slight decrease in the Average Packet delay and also slight decrement in the Link Utilization.
- For iSLIP :
 - By decreasing the Buffer Size (B) there is very less change in the Average Packet delay and Link Utilization.

Overall Analysis with respect to different queues are :

- i. The overall Average Packet delay of KOUQ is the smallest in all the cases followed by iSLIP and then by INQ.
- ii. In terms of Link Utilization iSLIP has obtained max value and for changes made in the configuration of the algorithm, link efficiency is not much affected.
- iii. Link Utilization wise $iSLIP > KOUQ > INQ$.
- iv. Avg Packet Delay wise $KOUQ > iSLIP > INQ$.
- v. Overall Performance $iSLIP > KOUQ > INQ$.