CS 544: Topics in Networks
Assignment 2 REPORT

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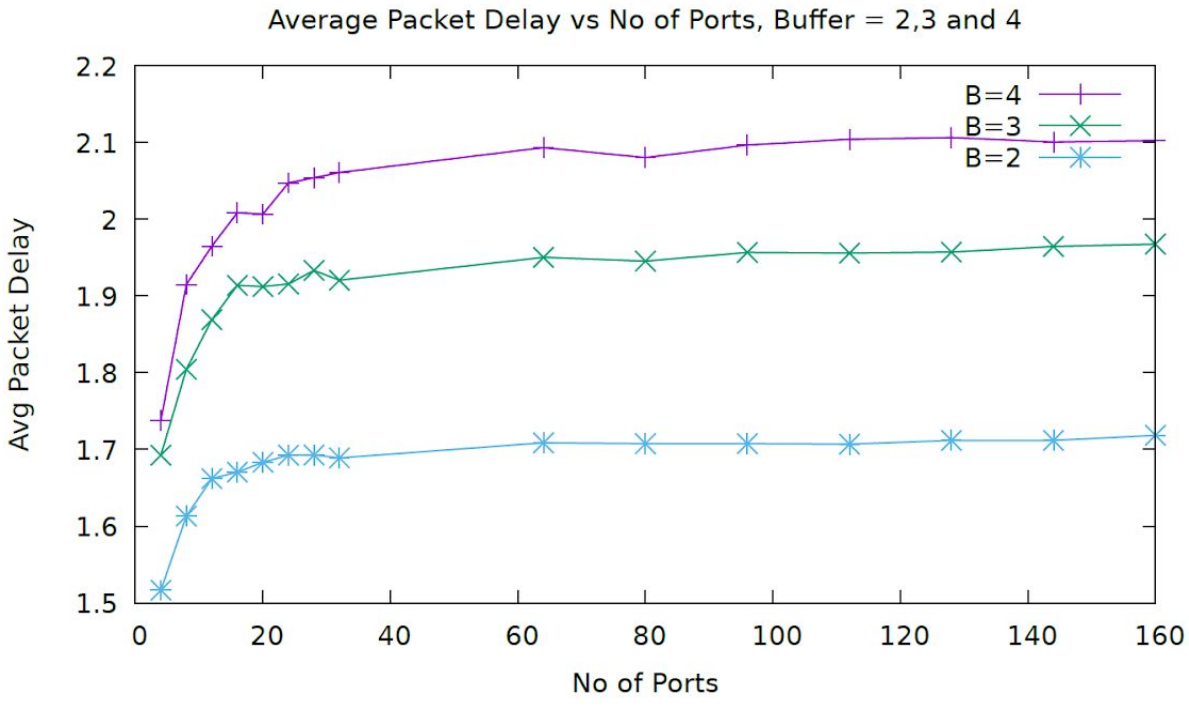
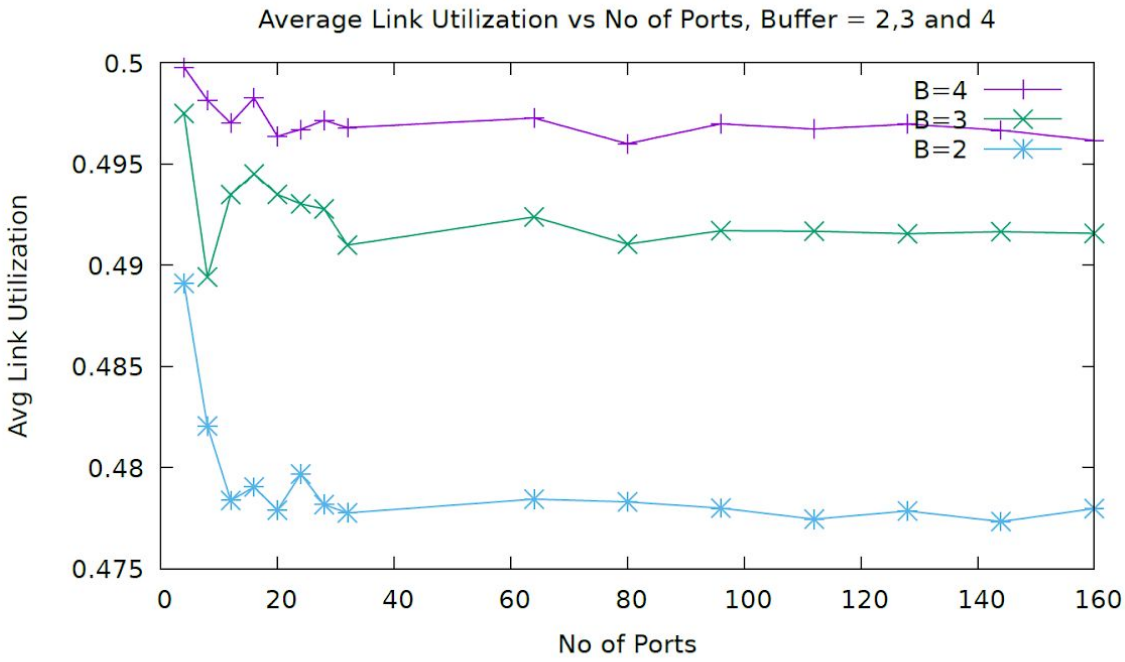
● INQ Packet Scheduling

For the INQ type of Packet scheduling, we had to choose one packet of all who are contending for a given output port. This kept our input buffer busy as the packets that lost in packet contention were left in the input queue buffer. On the other hand at every transmission slot output queue buffer was empty and fresh for new packets. The buffer size played quite an important role in Packet Delay and Link Utilization which can be clearly seen in the graphs below. As told below are the graphs comparing ***average packet delay*** and average ***link utilization*** for a variable number of nodes and buffer size.
The Avg Packet delay first increased with an increase in the number of ports then attained a somewhat constant value which was different for different buffers and is compared in the graph below. For link utilization, the value decreases with an increase in the number of ports.

- **Graph for Avg Packet Delay Comparison Between different Buffer Values**



- ***Graph for Avg Link Utilization Comparison Between different Buffer Values***

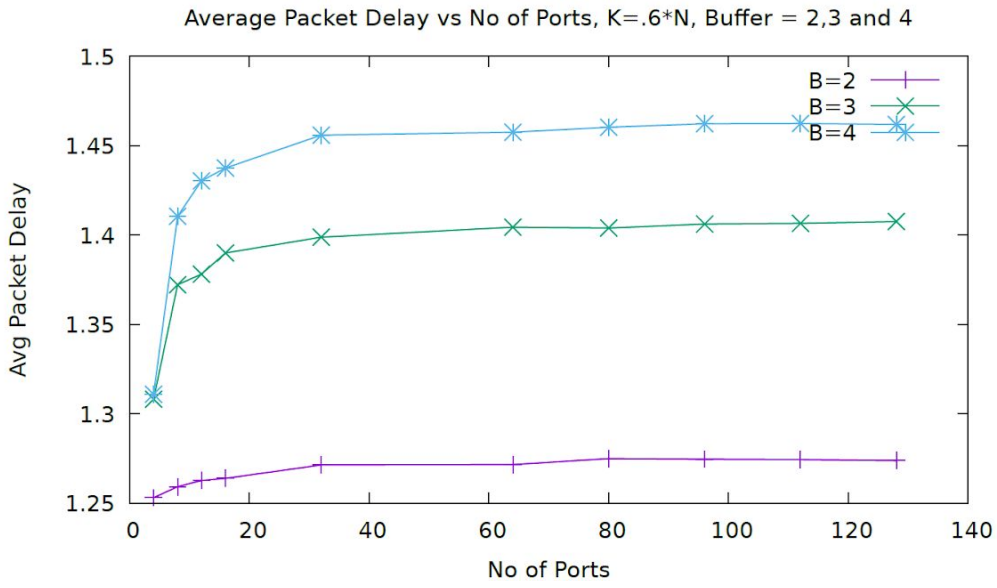


- **KOUQ Scheduling**

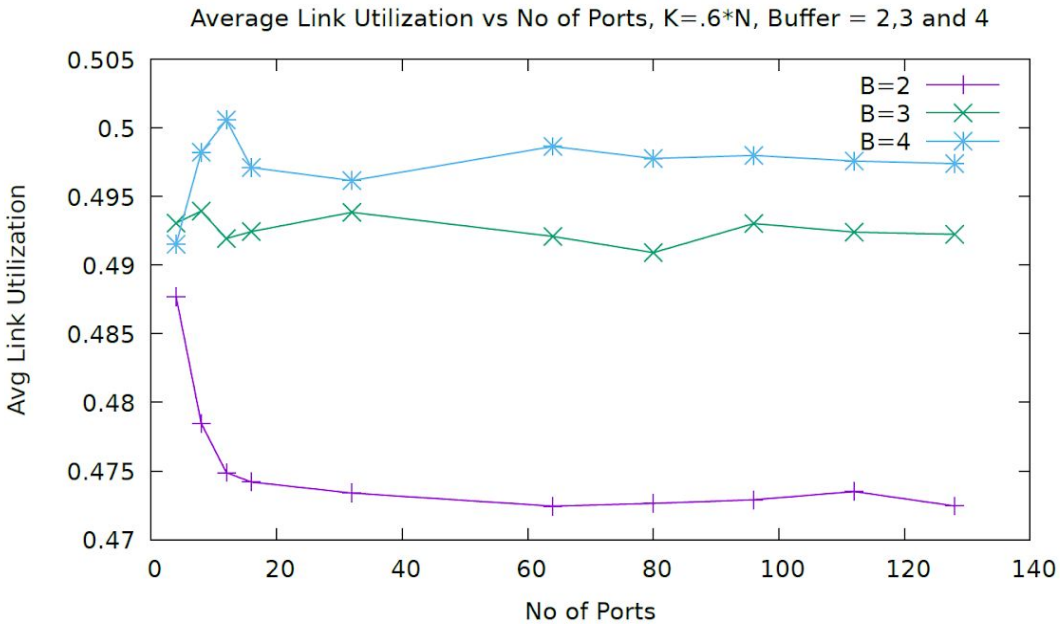
  For the KOUQ type of Packet scheduling, we had to choose a maximum of K packets who are contending but also keep in mind the space available in the buffer. The packets who were unable to win the contention here were unlike INQ dropped and were not kept in the input buffer. This way the input buffer was always free to welcome more traffic but on the other hand, the output buffer was busy and packets were dropped. The *dropped packet probability* which is calculated in the code has come out to be very low. Similar to INQ the buffer size played an important role here as well. With the increase in the number of ports, the value reaches a somewhat constant value and is distinguished on the basis of buffer value only. This is illustrated in the average packet delay graphs below. The Avg Packet delay first increased with an increase in the number of ports then attained a somewhat constant value which was different for different buffers and is compared in the graph below. For link utilization, the value decreases with an increase in the number of ports. The value of K didn't have any drastic effect and thus buffer value was used to compare for a variable number of nodes.

  The graphs are arranged with respect to k, for k =.6N both average packet delay and link utilization for all three buffer values and similarly for k = .8N and k = 1N.

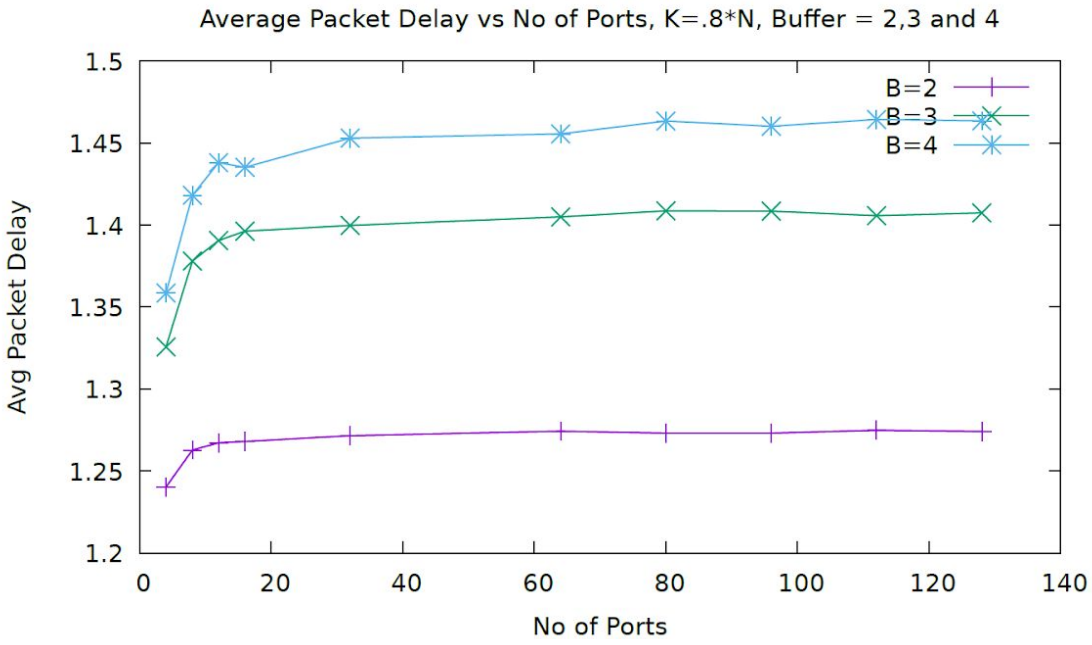
- ***Graph for Avg Packet Delay Comparison Between different Buffer Values, K=.6N***



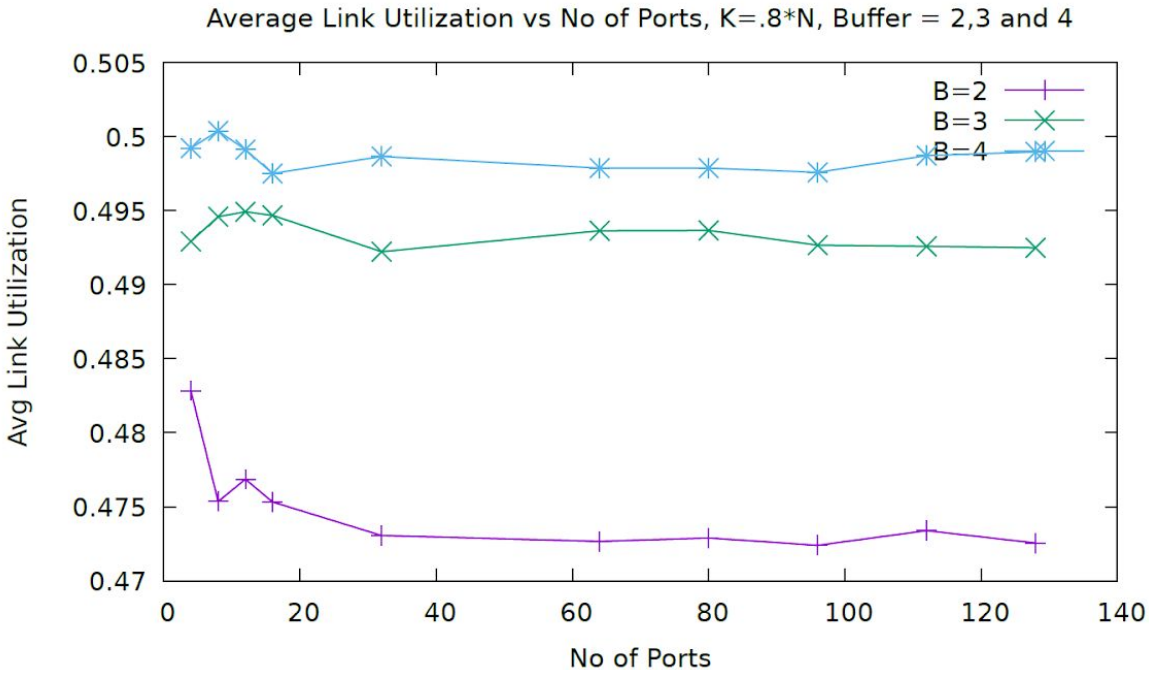
- ***Graph for Avg Link Utilization Comparison Between different Buffer Values, K=.6N***



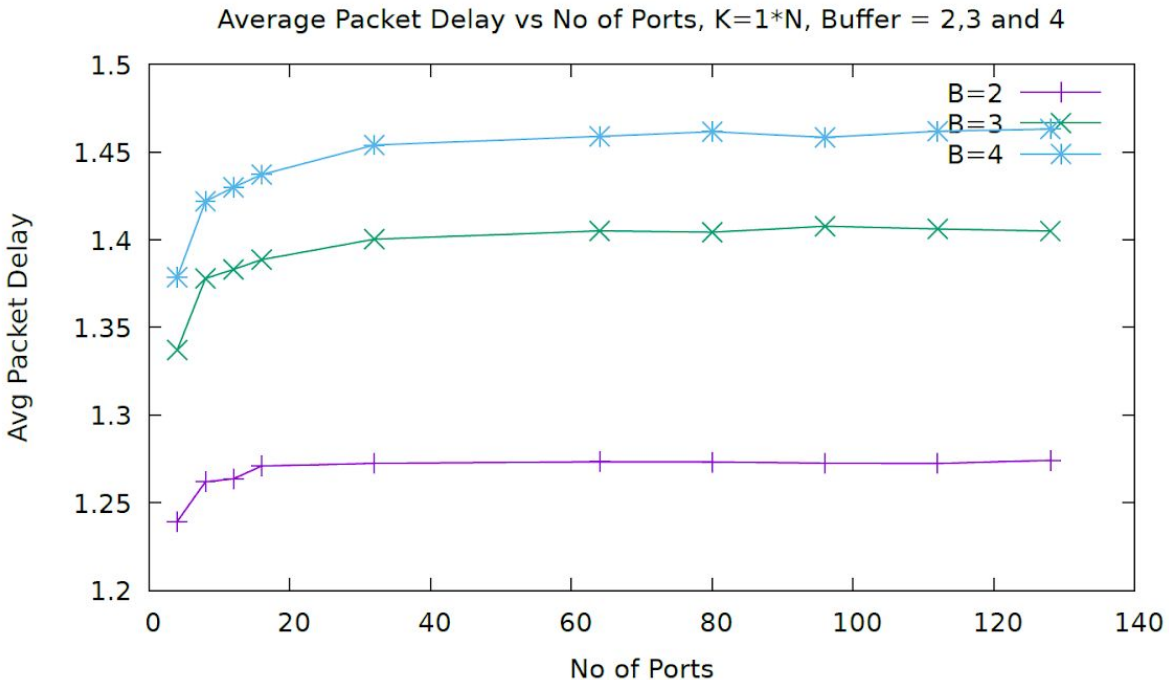
- ***Graph for Avg Packet Delay Comparison Between different Buffer Values, K=.8N***



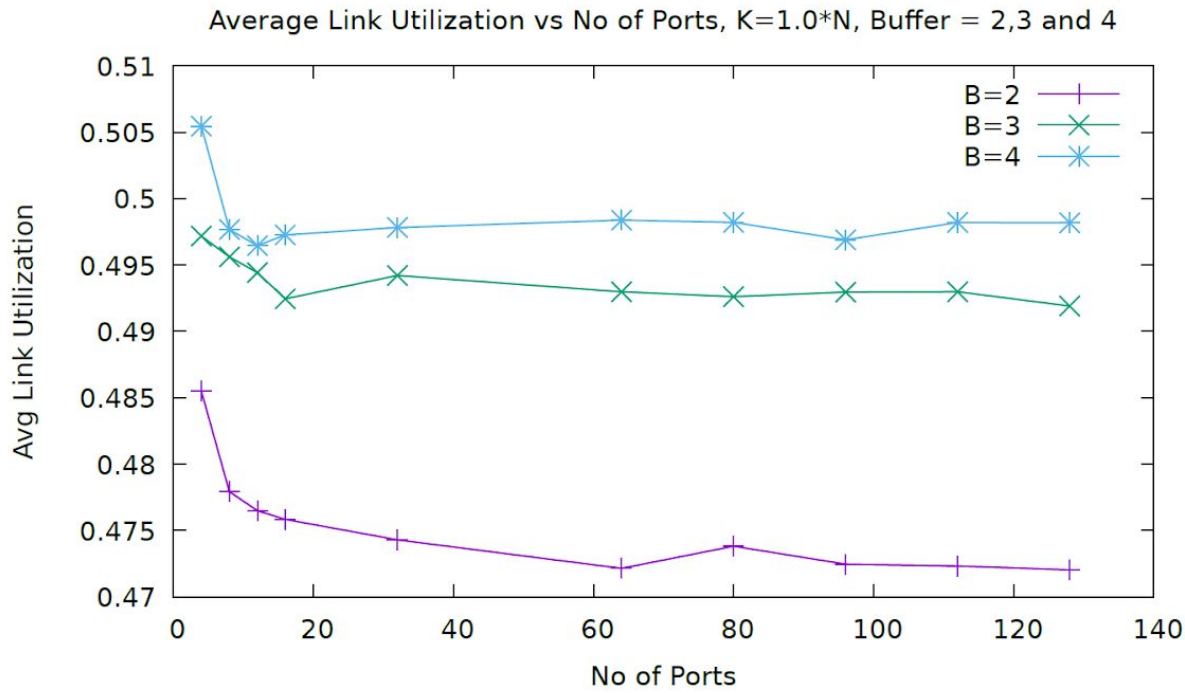
- ***Graph for Avg Link Utilization Comparison Between different Buffer Values, K=.8N***



- ***Graph for Avg Packet Delay Comparison Between different Buffer Values, K=1N***



- ***Graph for Avg Link Utilization Comparison Between different Buffer Values, K=1N***



- ## CODE STYLE EXPLANATION

With the goal to be able to track everything about the packet, a packet class was created rather than keeping a counter and using an integer in the queues to denote a packet. The packet class has all the values regards with the packet which are :

1) Input port: the port from which the packet entered.
2) Output port: the port from which packet exited.
3) Generation Time: Time slot at which packet was generated.
4) Transmission Time: The time at which the packet was transmitted.
5) Delta Time: To keep a track of the offset value.
6)Isdropped variable: To check whether the packet was dropped in the case of KOUQ.

This packet was used to create objects which were then used everywhere to run the simulation.