Explanation of Data Structure

The data structure used to for the COMP3331 Assignment was a graph. We had 2 graphs one for all the nodes from A to Z and another one for the nodes we read in. Both these graphs were Array Lists that stored the Node as their Array value. The graph that held the nodes from A to Z was called "allnodes" while the graph that stored values read in from topology and workload files was called "graph".

When a node was read in, we looped through the allnodes graph to find the node, and then we set the Source and destination node based on the value we found. The source and destination along with delay and capacity values, were used to create an edge. The edge represented connection between the two nodes. The edge class created and stored the values between two nodes on the graph.

Tabulation of Results

Note: A packet rate of "1" was used in these values

	Virtual Circuits	Number of packets	Successfully routed packets	Percentage of successfully routed packets	Number of blocked packets	Percentage of blocked packets	Number of hops	Propagation delay
Circuit SHP	8377	259106	236324	91.21	22782	8.79	2.66	168.68
Circuit SDP	8377	259106	239831	92.56	19275	7.44	3.35	140.86
Circuit LLP	8377	259106	212798	93.81	16028	6.19	2.77	175.50
PACKET SHP	259106	259106	254040	98.04	5066	1.96	2.70	171.60
PACKET SDP	259106	259106	254638	98.28	4468	1.72	3.43	140.68
PACKET LLP	259106	259106	255603	98.65	3503	1.35	2.95	190.07

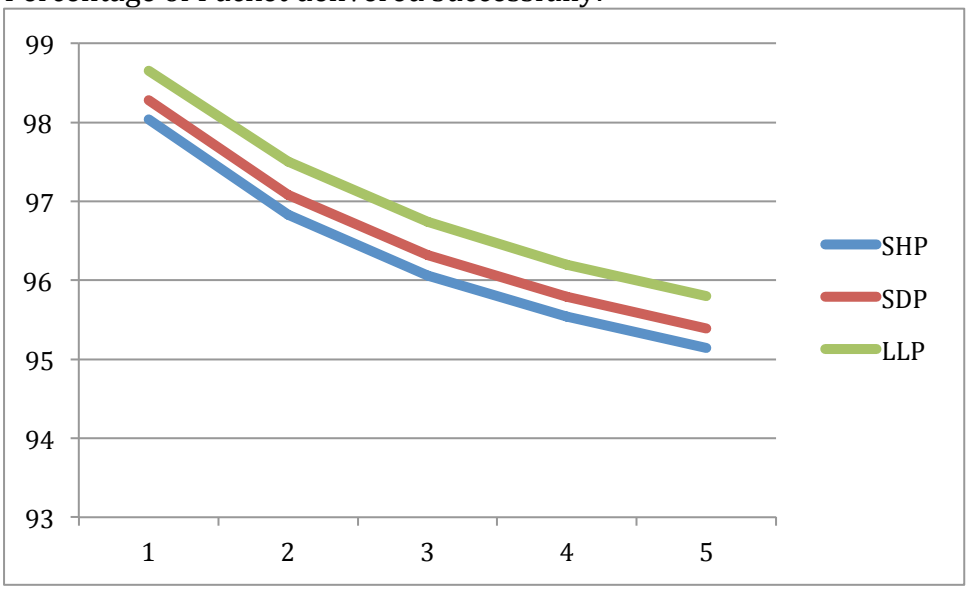
As we can see from the results the SHP has the lowest amount of hops per destination. This is due to the fact that the SHP algorithm looks for the path with the least amount of hops needed, hence it makes sense that SHP would have the least amount of hops.

We can see that the SDP algorithm has the least amount of propagation delay, as this should be expected. The SDP algorithm looks for the path with the least amount of the delay, hence SDP routing algorithm has the least propagation delay.

We can see that the LLP has the least amount of blocked packets compared to other algorithms. This can be down to the fact the LLP algorithm picks the least loaded path. By picking the least loaded path the chance of packets being blocked is being reduced.

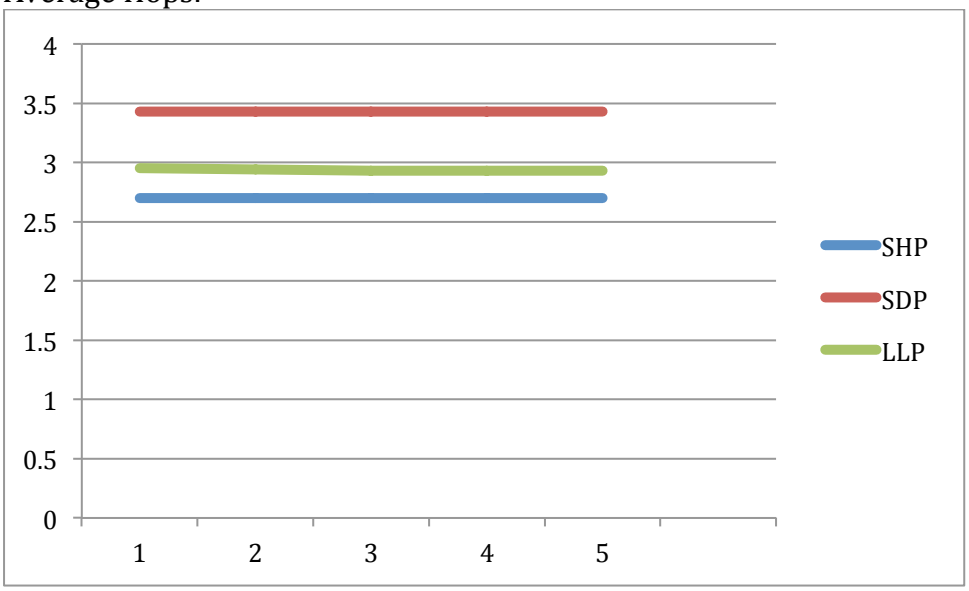
Packet Virtual Analysis

Percentage of Packet delivered successfully:



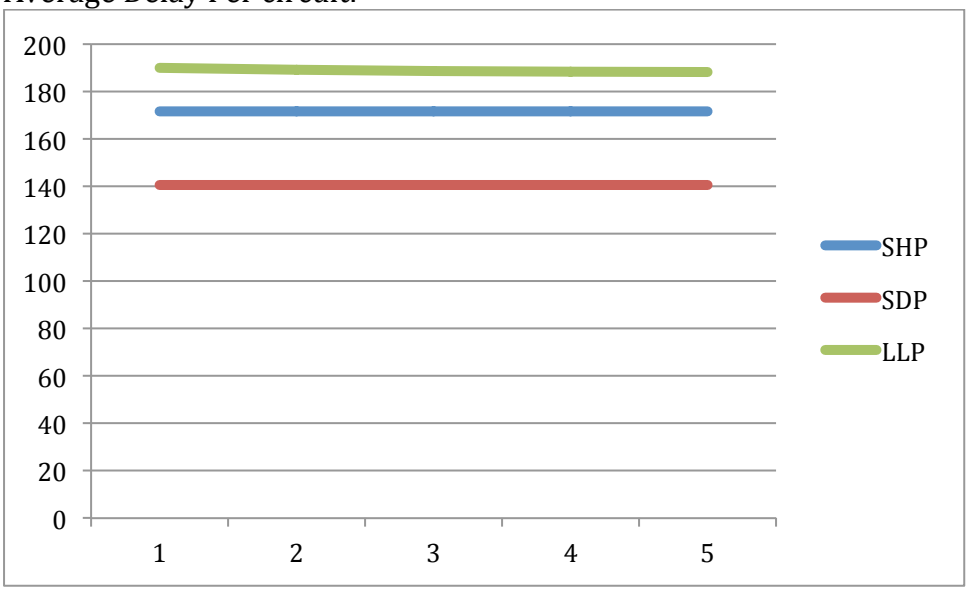
As we can see from the plot that as the packet rate increases, the amount of packets delivery successfully delivered for all 3 routing algorithms. All 3 routing algorithms are in uniform decrease as the packet rate increases. This can be due to the fact that there are more packets to deliver at higher packet rates and this leads to more congestion on the network.

Average Hops:



We can see that the average hops for all 3 circuits remains almost the same regardless of the routing algorithm applied. We can see that the HP has the lowest amount of average hops and remains constant regardless of packet rates. The LLP for higher packet rates, average hops decrease slightly.

Average Delay Per circuit:



For all 3 routing algorithms the average delay per circuit does not change much. There is slight increase/decrease as the packet rate goes up or down for change in packet rate. But this change is really negligible and overall makes little to know difference. We can see that that SDP algorithm as expected has the lowest circuit delay, as this algorithm looks for the path with shortest paths.