COMP9311 Computer Networks and Applications Assignments 2 : Report

Introduction:

RoutingPerformance
Programming language : Python 3
Screencast demo : https://youtu.be/TguOP46GL50
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Part 1 : Data structure for the internal representation of the network topology

The data structure for the internal representation of the network topology is Graph, which uses adjacency matrix to save the 'Link' between two node and each 'Link' has four attributes (delay, hop, current_capacity and capacity).

Part 2 : Tabulated summary (by using provided topology.txt and workload.txt)

Performance Metrics	**Network Scheme**					
	CIRCUIT			PACKET		
	Routing Protocols			**Routing Protocols**		
	SHP	SDP	LLP	SHP	SDP	LLP
Total number of virtual circuit requests	5884	5884	5884	5884	5884	5884
Total number of packets	176067	176067	176067	176067	176067	176067
Number of successfully routed packets	160639	166160	168838	176056	176056	176067
Percentage of successfully routed packets	91.24	94.37	95.89	99.99	99.99	100
Number of blocked packets	15428	9907	7229	11	11	0

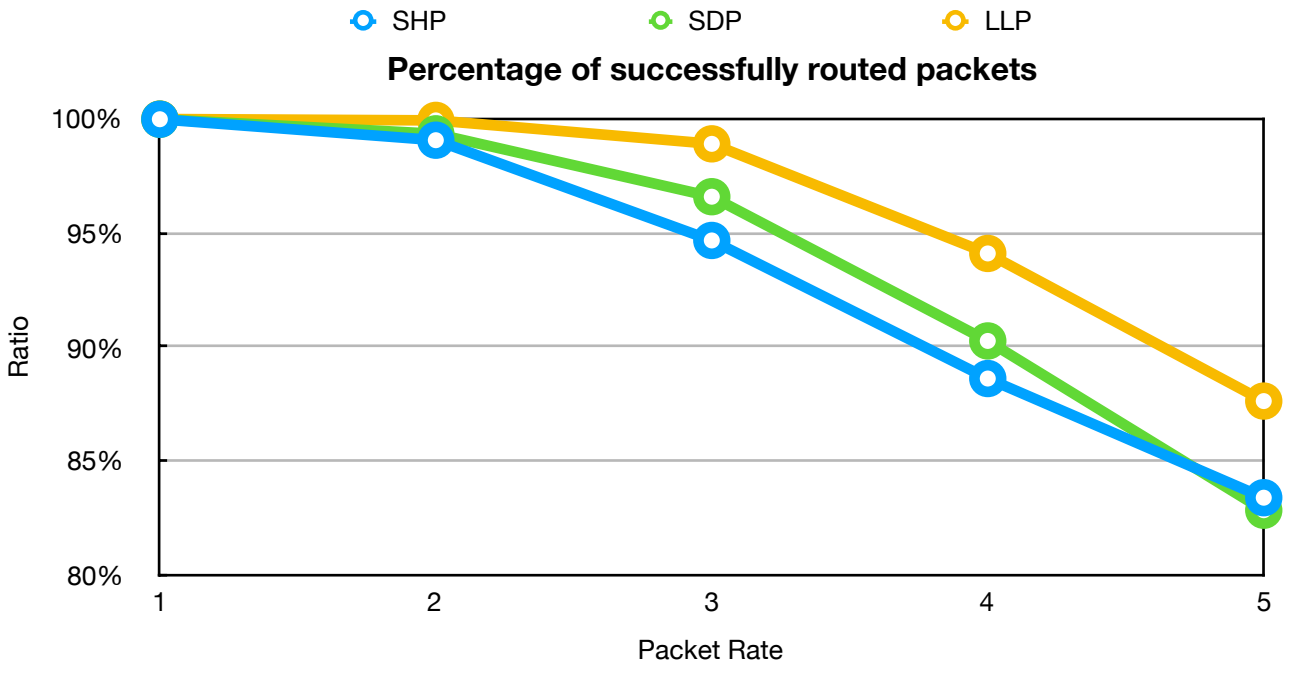
Percentage of blocked packets	8.76	5.63	4.11	0.01	0.01	0
Average number of hops per circuit	2.71	3.16	2.76	2.69	3.16	2.78
Average cumulative prop. Delay of circuit	170.40	146.96	172.02	169.60	145.93	174.47

NOTE : Packet rate for data in the above table was (1 packets/sec). Choose the path (when having multiple paths from one node to another) randomly, so the result may be some different by running more times.

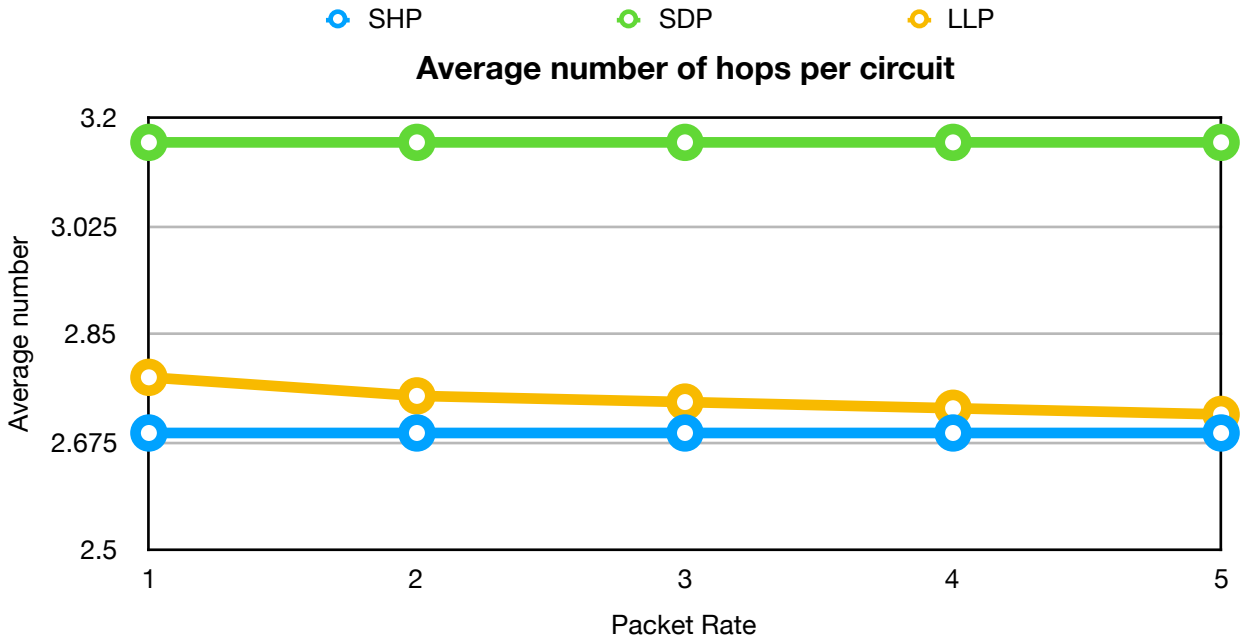
Part 3 : Analysis of the results (from percentage of blocked requests, average number of hops and the average propagation delay)

About the percentage of blocked requests, LLP is lower than the other two protocols. Because LLP chose the path depending on the capacity rate, it could choose the path with great possibility could go through from source to the destination.
About the average number of hops, SHP is lower than the other two protocols. Because SHP chose the path depending on the the hops from the source to the destination, the average number of hops per circuit is lower.
About the average propagation delay of circuit, SDP is lower than the other two protocols. Because SDP chose the path depending on the delay from the source to the destination, the average delay is lower.

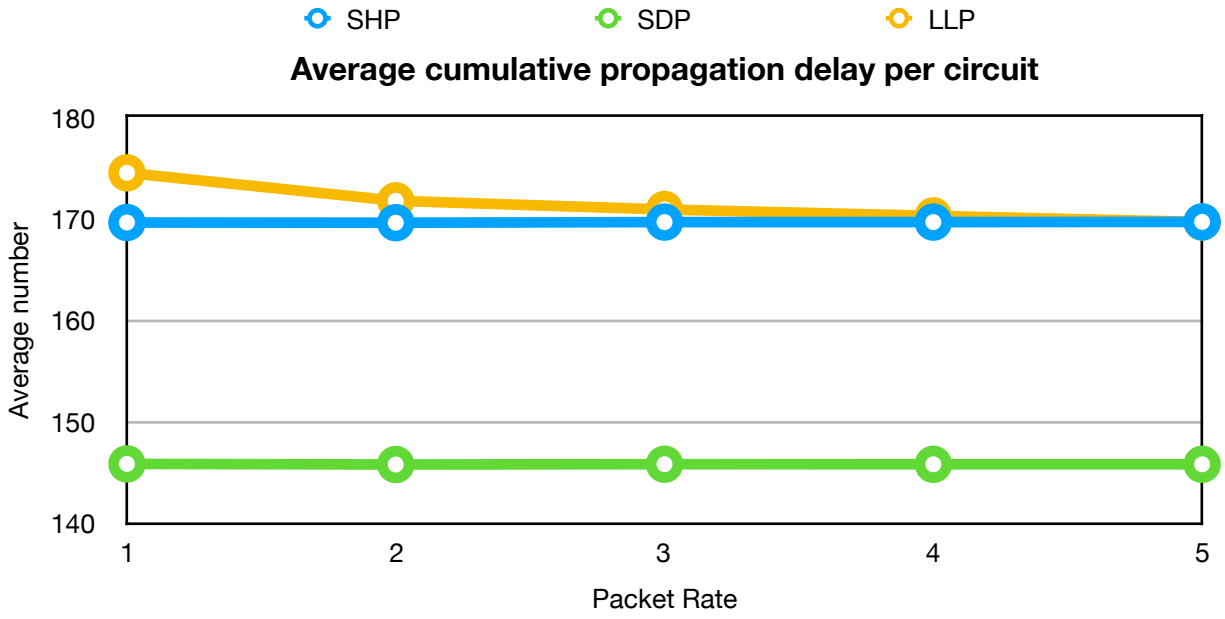
Part 4 : Performance evaluation of the virtual packet network with respect to the packet rate and different routing protocols.



This chart shows that the percentage of successfully routed packets of LLP is always higher than the other two protocols. However, the larger the packet rate is, the worse these three protocols performed. Because the number of packet increased and number of packets per second transfered, there would more conflict occurred.



This chart shows that the average number of hops per circuit of SHP is always lower than the other two protocols. Because SHP always chose the smallest number of hop per path.



This chart shows that the average cumulative propagation delay per circuit of SDP is always lower than the other two protocols. Because SDP always chose the smallest delay of per path.