COMP3331 Computer Networks and Applications

Assignment 2

Student: Yufan Zou, z5142372; Xiao Xu, z5109390

1. **The data structure used for internal representation of the network topology**
2. **A tabulated summary of comparison**

|  |  |  |  |
| --- | --- | --- | --- |
| Performance Metrics | SHP | SDP | LLP |
| Total number of virtual circuit requests | 5884 | 5884 | 5884 |
| Number of successfully routed requests | 5467 | 5340 | 5794 |
| Percentage of successfully routed request | 92.91 | 90.75 | 98.47 |
| Number of blocked requests | 417 | 544 | 90 |
| Percentage of blocked requests | 7.09 | 9.25 | 1.53 |
| Average number of hops per circu64it | 3.71 | 4.43 | 3.84 |
| Average cumulative propagation delay per circuit | 171.01 | 141.99 | 175.31 |

Note: Packet rate for data in the above table was (1 packet/sec).

Table2.1 Comparison among SHP, SDP and LLP in virtual circuit network

1. **Analysis of the results**

For the Shortest Hop Path (SHP) algorithm, the cost of all links in the topology graph is same. The algorithm always chooses the first one in the list, which will result in a large amount of blocked connections and hops per circuit due to saturated links. Randomizing the list of edges for every vertex in the graph before adding them to the open set is an optimization to this algorithm. This optimization will make more edges to be chosen and average the distribution of the connection. Also, a low propagation delay is not guaranteed through the proximity of vertexes. To this point, average cumulative propagation delay per circuit is high in this algorithm. However, a large number of vertexes in the shortest path is in a single link. A bottleneck which will lead to a large number of blocked connections will be made quickly in this algorithm.

For Shortest Delay Path (SDP) algorithm, the average degree in the topology graph is around 2 in the tested cases. Therefore, only one edge of every vertex can be used. Hence, a sizable percentage of requests will be blocked in this algorithm. The shortest propagation delay edge is always being chosen in this algorithm. The shortest propagation edge will be saturated in a short time and will not let more connections through if both edges linked to a same vertex. Another consequence of it is that the established connection have the smallest total propagation delay possible. However, the smallest total propagation delay does not guarantee the least hops. In this case, the performance will be bad if queueing, transmission and processing delay are major. While its performance may be seriously bad because it is under a circuit network.

For Least Loaded Path (LLP) algorithm, it will obtain many effective paths because of considering the how the path loaded. This algorithm can avoid the paths that are saturated because it considers the rejected paths. This will make the through and distributes better. But the choice of connection may not be the best because of the wide distribution connection. Therefore, average cumulative propagation delay of this algorithm is higher than other two algorithms. However, it can avoid the bottlenecks compared to the other two algorithms. And the number of hops per path is small due to the widely distributed path.

1. **Performance evaluation**

Figure 4.1 Different packet rate to successfully routed packets in different protocols

The packet rate does not influence successfully routed packets in any protocols since it is under circuit network.

Figure 4.2 Different packet rate to average number of hops per circuit in different protocols

The packet rate does not influence average number of hops per circuit in any protocols since it is under circuit network.

Figure 4.3 Different packet rate to average propagation delay in different protocols

The packet rate does not influence average propagation delay in any protocols since it is under circuit network.