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| COMP3331 |
| Programming Assignment |
| Routing Performance Analysis |
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# Data Structures

## Workload

The workload was stored as a queue of *Requests* in the *Workload* class. After parsing the *workload.txt* input file, a queue of *Requests* is created and ordered by the requested time. Each *Request* contains

* Source node name
* Destination node name
* The Path between the nodes (a list of nodes between source and destination)
* Timestamp and Duration

The path remains uninitialized until the request is processed and a path is calculated using the routing processor.

## Network Topology

The network topology was stored as a graph in the *Network* class. The graph was broken into vertices for each node defined in *topology.txt* and Edges for each connection between nodes defined in *topology.txt*. Vertices were stored in a hash table referenced by their node-name stored as strings. Each vertex then contained a hash table of connected Edges, referenced by the other end of the Edge. Edges contain information on their propagation delay, virtual circuit capacity and number of active connections.

Class *Network*

HashMap<String, Vertex> *Nodes*

“A” “B” “C”

Class *Vertex*

String *name* = “A”

HashMap<String, Edge> *adjacent*

“B”

“C”

Class *Vertex*

String *name* = “B”

HashMap<String, Edge> *adjacent*

“A” “C”

Class *Vertex*

String *name* = “C”

HashMap<String, Edge> *adjacent*

“B”

“A”

Class *Edge*

Class *Edge*

Class *Edge*

PriorityQueue <Request>

*activeConnections*

The network also contains a queue of active connection requests, used to keep track of loading on the network. This data structure is illustrated in Figure 1.

Figure 1 - Diagram of network topology data structure

# Comparison of Routing Protocols

Table 1: Comparison of the three routing protocols \*

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| --- | --- | --- | --- |
| *Performance Metrics* | *SHP* | *SDP* | *LLP* |
| Total number of virtual circuit requests | 8377 | 8377 | 8377 |
| Total number of packets | 8377 | 8377 | 8377 |
| Number of successfully routed packets | 4651 | 3886 | 4047 |
| Percentage of successfully routed packets | 55.52 | 46.39 | 48.31 |
| Number of blocked packets | 3726 | 4491 | 4330 |
| Percentage of blocked packets | 44.48 | 53.61 | 51.69 |
| Average number of hops per circuit | 3.42 | 3.86 | 4.54 |
| Average cumulative propagation delay per circuit | 146.53 | 135.54 | 215.97 |
| *\* Virtual circuit network with packet rate of 1 packet/sec* | | | |

# Virtual Packet Network Performance Evaluation





