Result Analysis Document

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The results have been calculated for three different scales of networks 20/40/80 nodes in the network. The queries fired in the network follow a zipf distribution with the most popular query being fired the most number of times in the network and the least popular one less number of times.

The analysis is done on the basis of the minimum latency, maximum latency, standard deviation, mean latency, max and min number of hops, Standard deviation of hops.

RESULT ANALYSIS FOR 20 NODES:

LATENCY:

minimum latency: 0.102 milliseconds

maximum latency: 23.138535 milliseconds

standard deviation of latency: 16.348238 milliseconds

mean of latency: 11.57905 milliseconds

HOPS:

Average number of minimum hops: 1

Average number of maximum hops: 3.15

standard deviation of hops: 0.667866647

mean of hops: 1.94228

RESULT ANALYSIS FOR 40 NODES:

LATENCY:

minimum latency: 4.40938 milliseconds

maximum latency: 36.775285milliseconds

standard deviation of latency: 25.692018 milliseconds

mean of latency: 18.608112milliseconds

HOPS:

Average number of minimum hops: 2

Average number of maximum hops: 3.5

standard deviation of hops: 0.6812

mean of hops: 2.23

RESULT ANALYSIS FOR 80 NODES:

LATENCY:

minimum latency: 0.533092 milliseconds

maximum latency: 67.280191 milliseconds

standard deviation of latency: 15.069614 milliseconds

mean of latency: 34.056965 milliseconds

HOPS:

Average number of minimum hops: 1.6

Average number of maximum hops: 3.8

standard deviation of hops: 0.719 mean

of hops: 2.7451

Latency:

From the results presented, it can be seen that the Latency value increases as the number of nodes in the network increases. This results due to the fact that as number of nodes increase, the propagation time for the query to travel from a node in a network towards the end of the network increases.

Each network size, depending on its size (number of nodes) has resources allocated to it accordingly as follows:

# of Nodes in the Network	# of Entries (each node)
20	8
40	4
80	2

Due to this distribution, as the network size increases, the number of resource allocated decreases resulting in increasing latency.

Since, all the simulations were done in a local network, no packet loss was experienced and hence delay and latency are equal in this case.

Number of Hops:

With the increase in network size, the number of hops increases. For a network the average number of hops is given by:

log N to base n

where N is number of nodes in network and n is the minimum number of nodes it is connected to. Hence, in case of max 80 nodes, the Maximum hop count is 3.98 ~ 4.

Per Query Cost:

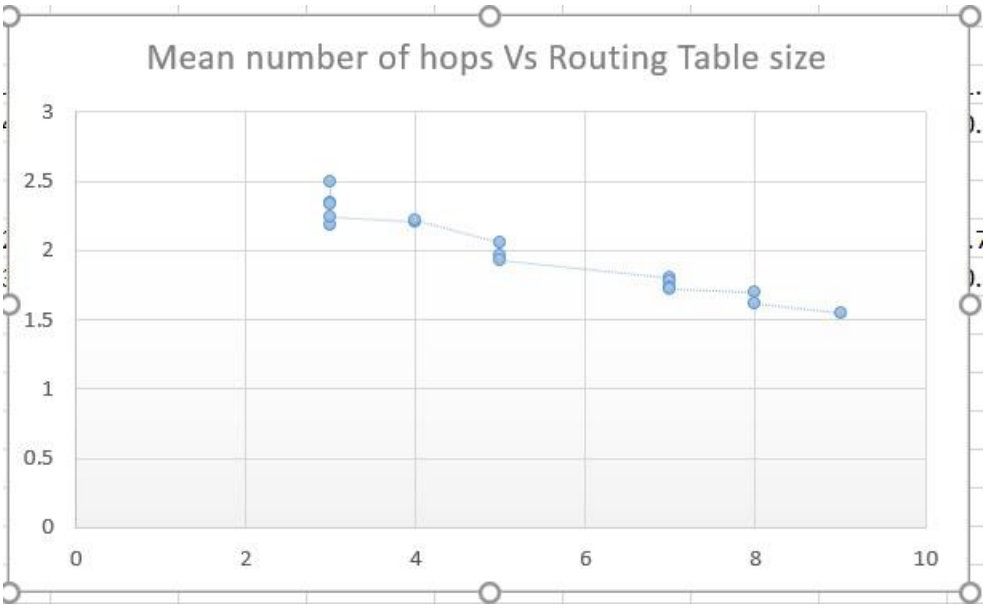
The per query cost is given by the mean number of hops in network. Hence, the query cost will increase with increasing network size. Its 1.94 for a 20 node network, 2.23 for a 40 node network and 2.741 for a 80 node network.

Per Node Cost:

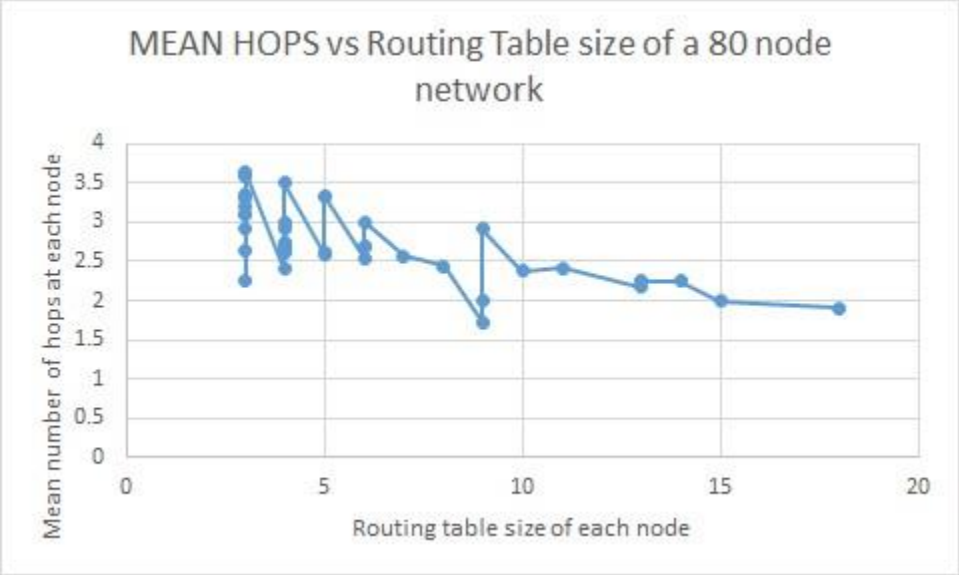
The per node cost is the number of queries processed by each node. In this case when we have 160 resource files, the per node cost will be 160*5 = 800. Hence, the per node cost is 800 (number of query messages received, forwarded, and answered)

Routing table size and mean hops analysis:

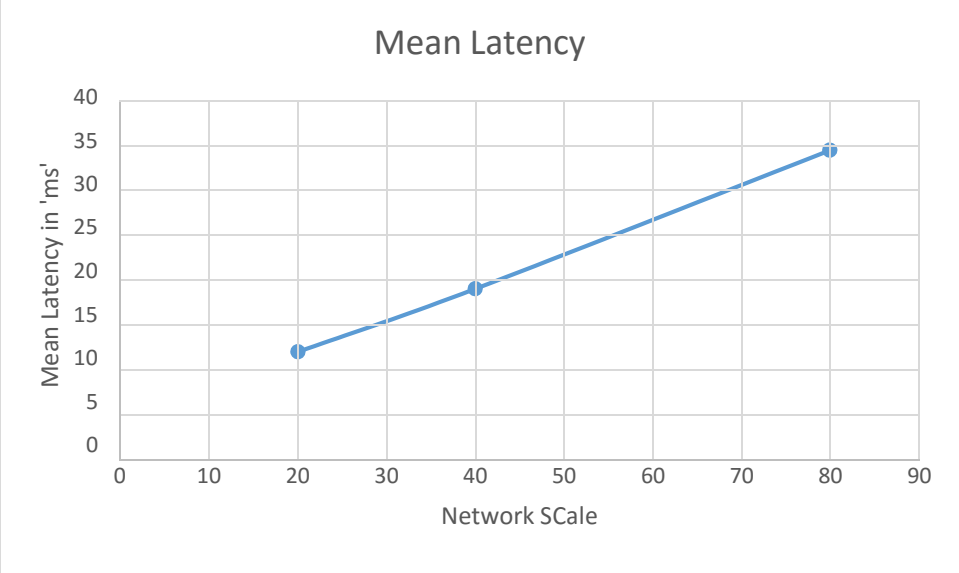
From the below graphs, we can see that as the node degree increases considerably, the average number of hops decreases.



Graph 1: The above graph is for a 20 node network

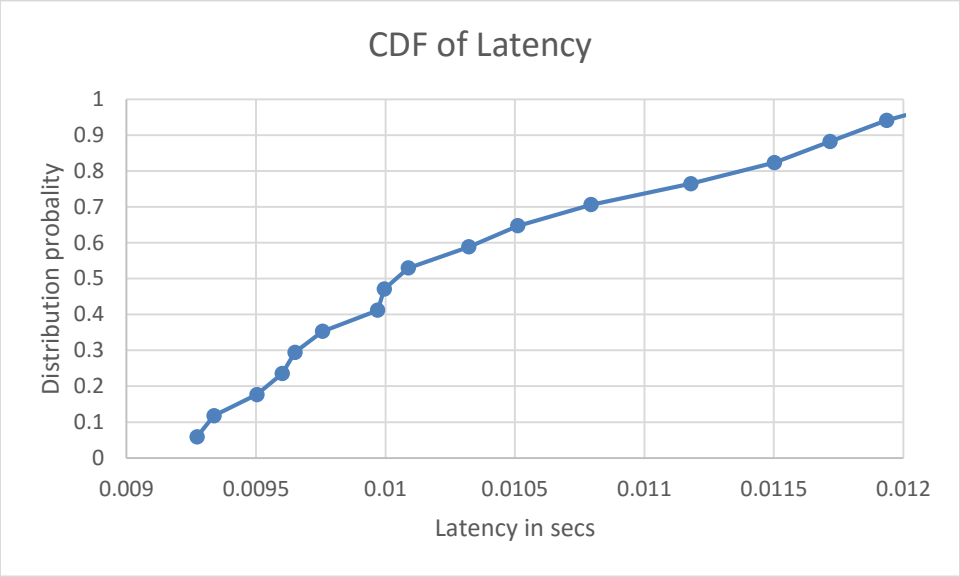


Latency and network size analysis:



We can see from the graph above that as the size of the network increases, the mean latency increases. This is due to decrease in number of resources per node and also increase in number of nodes which are farther away.

CDF: Latency vs Probability Distribution for 20 nodes



From the above graph it can be seen that, more than 80 percent of the nodes have a latency less than 11.5 miliseconds.