Convergence time for each topology in milli-seconds was recorded for different size of network.

Termination condition for algorithm :

Push-Sum : if last 3 S/W ratios of a node doesn't change by pow(10,-10), node is eliminated from network. If a node gets into a situation where all its neighbours are terminated, Algorithm gets terminated.

Gossip : if a node gets a rumour for 20 times, node gets terminated. If a node gets into a situation where all of its neighbours are terminated, Algorithm gets terminated.

Push - Sum Algorithm (time in milli-seconds)						
Nodes/Topology	Full Network	Line	Random 2D Grid	3D torus	Honeycomb	Random Honeycomb
50	88	3436	4	136	1076	226
100	306	31016	960	387	2670	521
250	1391	207134	25140	2738	25293	1818
500	5582	1827261	113340	7127	116246	5847
750	11110		514511	49931	454237	12678
1000	19412		944505	101821	1378524	30875
1500	44102			211298		61947
2000	91710					120738
3000	202554					

Gossip Algorithm (time in milli-seconds)						
Nodes/Topology	Full Network	Line	Random 2D Grid	3D torus	Honeycomb	Random Honeycomb
50	28	7	8	24	20	19
100	70	10	4	52	11	33
250	312	12	124	240	69	121
500	1263	20	915	516	58	392
750	2507	36	3688	2062	410	824
1000	4431	20	9274	3145	439	1300
1500	9553	28	36393	5576	1612	3155
3000	39874	41		20669	5453	13295
5000	104663	79		75786	3307	38856
10000		159			12301	
25000		566			67180	
50000		256				
100000		540				

Graphs are plotted for time vs. no. of nodes for both gossip and Push-sum Algorithms. (In Page 2)

Interesting Observations:

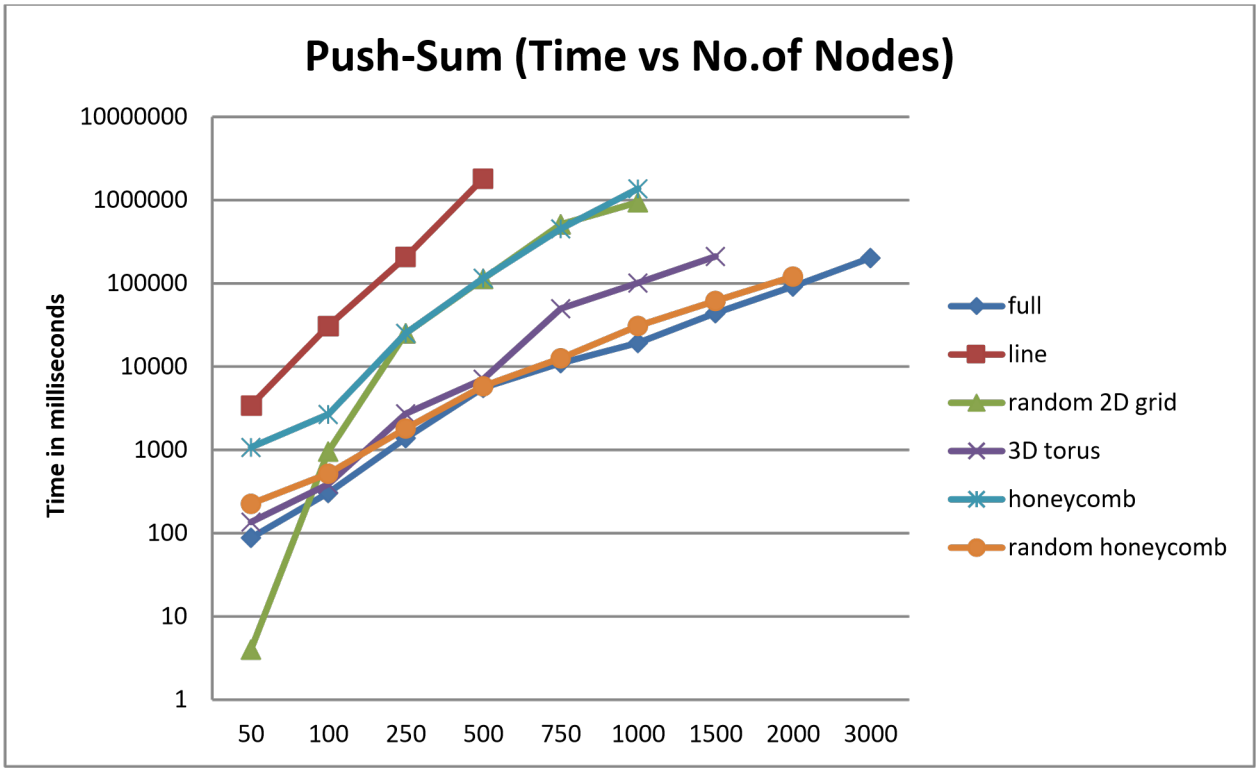
- For push-sum algorithm, **Line** topology converges **the slowest,** while **Full Network** the **fastest.**

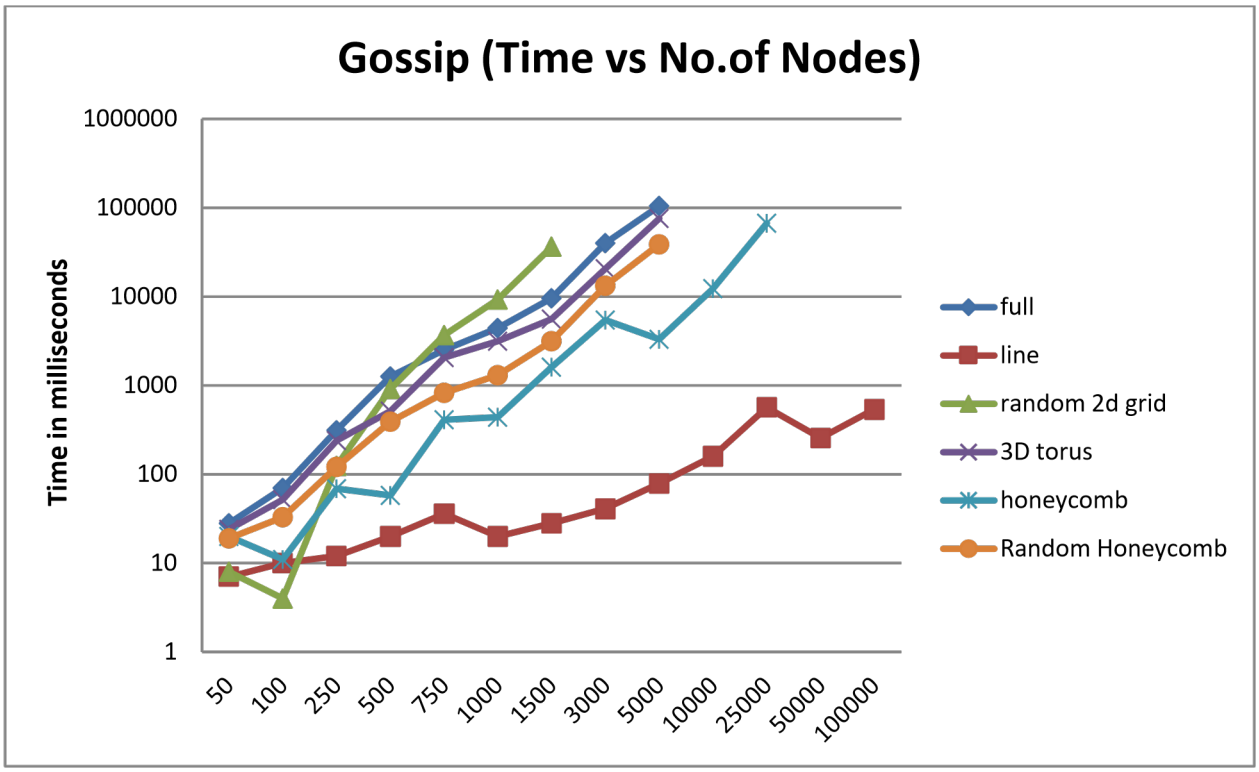
  Possible explanation: In push sum, the sum/weight ratios of all nodes converge to a point.In line topology, Each node is connected to only two neighbours whose s/w is initially not highly deviant from the node's ratio(We chose node_id as sum for each node). So the change observed in the ratio would be relatively small for each message it receives.

In full network each node is connected to every other node. So each node has a higher probability to converge faster to the final value when compared to the other topologies.

- For gossip algorithm, it is observed that, the more neighbors' a node has, the more time it will take for convergence. Hence Line topology converges the fastest, while full network converges the slowest.

Plots:





*Original Graphs can be found in the excel file “project2 observations”.