# Project Report

**Group Members:**

1. Ruchika Mishra, UFID - 9137 1418
2. Mrigank Shekhar, UFID - 9428 9218

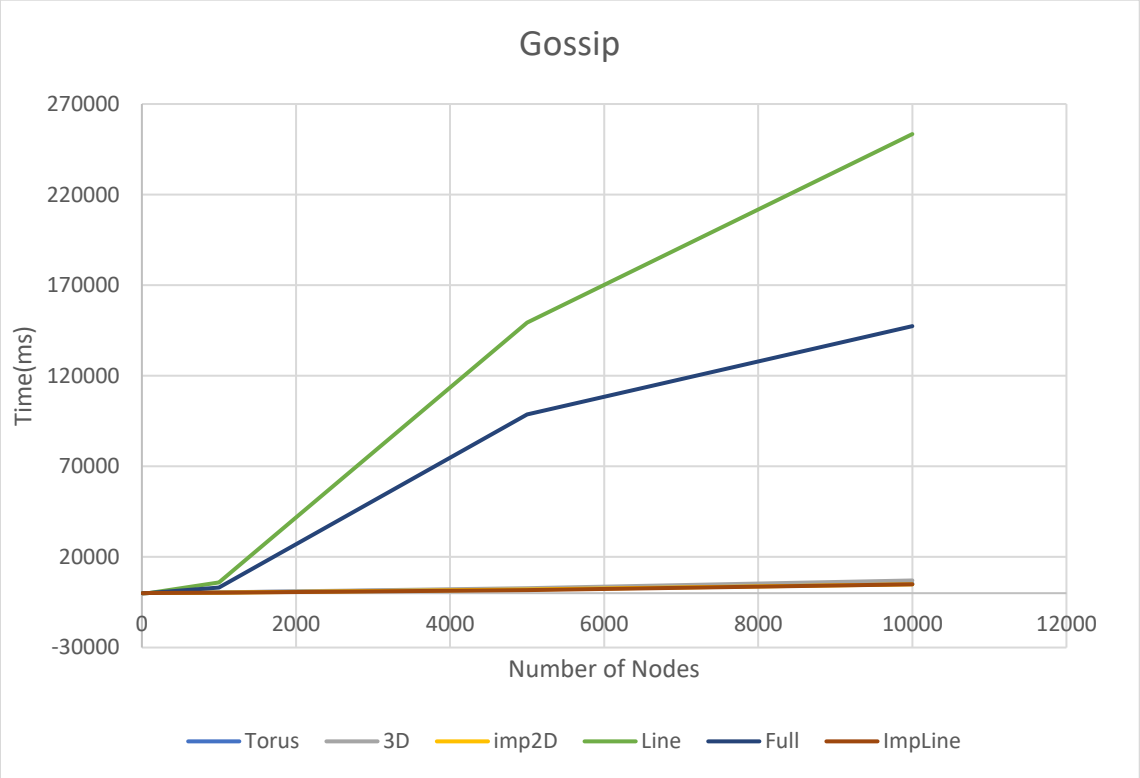
**Implementation Details:**

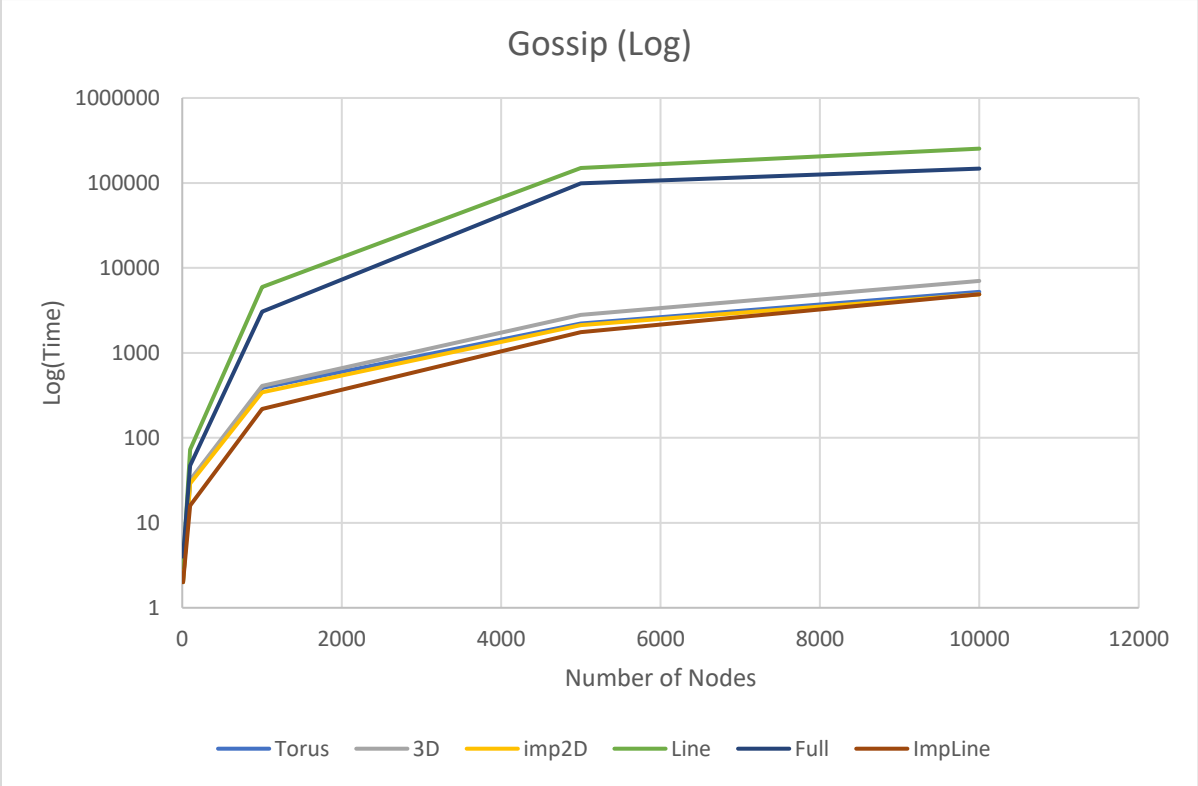
In our implementation, we stop the transmission of the message from a particular node when it has received the message for 10 times. The criteria of convergence for both the Gossip and Push-Sum algorithm is when the spread is 100%. Spread refers to the percentage of the nodes that have received the message.

For Push-Sum algorithm, the actor terminates if an actor's ratio s/w did not change more than $10^{-10}$ in 3 consecutive rounds.

**Graphs plotting convergence time vs size of the network for different topologies and algorithms**

**Gossip Algorithm:**






**Push-Sum Algorithm:**


**Observations:**

1. As expected the line topology has the maximum convergence time. The main reason for the behavior can be attributed to the fact that a single node propagates the message to only one node at a time and thus takes a longer time to cover all the nodes in the topology.
2. Full topology has advantages like a high degree of reliability although it comes at a cost of the large quantity of redundant links between nodes and so there is multiplicity of paths for the data. Due to the above behavior, the convergence time was expected to be more for larger number of nodes and the same was observed.
3. The main advantage of imperfect line is we are not limiting the way we are choosing neighbors for this strategy thus giving us better coverage. Due to this for both the algorithms we can notice that the convergence time is lesser for imperfect line topology.
4. For Gossip algorithm, the 3D topology has better performance than Random 2D topology. This does not hold true for the Push - Sum algorithm where the Random 2D topology has better convergence time.
5. For Gossip algorithm torus topology has better convergence time over all topologies. Gossip algorithm showed better performance than Push-Sum for all the topologies.