

(Probabilistic) Broadcast

Large Scale Distributed Systems

Graphs can provide a mathematical abstraction that represents a physical network where nodes/vertices are connected by communication links/edges. Starting from the graphs developed in the previous tasks (random and preferential) we will now begin exploring a broadcast algorithm on top of these graphs.

The distributed algorithm will operate in synchronous rounds. At round zero, nodes only have access to their own local state and can issue messages to be transmitted to their direct neighbours. At round one these incoming messages can be inspected, state updated, and new messages transmitted to be available at round two. And so forth.

The first task is to select a random node and broadcast from there a message that should be delivered to all the nodes. The algorithm is flooding and, under no faults, it will reach all nodes in at most diameter synchronous rounds.

The next task is to try to limit the number of transmissions to a subset of neighbours and see how this affects delivery at all nodes. Play with different fractions and analyse how this affects the percentage of nodes that end up receiving the message. It is recommended to average the results across different runs.