CS425 MP2 Report

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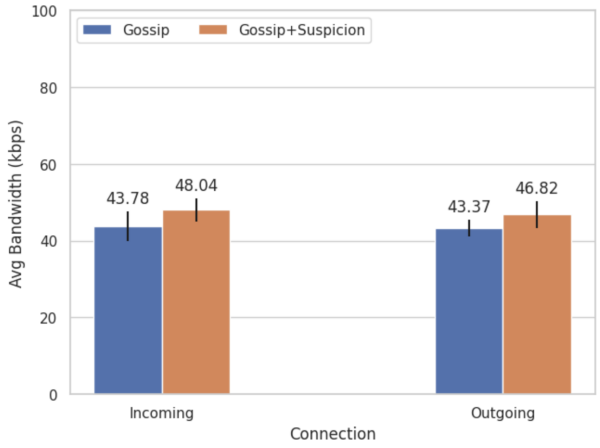
We have an introducer, which helps each machine join the network. We are running a server on each machine. It runs separate threads that handle pinging (sending heartbeats), checking for failures (whether the heartbeat counter increase has timed out or not), and checking for input at the machine. Note that B = Number of nodes the gossip/suspicion message are sent to.

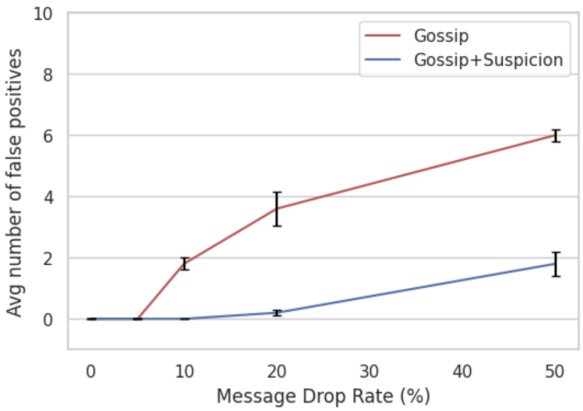
Failure Detection with Time Bound (5 seconds)

System Parameters: T_gossip = 0.5s, T_fail = 2s, T_cleanup = 6

Bandwidth (B=3)

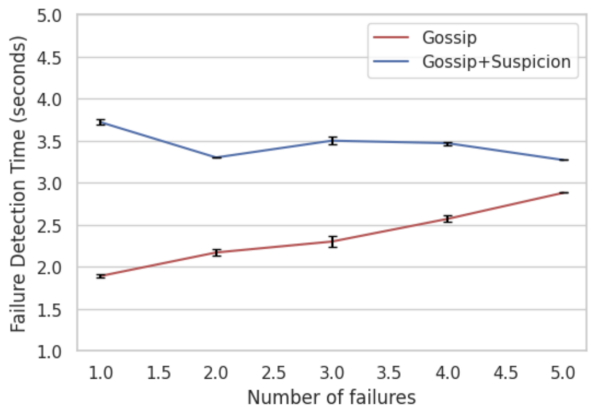


False Positives vs Message Drop Rate (B=2)



The incoming and outgoing bandwidth for GOSSIP is slightly lower than GOSSIP+S since there are no 'suspicion' messages being passed between machines in the former mode.

For the second plot, we ran each setting (diff. message drop rate) 5 times and took the average number of false positives for plotting. The number of false positives increases as the drop rate goes up. For GOSSIP+S, nodes are suspected of failing in case of a high message drop rate, however these are often not logged as actual failures since a ping is received later on with the correct status of the machine in question, unlike normal gossip. Thus gossip has more false positives.

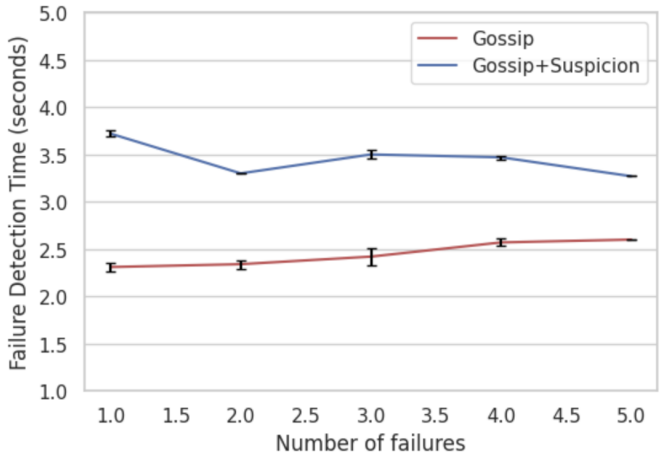


Failure Detection Time vs Number of Failures: (B = 3, 0% message drop)

The time taken to detect failures is lower in case of GOSSIP compared to GOSSIP+S because there is no suspect step involved. As the number of failures increase, the detection time remains fairly constant since the fail and suspect messages are gossiped at regular intervals in separate threads. In all cases, failure detection time is < 5 seconds as specified.

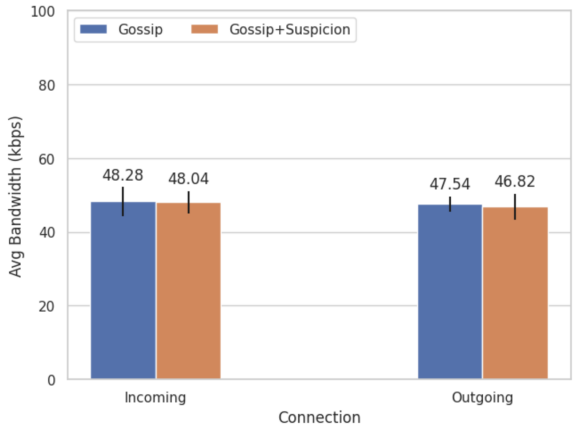
Failure Detection with Fixed Base Bandwidth Cap (49 kbps)

System Parameters: T_gossip (for GOSSIP) = 0.47s, T_gossip (for GOSSIP+S) = 0.5s, T_fail = 2s, T_cleanup = 6. Note that we only changed T_gossip in order to make the base bandwidth of both GOSSIP and GOSSIP+S within 5% of each other.

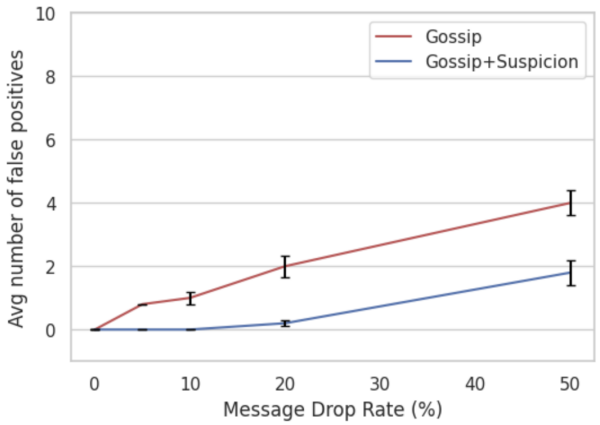


Trends are similar to the previous case. Overall bandwidth is a bit higher since we decreased T_gossip slightly (increased frequency of gossiping).

Bandwidth (B=3)



False Positives vs Message Drop Rate (B=2)



The incoming and outgoing bandwidth are now almost equal for both GOSSIP and GOSSIP+S (clearly within 5% of each other). Bandwidth for GOSSIP has increased from before since frequency of gossip has increased.

For the second plot, frequency of gossip has increased slightly, so the number of false positives detected is a bit lower when there is message drop, as expected. This is because it is more likely that a ping message for a node is received before its status is changed to failed at any node.