# MP4 Report

As instructed in (d), the following image shows how channel utilization varies with increasing number with nodes, which is that N varies from 10 to 500 and R has five different values. The black curve when R=8 is the plot for (a).

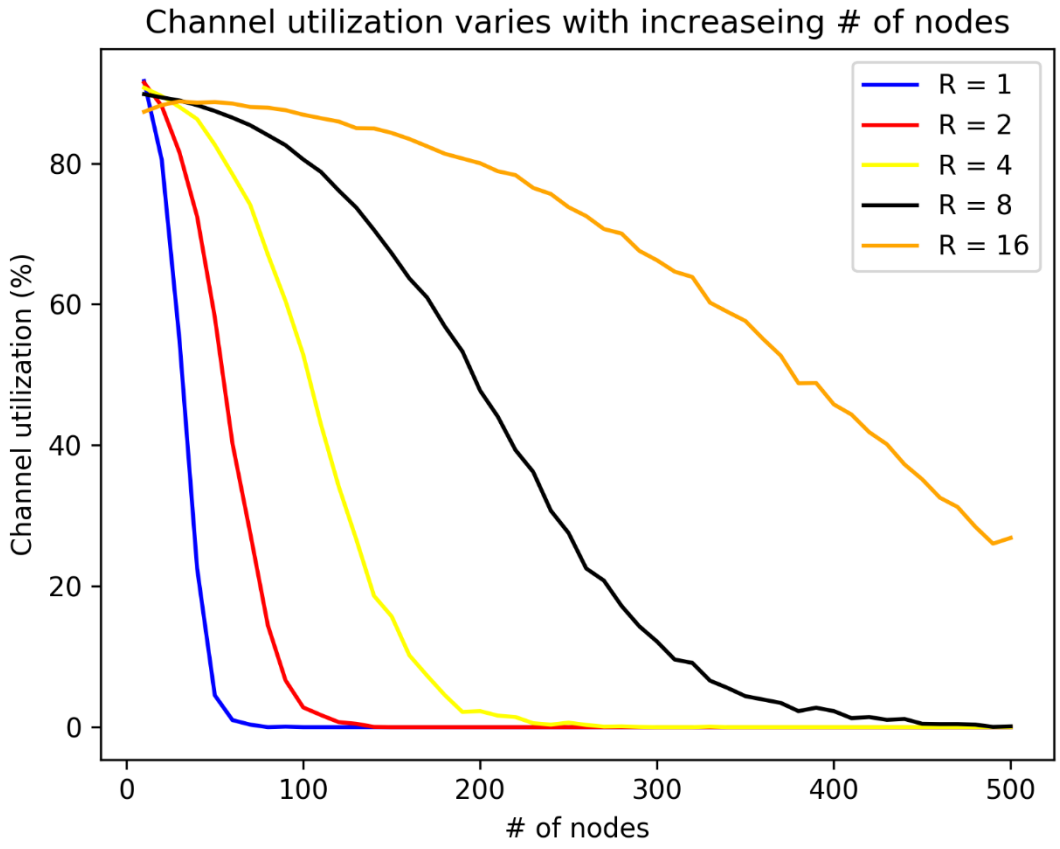


*Figure 1: This graph depicts channel utilization varying with increasing number of nodes*

Figure 2 below also represents the channel utilization. However, it has different value for L (packet length), as instructed in (e).

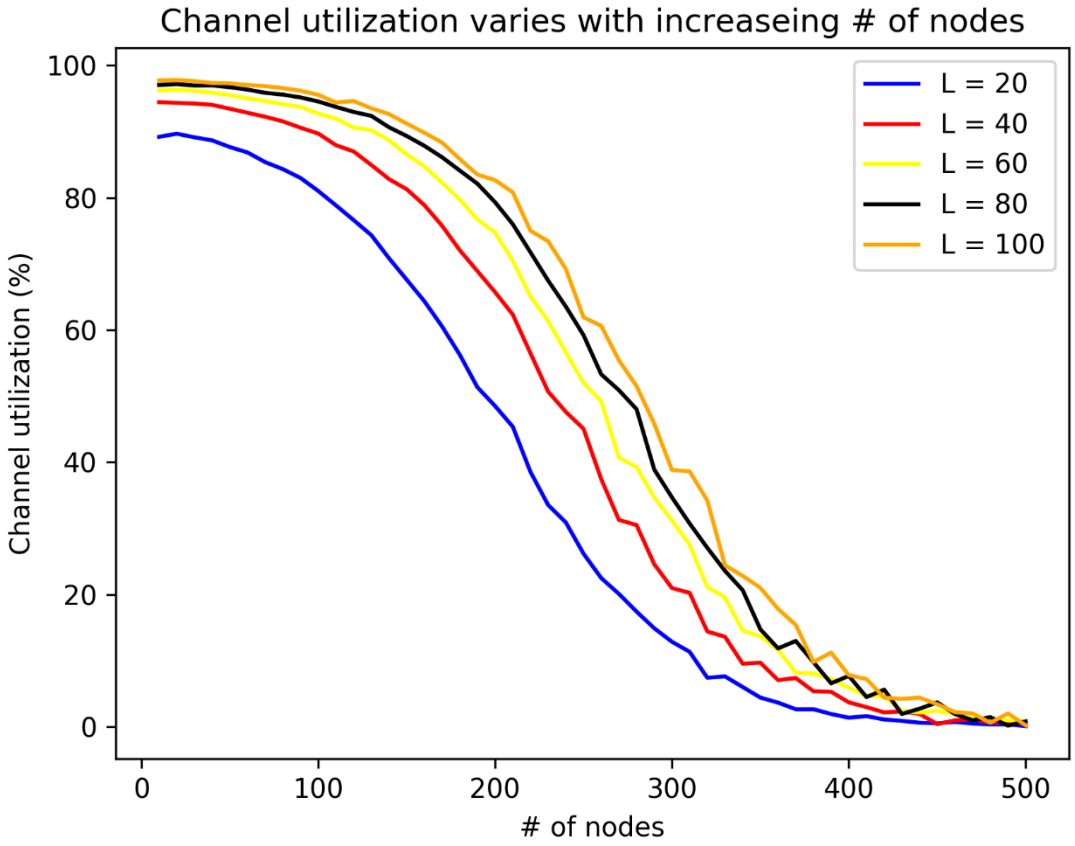


*Figure 2: This picture shows channel utilization varying with increasing number of nodes and different L value*

Comparing these two graphs, they both have a similar shape and always decrease. it can be concluded that increasing the number of nodes will definitely cause the channel utilization to decrease, because more nodes using one channel will cause more collisions and less successful packet transmissions.

However, by increasing R, the channel utilization will converge to zero much slower. When R is very small, the channel utilization converges to zero drastically. This is because when initial R is smaller, the nodes are more likely to pick the same number from a smaller range, leading to collision and lower channel utilization.

By increasing L, the trends of channel utilization share very similar pattern. Packet length only has limited impact on channel utilization. This is because larger packet length will occupy more time for a single packet transmission, and increase the channel occupied time portion a little bit in the whole simulation, but it cannot genuinely reduce the collisions.

The following image is about channel idle fraction also varying with increasing number of nodes, as instructed in (b).

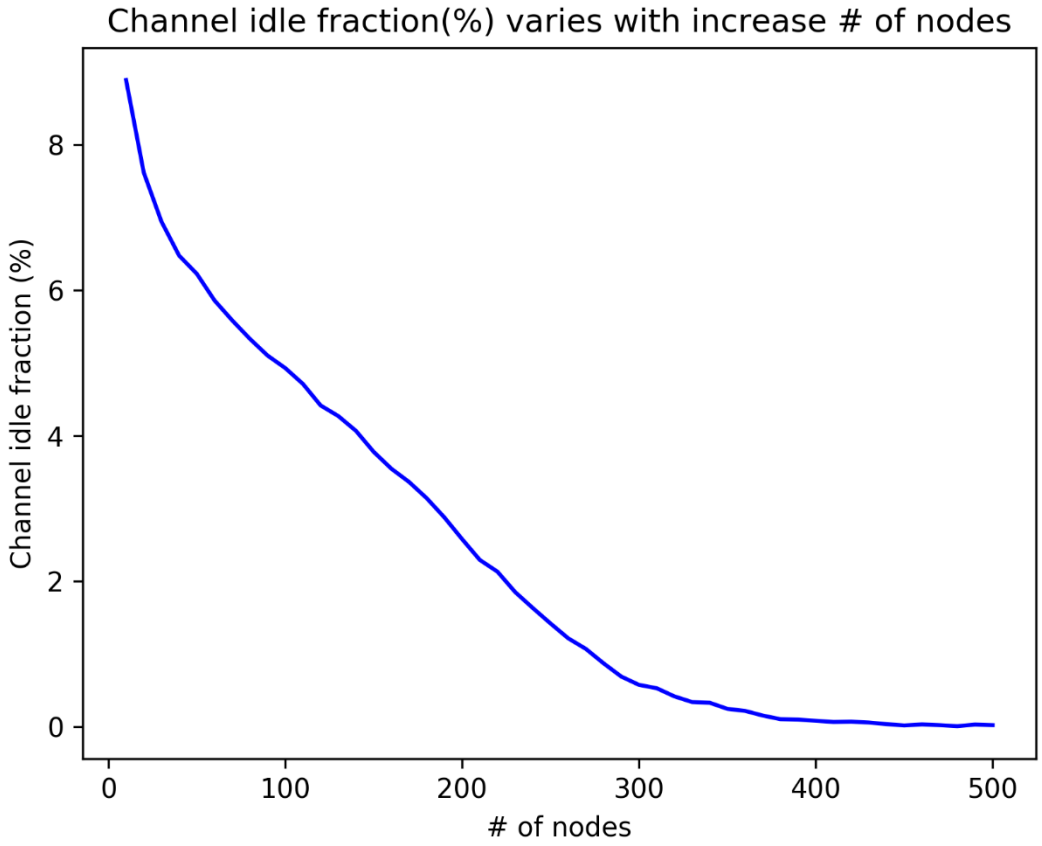


*Figure 3: This graph depicts channel idle fraction varies with increasing number of nodes*

Finally, figure 4 exhibits the total number of collisions with increasing number of nodes, as instructed in (c).

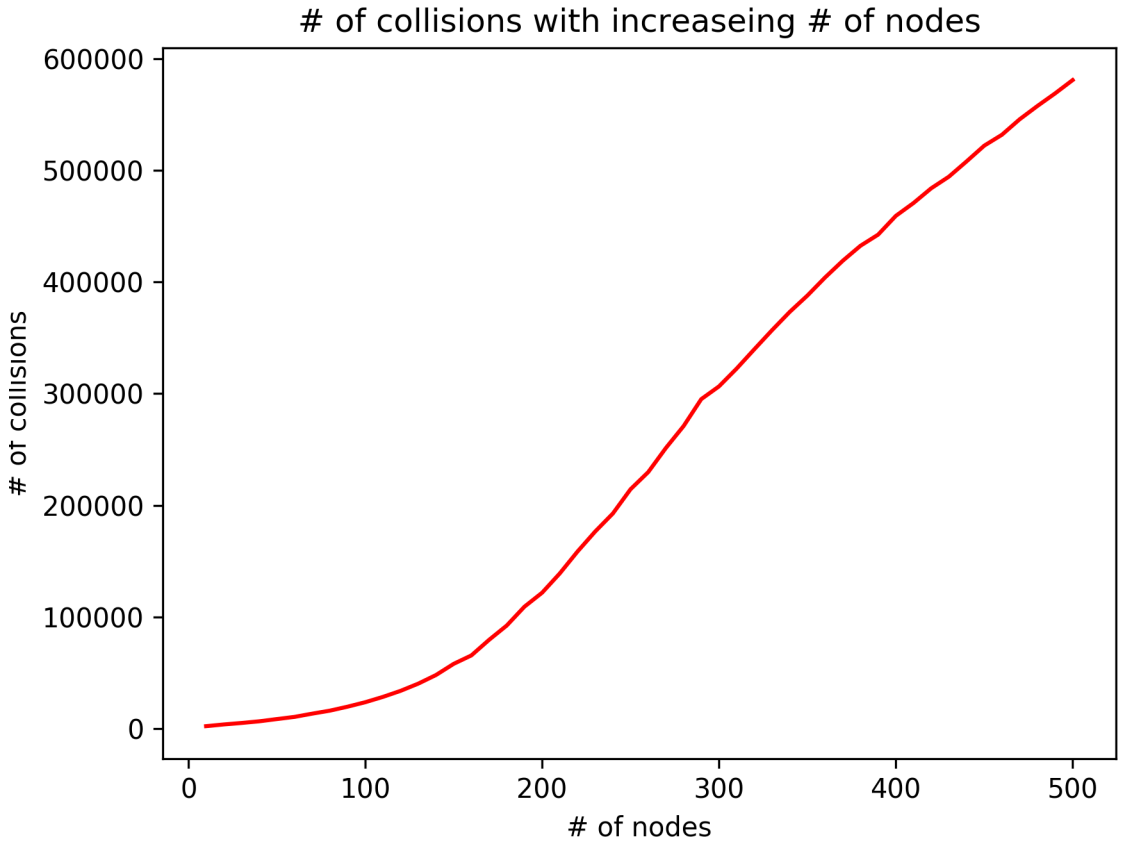


*Figure 4: This graph shows total number of collisions with increasing number of nodes*