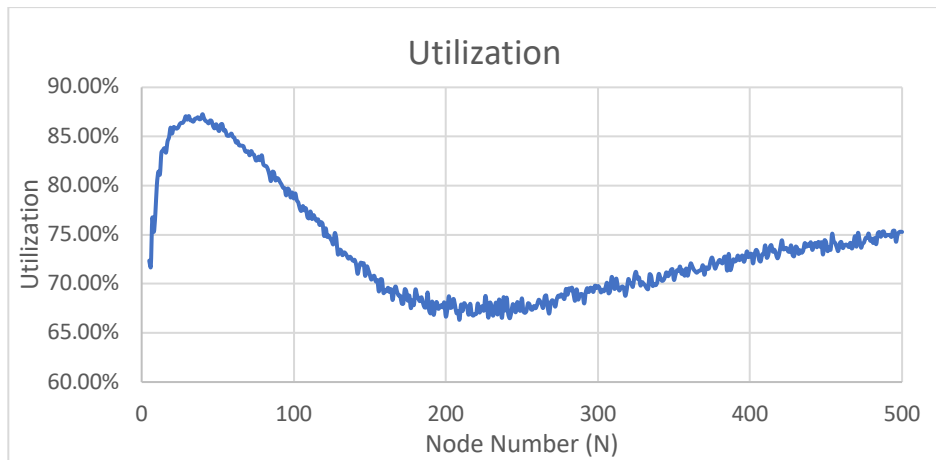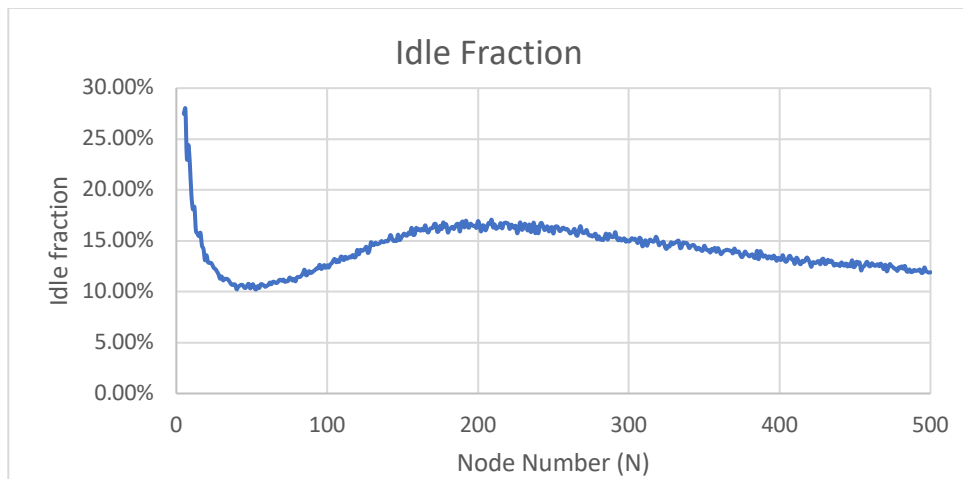# ECE 438 MP4 Report

(a)
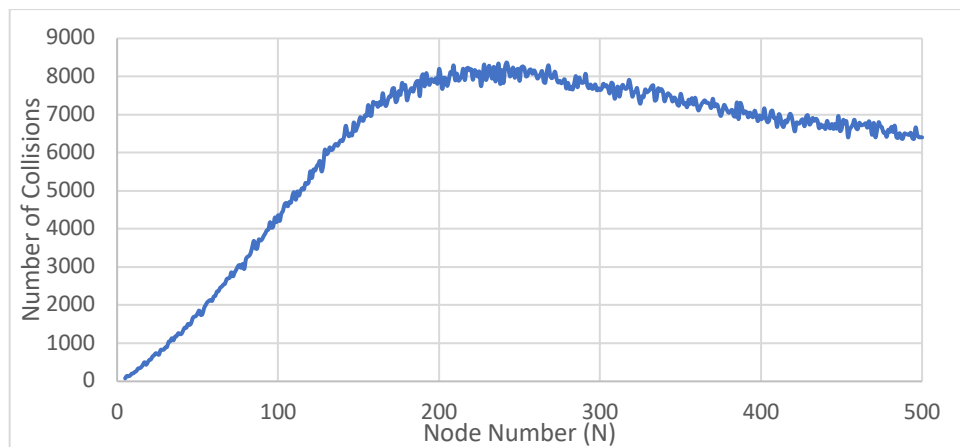

Utilization

X axis is the node number from 5 to 500 and Y axis is the channel utilization percentage.
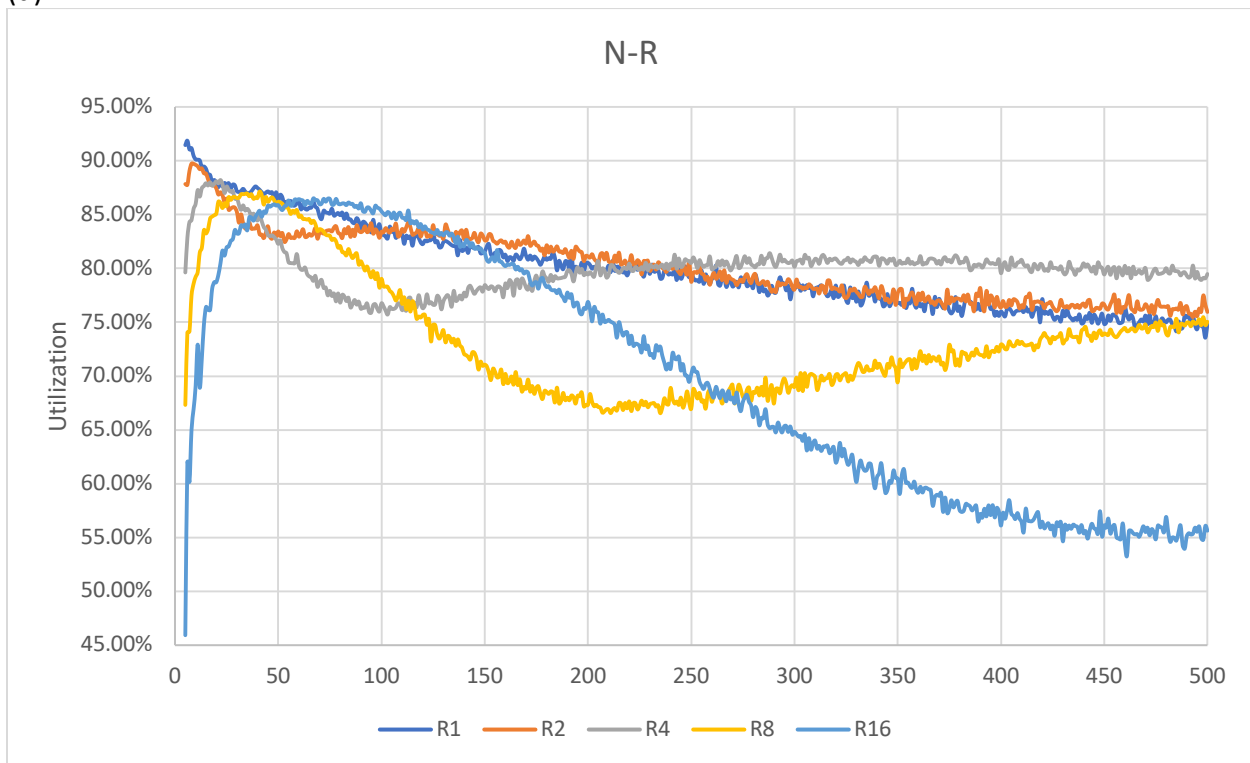
(b)

Idle Fraction

X axis is the node number from 5 to 500 and Y axis is the channel idle fraction in percentage.
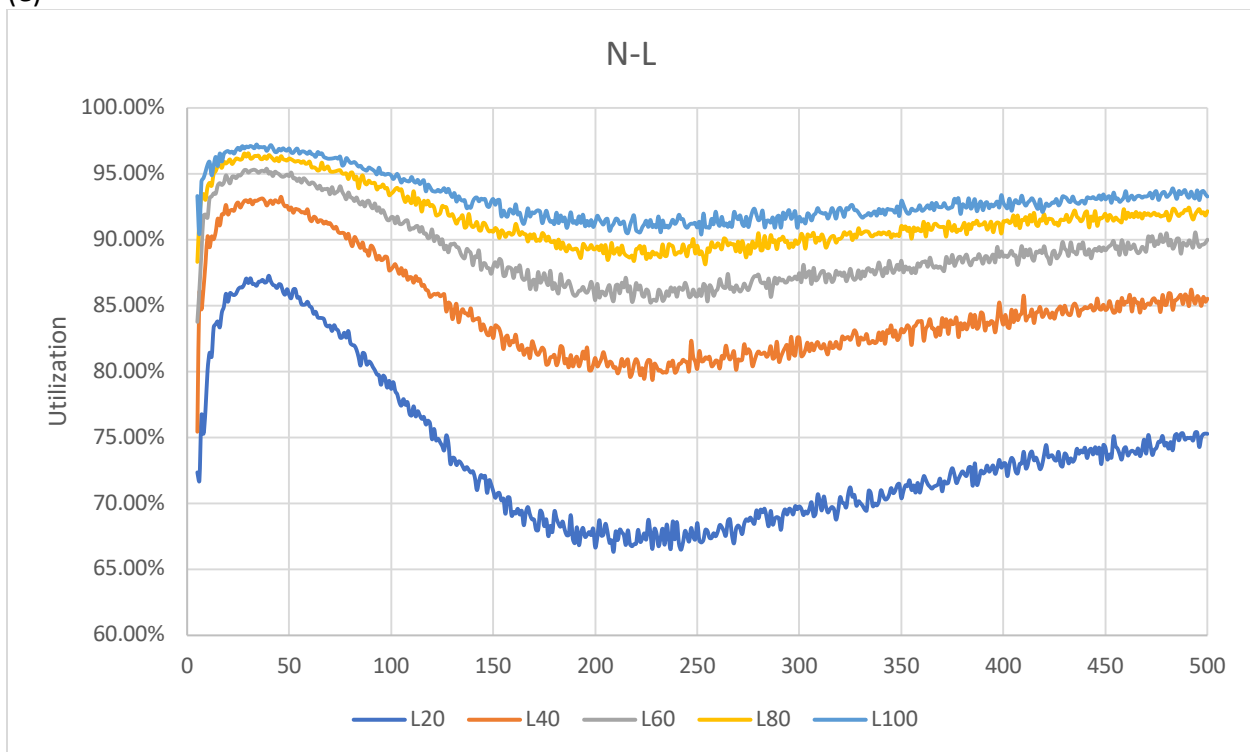
(c)

X axis is the node number from 5 to 500 and Y axis is the number of collisions.

(d)

X axis is the node number from 5 to 500 and Y axis is the channel utilization percentage.
Different colors represent different initial R value as above.

(e)

X axis is the node number from 5 to 500 and Y axis is the channel utilization percentage.

Different colors represent different packet length (L).

(f)

1. node Number N and initial R

The channel utilization first increase then decrease and slowly go up with the increase of node number. When node number is small, the R value is relatively bigger. Therefore, there are many idle clock ticks in channel. When node number is slightly bigger, in which case N is closer to average R number, the utilization increases steadily and it peaks at some point. After that, the node number is relatively larger than average R, so in this phase, collisions count increases fast, which results in the drop of utilization. Due to more collisions, each node is easier to reach maximum R, while node is far smaller than maximum R. Thus, idle time also increase in this phase and is close to maximum R at some point N, then idle time decrease again. The decrease of idle time is the reason why utilization increases slowly in last phase.

For different R, they determine the peak and valley of the curve. With larger initial R, the utilization peaks at larger N.

2. packets length L

Apparently, larger L have a higher channel utilization. Because longer packets length increases the transmission time of the channel. On the whole, longer transmission time reduce the time node counting down their R which means less idle time and collisions.