

## ABSTRACT

Internet of Things (IoT) is a concept where an object can transmit data over a network without using human assistance. These objects can be sensors, gadgets, or household devices. Currently, the growth in the number of IoT devices connected to telecommunications networks is increasing rapidly, resulting in a lack of communication network capabilities to serve a very massive number of devices in the future in a wide area coverage.

Problems arise when the number of IoT devices connected to telecommunications networks is increasing and network provider devices have difficulty serving the very large number of devices. In this study, two tests will be carried out. The first test is to find out the optimal total of users that can be served by cell-free massive MIMO on ALOHA and the second test is to find out the optimal traffic characteristics on cell-free massive MIMO where the user is said to have succeeded in transmitting if the SINR value is above the specified threshold. Threshold value depends on the sensitivity of each device used, in this simulation we assume that the device we are using will transmit successfully if it is above 10dB.

The results of the simulation and analysis in this study indicate that the more active users, the greater the interference that will occur so that the total SINR value above the threshold becomes less, besides the number of access points and the number of antennas greatly affect the number of users that can be served. And the optimal characteristic is when the number of active users is 40% of the total users where in these conditions the average SINR value above the threshold reaches 95.41% while when we increase user activity to 50%, the average SINR value is above the threshold. limit to 33.77%. There was a decrease of 61.63%.

**Keywords:** *MIMO, ALOHA, Internet of Thing (IOT).*