

## ABSTRACT

Along with the rapid development of communication technology today, the use of large telecommunications is inevitable. This is directly proportional to the growing development of services provided by technology today. This research focuses on the allocation of resources in cognitive radio networks and uses the ant colony algorithm as a solution for optimizing spectrum utilization. Not only from the individual that is considered, but also many aspects that must be considered so that spectrum resources can work optimally. When the primary user works well and is able to choose the best sub-channel to transmit the data, that's where the allocation of resources works optimally. Secondary users can also choose the remaining sub-channels to transmit the data. The results that have been studied show that the maximized resource allocation algorithm has advantages in optimizing the resource allocation, compared to other allocation algorithms.

The ant colony algorithm chosen in this study provides a solution in optimizing the allocation of these resources. Several stages carried out by this algorithm are able to streamline the spectrum in allocating these resources, so that the simulation results shown are able to minimize existing disturbances. It also can show some interference values based on channel availability and the distance between the primary user and also the secondary user.

The results of this final project using ant colony algorithm, get the average data rate value is  $2.57504 \times 10^6$  bps for PU and  $1.5347 \times 10^6$  bps for SU, spectral efficiency 17.46589 b for PU and 13.21337 for SU, energy efficiency  $1.95754 \times 10^7$  b/sWatt for PU and  $1.35425 \times 10^7$  b/sWatt for SU, and fairness is 0.76861 for PU and 0.74305 for SU.

**Keywords:** Cognitive Radio Network, Resource Allocation, Ant Colony Algorithm, Sub-Channel