

## ABSTRACT

Radio over fiber is a process of sending radio signals through fiber optic cables. By using fiber optic cable there will be many advantages in the form of small transmission loss, wide bandwidth, not affected by electromagnetic waves, and data security. So that with its advantages, research continues to be carried out to improve the performance of fiber optic communication systems.

The need for high speed data services and has a large bandwidth is always increasing every year. Therefore Radio over Fiber is present as one of the technologies that can support the growing demand. Using fiber optic cable can save costs and increase performance for high speed fiber. Seeing the rapid development of communication in the world, Radio over Fiber can be applied to support long distance communication services. This Final Project tests and simulates Radio over Fiber (RoF) based on Coarse Wavelength Division Multiplexing (CWDM) at a frequency of 3.5 Ghz for 5G performance. The main parameters used for the analysis of the results of this study are Bit Error Rate (BER), Q-Factor, Rise Time Budget (RTB), Link Power Budget (LPB), Signal to Noise Ratio and power at a distance of 1 km to 10 km. The design that has been made is implemented in simulation software.

From the results of testing and simulation at a distance of 1 km to 10 km, the results of the average Q-factor 10.362 and BER  $10^{-31.490}$  for the transmission power of -8 dB up to -4 dB. At a distance of 1 km to 10 km the results of the average Q-factor are 21.729 and BER  $10^{-106.312}$  for the transmission power of -3 dB up to 0 dB. It is hoped that this research can be used as a reference for the development of 5G networks and the next generation.

Keywords: Radio Over Fiber, Coarse Wavelength Division Multiplexing, 5G