

## ABSTRACT

WLAN (Wireless LAN) is LAN network where two or more computers are connected without using any physical wire. WLAN use radio wave as means of communication and to receive data. Radio over Fiber is a radio system that use fiber optic network as means of transmission. Optical communication system has transmitter, transmission lines and receiver. The transmitter in optical communication system can be LED (Light Emitting Diode) or laser, and the receiver is PIN (Positive Intrinsic Negative) photodiode and APD (Avalanche Photodiode).

The simulation is built using C++ language program that is Borland C++ Builder. The VCSEL simulation has some input signals, which are step signal, sine signal and OFDM with BPSK modulation signal. VCSEL is modeled using rate equation formulas to find its characteristics. To optimize the simulation performance, the bias current that being used is limited from 10 mA to 30 mA. While to proof the thermal characteristic of VCSEL, the temperature is limited from 26°C to 50 °C.

This Final Project gave optical analog signal as the output to proof the characteristic of VCSEL. The simulation has 0,243% of error which came from the numerical method that used to finish rate equation formulas. Based on simulation, threshold current value is 6,44 mA, threshold carrier density is  $1,51168 \times 10^{24}/\text{m}^3$  and time delay which needed by VCSEL is  $9,19 \times 10^{-10}$  s. Based on the analysis result, it can be concluded that the bias current and temperature is influencing the VCSEL responses. If the bias current higher, the responses will be worse. If the temperature is higher, the response from the same bias current will be worse.

**Keyword** : WLAN, laser, VCSEL, optical fiber