

## **ABSTRACT**

*Long Range (LoRa) has attracted a lot of attention due to its flexibility which has given rise to a tremendous proliferation of LoRa-based offerings among the emerging Low Power Wide Area Network (LPWAN). LoRa is widely used partially independent LoRa networks are expected to be used in the vicinity One of the main problems of LoRa technology is that it is susceptible to noise or interference because it only uses up chirp signaling during modulation. The use of hybrid methods can reduce noise and interference problems, this research designs LoRa communication based on up and down chirp. The hybrid method consists of FFT-based demodulation and cross correlation. The research is divided into 2, first by taking LoRa signal data from an oscilloscope device, second by taking LoRa signal data from a Realtek Software Defined Radio (RTL-SDR) device. Then both signals are analyzed and processed using software, namely matlab. Based on the test results of the LoRa device, it shows that the effect of using a larger tx power on the LoRa Dragino Shield device produces a better SNR value and also affects the range of LoRa. The results of the free space path loss calculation can be proven that with a distance of 5 meters, the FSPL value is 45.65 dB, a distance of 10 meters the FSPL value is 51.67 dB, and a distance of 15 meters the FSPL value is 55.20 dB. Indicating the closer the distance the potential loss of signal energy is very little and the more likely LOS occurs. This means that the hybrid method with combined up chirp and down chirp signals is effective in sending LoRa information signals.*

**Keywords:** *LoRa, Up and down chirp signal, Signal to Noise Ratio (SNR), cross correlation*