ABSTRACT

A smart water meter system is a technology that automatically reads and displays water usage through sensors, eliminating the need for manual readings. Data from the sensors is transmitted to a database server via a communication system that requires a wide-area, low-power network. This technology leverages the Internet of Things (IoT) concept to enable real-time data transmission. In Indonesia, the implementation of smart water meter systems can facilitate accurate and sustainable water distribution..

LoRaWAN, as a low-power, wide-area communication technology, offers an efficient and economical solution for smart water meters. LoRaWAN incurs lower costs compared to other technologies such as EC-GSM and NB-IoT. With a simple infrastructure and no spectrum licensing fees, LoRaWAN becomes an economical and effective solution, particularly for remote areas. The implementation of LoRaWAN in smart water meter systems demonstrates this technology's capability to support improved water management.

Testing the LoRaWAN communication system on smart water meters showed varying performance based on distance, environmental conditions, and spreading factor (SF). The results indicated that the lowest average RSSI was -102.67 dBm at a distance of 1.5 km, and the highest was -76.74 dBm at a distance of 100 m. The lowest average SNR was recorded at -12.5 dB at 700 m, while the highest was 3.38 dB at 100 m. The lowest packet loss was 0% at 100 m, while the highest reached 91% at 1.5 km with an SF of 7. The lowest delay recorded was 51.456 ms, and the highest was 329.728 ms. Using the appropriate SF can enhance communication stability and efficiency. The system also demonstrated power consumption efficiency, with minimal current increase when connected to the gateway. With an 8500 mAh battery, the current increase was only 0.06 mA when the end device was connected to the gateway.

Keywords: LoRaWAN, RSSI, SNR, *Delay*, *Packet Loss*