

## Long-distance communication via LPWA (LoRa)

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The present study is devoted to develop an IoT modules based on private LoRa. We have implemented a set of base unit and extension unit of private LoRa and examined their performance in an urban environment in west Tokyo. The communication was successful to transmit over 6 km in the urban area. We next develop a low-cost water level meter using the communication modules. The target price is lower than 1000 US dollars for each. This implies that, with a budget of 100 million US dollars, we are able to deploy 100 thousand of water level meters all over Japan.