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An Analysis of LoRa Low Power Technology and its Applications

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INTRODUCTION

LoRa : Long Range, low power wireless platform is a prevailing choice for IOT platforms. Creating smart IOT applications will improve the way we address some of the biggest challenges faced by cities, healthcare industries, agricultural sectors and other businesses. LoRa technology if used intelligently, can make the world a smart planet. LoRa Technology is a SemTech innovation that uses the LoRaWAN protocol specification. It uses the 915MHz unlicensed ISM (Industry, Scientific and Medical) band to enable low power, wide area network communication.

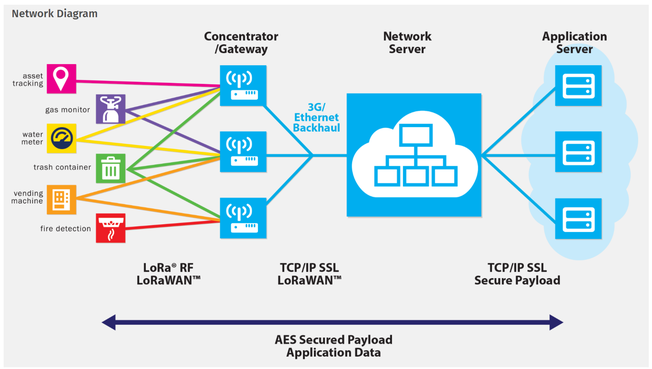
FEATURES

Feature	LORAWAN
Modulation	CSS chip
Rx Bandwidth	125 – 500 kHz
Data Rate	50Kbps – 290 Kbps
Max # messages a day	Unlimited
Max Output power	20 dBm
Link budget	154 dBm
Battery Lifetime	105 months
Power efficiency	Very High
Interference immunity	Very High
Coexistence	Yes
Security	Yes
Mobility	Yes

Key Features
Long Range
Low Power
Low Cost
Secure
Bidirectional
Standardized
Low number of base stations

LoRa Technology enables GPS-Free tracking. A single base station provides deep penetration in dense urban/ indoor regions and the technology uses end to end AES128 encryption.

BACKGROUND



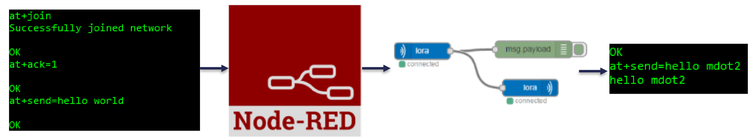
SETUP

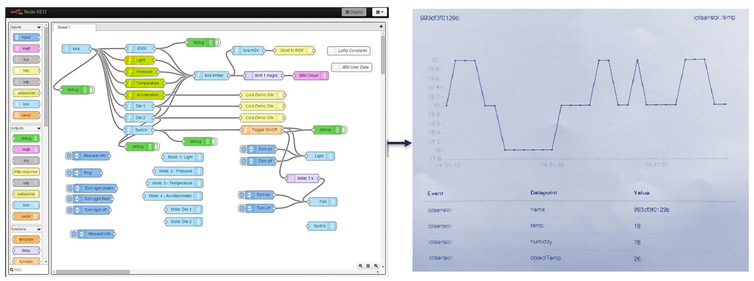
Figure 1: MultiTech Conduit

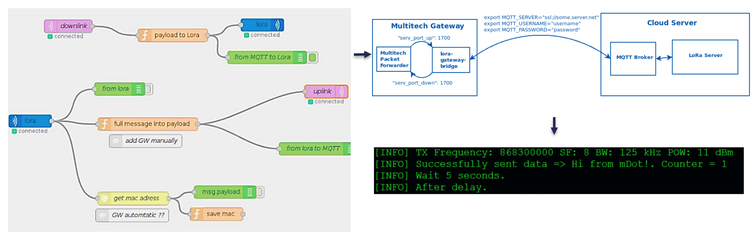
Figure 2: mDot End Device

The two main devices used will be the Multitech conduit that acts as a gateway and the mDot end device which is a node. The programmer beside the mDot end device in Figure 2 is used to reprogram the mDot to enhance the functionality.

RESULTS







CONCLUSION

Once the Multitech Conduit and the end device were setup, messages could be sent from the node to the gateway and then to the IBM BlueMix IOT platform. It can currently send information like temperature, pressure, accelerometer readings, location in terms of latitude and longitude to the conduit and then to the IOT platform. The information can then be used to plot graphs at any point of time.

FUTURE RESEARCH

The mDot End device will be programmed further using the MTMDK-ST-mDot and MTMDK2-ST-mDot. An Arduino shield will be used to interface additional sensors or devices. The programming platform will change from Node-Red which is the current system to a Linux server to enable effective programming of the nodes.
The MultiTech Conduit (LoRa Gateway/Server) and node will be installed with additional accessory cards to transmit and receive data using UART/COM monitors, communicate with the MQTT server and store information in the IBM BlueMix IOT platform.
The final step will be to set up a LoRa base station with antennas using the OpenChirp Infrastructure.

Photo of an OpenChirp gateway (left) and a LoRaBug node (right)

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