

## LoRa Network for VARI-TRAC Tagging Sensors

### Technology Overview

LoRa is a Low Power radio specification intended for wireless battery-operated Telemetry in regional, national or global network. LoRa is a worldwide, license free band operating in the 868MHz and 902MHz bands which are available to users as defined by both ETSI and CEPT. LoRa's target key requirements of customers such as secure bi-directional communication, mobility and localization services. This standard will provide seamless interoperability among smart devices in our TAG-TRAC and TELE-TRAC range without the need of complex local installations and gives back the freedom to the users enabling the role out of a monitoring and communications service without the ongoing subscription costs charged by a mobile carrier.

LoRa's network architecture is well defined and allows for low bit rate data to be transmitted and received at ranges more than 10 miles LOS (Line of sight and subject to elevation and congestion)

All communication is generally bi-directional, although both TAG-TRAC/TELE-TARC support operation such as multicast enabling software upgrade over the air or other mass distribution messages to reduce the on-air communication time.

Communication between end-devices and gateways is spread out on different frequency channels and data rates. The selection of the data rate is a trade-off between communication range and message duration. Due to the spread spectrum technology, communications with different data rates do not interfere with each other and create a set of "virtual" channels increasing the capacity of the gateway. LoRa data rates range from 0.3 kbps to 50 kbps.

To maximize both battery life of the Tag and overall network capacity, the LoRa network server manages the data rate and RF output for each end-device individually by means of an adaptive data rate (ADR) scheme.

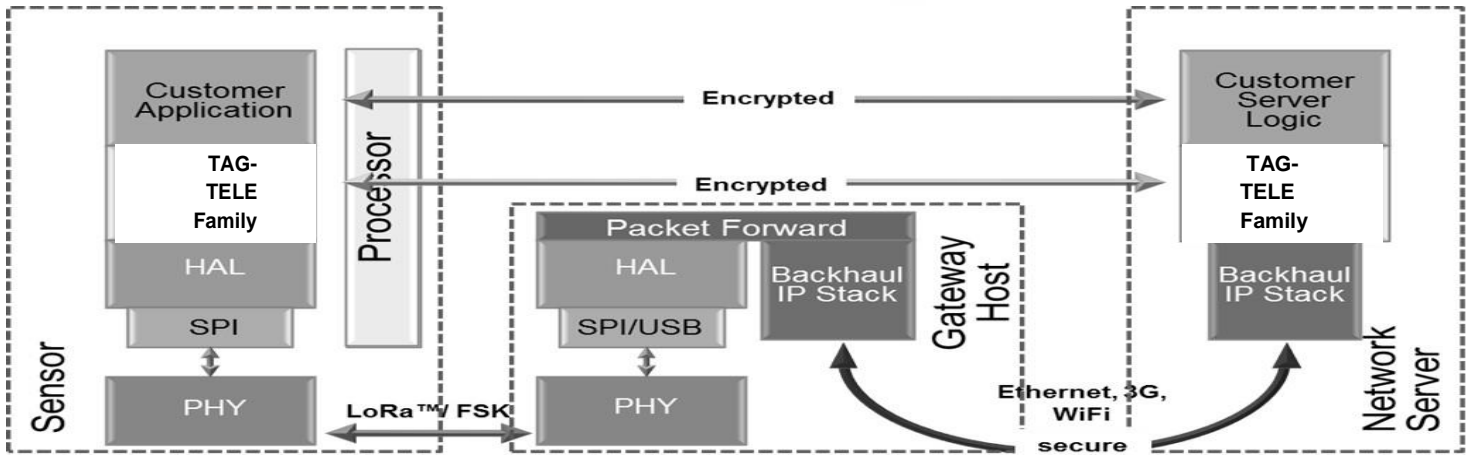
National wide networks targeting critical infrastructures, confidential personal data or critical functions or where there is a need for secure communication has been solved by multiple layers of encryption:

Unique Network key (EUI64) and ensure security on network level

Unique Application key (EUI64) ensure end to end security on application level

Device specific key (EUI128)

nearly continuously open receive windows, only closed when transmitting. Class C



## Applications



### Logistics

- Fleet Monitoring
- Container Tracking
- Safety
- Security

### Construction

- Low Value Equipment Tracking
- Equipment Health & Usage Monitoring
- Operations & Safety

### Governmental

- Fleet Monitoring
- Asset Management
- Emergency communications
- Operations monitoring

### Utilities

- Fleet monitoring
- Meter reading
- TOTEM analysis
- Lone Worker

## General Features

- Very small and portable
- Extremely long-time battery powered operation
- Miniature Omnidirectional GPS antenna giving unparalleled reception of GPS signal
- Free-fall detection
- Dead reckoning navigation
- E-Call capable out of the box

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- End-to-end secure communication using AES-256 cipher
- No LoRa network costs
- Built in Industry leading on device and over the air data security
- Fully enclosed and waterproof to IP67
- Highly accurate sensor functions
- Digital and Analog Input/output
- Over-the-air firmware updates