

## SOLUTION BRIEF

### Intel IoT

### Long Range Wireless platform

# HOW IS LoRa WIRELESS CHANGING CONNECTED SYSTEMS & DEVICES

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The digital revolution has changed the way we use and implement connected systems and devices on public or commercial transportation. The growth of information technology along with the Internet of Things (IoT) has significantly multiplied new potential services based on the increase of connected devices as well as mobile terminals. It is now possible to seamlessly connect devices, related gateways/servers and passengers even when travelling. All market studies addressing IoT foresee a dramatic growth both for passengers and professional applications, thanks to the huge amount of data gathered on-line these connected systems. Using data analytics then helps to solve complex logistic services in the field of asset management, preventive maintenance, passenger information and passenger satisfaction, security improvement, energy saving, etc.

WHAT EMERGES IN TRANSPORTATION IS THE USE OF IoT TO DELIVER THE MOST VALUE, IN THE FIELD OF ASSET MANAGEMENT, PREVENTIVE MAINTENANCE, PASSENGER INFORMATION & PASSENGER SATISFACTION, FREIGHT MANAGEMENT, AND SECURITY

## What is LoRa™ ?



- LoRaWAN is a Low-Power Wide-Area Network (LPWAN), for connected devices allowing long range communications at a low bit rate. LoRa acts as the LONG RANGE physical layer radio, especially designed for low-power sensors operated with a battery, e.g. long life-time due to very low consumption of devices. LoRa devices are therefore very easy to install since they require no direct wiring for power or connectivity, and the cost of installation is low.
- LoRa is not the only wireless technology that could be used in a LPWAN, but it is the only one supported by an open industry alliance, the LoRa Alliance, and adopted by 500 industrial members.
- LoRa™ technology is perfectly suited for connecting devices and sensors that send small amounts of data over a long range, up to 15 km, while maintaining long battery life. (for example: Localization/GPS, Temperature or shock detector, passenger counting, presence detection, failure detection, etc)
- LoRa™ networking topology can accommodate private wireless networks sub-systems of interconnected devices such as in stations, in industrial premises indoor or outdoor, as well as in high speed or commuter trains, freight trains, Tram, buses or cargos.

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LoRa™ IS THE PERFECT WIRELESS TECHNOLOGY TO CONNECT OBJECTS FOR ASSET MANAGEMENT IN MOBILITIES SUCH AS TRAINS, TRAMS, CARGOS, BUSES AS WELL AS STATIONS, DEPOTS OR ANY PREMISES

### Use Cases in transportation

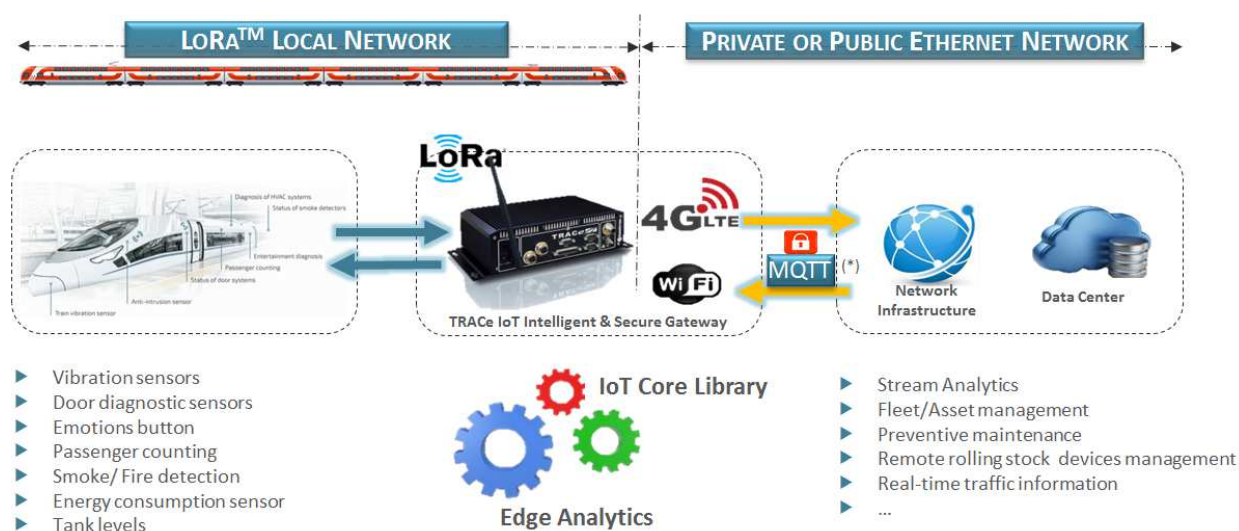
The LoRaWAN wireless connected topology relies on a LoRa- gateway converting LoRa messages into UDP and http frames to feed a LoRa server, and finally application servers in the cloud, where all data analytics are supported as a service or by application. This goes generally along with a TelCo provider, offering as well IoT related services. This type of topology is good for most of classical industries and consumer/home/office applications.

However, when it comes to mobile or rugged/outdoor environments, such as on high speed trains, freight trains, and outdoor industrial areas, it is not possible to rely on a permanent cloud connection, as Internet access (through G4/G3, WiFi or fixed networks) is not always accessible. etc. It is then necessary to handle private local network with a local edge analytics server in order to monitor real-time all the connected devices. Another concern is about data privacy: even if encrypted or protected, some users refuse to send their data to the Cloud. Examples of such situations in transportation include:

- Asset management for fleets of vehicles, trains, containers, cargos, etc
- Monitoring of large operation sites (outdoor) in harsh environment
- Application requiring local On Premise Network and Edge Analytics

The LoRa network topology and platform must then provide a simple private network capability and the MQTT messaging protocol over TCP/IP helps to dispatch the messages to whoever would subscribe to their respective topics.

### The new LoRa networking platform for mobility from Intel & Kontron



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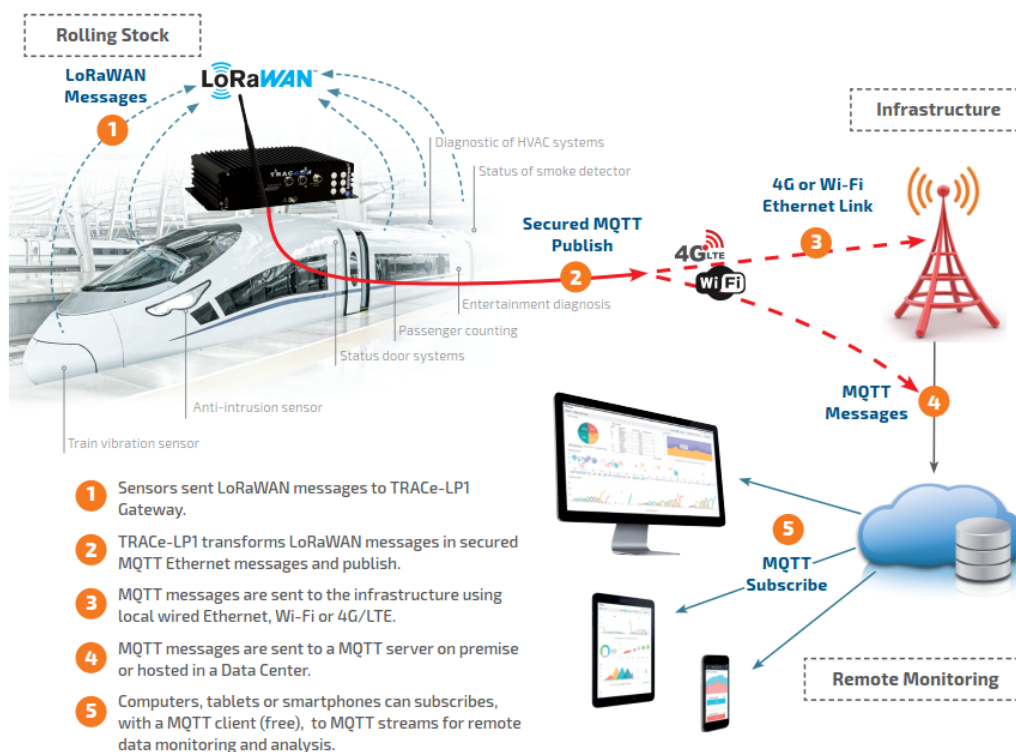
With the support of Intel, Kontron, a leader in embedded computing, has extended its gateway product portfolio and is the first to announce a secure, all-in-one LoRaWAN to MQTT gateway.



The recently introduced TRACe-LP1 allows secure train to ground station and provides reliable data transmission with connected LoRa devices. Already being tested on high-speed trains and freight transport, the TRACe-LP1 utilizes an Intel Atom processor to power the LoRaWAN embedded computer. This new Gateway platform compliments the existing Kontron TRACe portfolio, of Intel based railway certified computers.

By supporting continuous communications from LoRa-based devices to a Cloud server, this IoT gateway enables highly-secure data collection and remote analysis. This approach gives operators the needed security from a private local LoRaWAN network infrastructure that is exclusively reserved for intra-vehicle communication. Security is iron-clad as the LoRaWAN™ to MQTT Gateway supports advanced security features, both at software and hardware levels. Associated cloud server connections are also secured by a TLS connection that uses private keys on both sides.

Typical block diagram:



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Intel and Kontron have created a new and unique mobile LoRa connected device platform

The adoption of an Intel extended temperature Atom processor combined with a LoRa radio concentrator both based on a proven TRACe product' family is a robust answer.

TRACe™ is a field proven product designed to sustain a wide range of temperatures (-40 up to 70°C), it offers Ethernet connectivity from one of the two gigabit Ethernet (GbE) connectors using a rugged M12 connector.

Based on an open Linux distribution, this powerful gateway features an Intel® Atom quad core running at 1.91 GHz and 2 Gbytes main memory. It is designed to EN50155 railway certification standards.

TRACe-LP1 can be directly installed on train to create a private local LoRaWAN network infrastructure reserved for intra-vehicle communication, with no message loss. It has been demonstrated that single gateway at one end is enough to cover connected devices inside a whole double length high speed train, without using external antennas. This private network infrastructure, interconnects all mobile LoRa sensors and supports edge analytics and connection to the Cloud (private or public).

LPWAN COMMUNICATIONS IN TRANSPORTATION OR MOBILE APPLICATIONS REQUIRE A ROBUST NETWORK TOPOLOGY

POSSIBILITIES START HERE

