



# Shipment Quality

LoRa® APPLICATION BRIEF

## DESCRIPTION

There are tens of millions of packages and documents shipped daily to countries around the globe. Keeping track of these shipments is a tremendous undertaking. In addition, shipping companies and retailers need to be able to track the condition of temperature-sensitive or fragile items to make sure they arrive safely.

By implementing an Internet of Things (IoT) shipment quality solution comprised of sensors and gateways embedded with LoRa Technology, and a low power wide area network based on the LoRaWAN™ protocol, shipment quality can be determined as the sensors gather information on location including temperature, drops and ensuring items meet their final destination in the conditions necessary to confirm quality.

## HOW A LoRaWAN-BASED SHIPMENT QUALITY SYSTEM WORKS

Semtech LoRa Technology enables connectivity, real-time analytics, reporting, and additional functions such as geolocation.

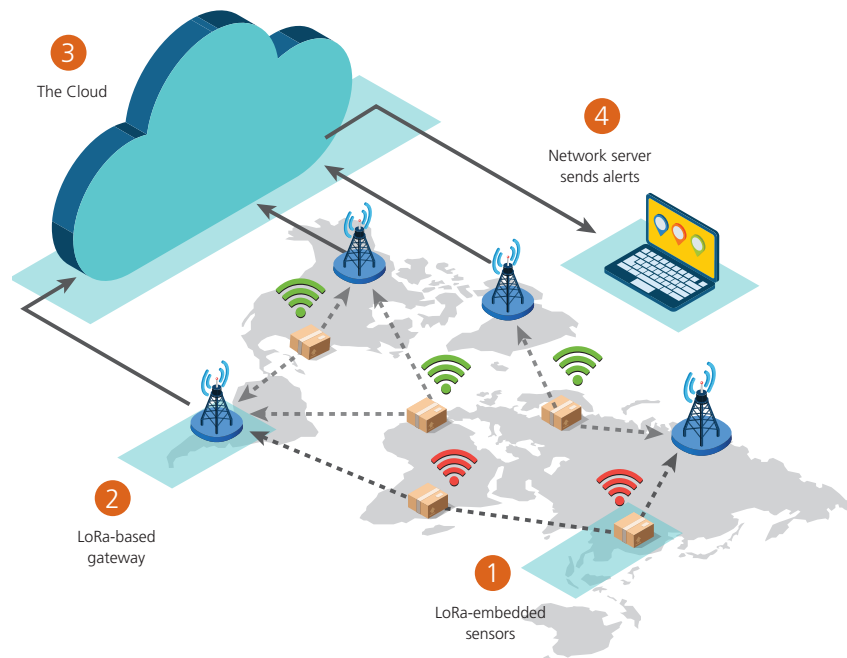
- 1 Sensors affixed to packages and embedded with LoRa Technology collect movement, location data and in special cases temperature or package opening data if the package is sensitive to environment or has a high value
- 2 LoRa-based gateways collect data that is periodically transmitted by the sensors
- 3 Gateway sends information to Cloud server where the data is analyzed by an application server
- 4 Application server sends alerts to shipping company or retailer via mobile device or computer

## BENEFITS

- Monitor item location to ensure it arrives at its intended destination.
- Monitor temperature, humidity levels, drops, rapid movement, or package openings to ensure safety and quality of sensitive materials.
- Low maintenance costs thanks to LoRa sensors low power operation, ensuring batteries can last up to 10 years.
- Provides reliable RF communication link between sensing infrastructure and LoRaWAN-based network.

## APPLICATIONS

Sensors placed on outgoing packages can detect location, temperature, movement, and other data to ensure items meet their final destination in the condition necessary to ensure quality.



Semtech products used in this application:

Sensors	Gateway
• SX1272/3	• SX1301
• SX1276/7/8/9	

All application elements (sensing modules, gateways, servers, software) are available through LoRa Alliance™ partners.



## FIND YOUR IoT SOLUTION FROM SEMTECH'S LoRa ECOSYSTEM

MODULES & MODEMS

SENSORS

BASE STATIONS

NETWORK SERVERS

SYSTEM INTEGRATORS

For a full list of LoRa Ecosystem partners and services, visit our LoRa Community [www.semtech.com/LoRaCommunity](http://www.semtech.com/LoRaCommunity)

## KEY FEATURES OF SEMTECH'S LoRa WIRELESS RF TECHNOLOGY

**LONG RANGE** Penetrates in dense urban and deep indoor environments, connecting to sensors 15-30 miles away in rural areas

**LOW POWER** Enables multi-year battery lifetime of up to 20 years or more

**HIGH CAPACITY** Supports millions of messages per base station

**GEOLOCATION** Enables tracking applications without GPS or additional power consumption

**STANDARDIZED** LoRaWAN specification ensures interoperability among applications, IoT solution providers and telecom operators

**SECURE** Embedded end-to-end AES-128 encryption of data ensuring optimal privacy and protection

**LOW COST** Reduces upfront infrastructure investments, as well as operating and end-node costs

## JUMP-START YOUR IoT DEVELOPMENT TODAY

Semtech offers several training options to help you get started:



Learn about Semtech's LoRa Technology platform: visit [www.semtech.com/IoT](http://www.semtech.com/IoT)



Join the LoRa Community: [www.semtech.com/LoRaCommunity](http://www.semtech.com/LoRaCommunity)



Become a member of the LoRa Alliance™: visit [www.lora-alliance.org](http://www.lora-alliance.org)



Attend a LoRa Boot Camp for a full-day of training featuring LoRa Technology and real world applications: [www.semtech.com/IoT](http://www.semtech.com/IoT)



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