SEMTECH CORPORATION

LoRa Technology

REAL WORLD SOLUTIONS

SMART CITIES

LoRa®

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www.semtech.com/IoT

LoRa Technology
USE CASE COLLECTION

Dear IoT Innovators,

More than 40% of all Low Power Wide Area Network (LPWAN) public network connections are expected to be LoRa-based devices and represent the dominant LPWAN solution in 2019.* We also anticipate there will be over 200,000 gateways in total deployed, which will include both macro and picocell gateways. This will provide the capacity to support over 1 billion end nodes. In addition, by early 2019, we expect LoRa end nodes deployed to exceed 80 million units.

With this rapid IoT evolution and adoption of the LoRaWAN™ open standard with deployment in over 65 countries, Semtech's LoRa® devices and wireless radio frequency technology (LoRa Technology) enable a new generation of IoT use cases that can be deployed quickly, potentially disrupting existing industries including smart cities, smart buildings, smart supply chain and logistics, smart metering, and smart agriculture. Vertical deployments range from improving a smart city's operational efficiencies to monitoring valuable airport equipment across multiple locations to providing public safety to the community.

In a short timeframe, Semtech facilitated the development of a strong and influential ecosystem of industry-leading companies comprised of network operators, system integrators, manufacturers of gateways, end nodes, and sensors, as well as a plethora of IoT application developers. With this foundation, solution providers are positioned to enable the connectivity of billions of sensors incorporating LoRa while enriching people's lives. With endless use cases ranging from water protection to energy sustainability to parking management, LoRa is a flexible and scalable IoT platform.

By leveraging an established infrastructure, Semtech's LoRa Technology addresses the market and technology gap for an IoT platform that features long-range, low-power, easy to deploy, and multi-year battery life. Along with its secured connections and low cost, LoRa Technology is now the obvious choice for LPWAN proliferation. It's the DNA of the IoT.

Regards,
Marc

Marc Pegulu
Vice President and General Manager
Semtech Wireless and Sensing Products Group
www.semtech.com/IoT

*Information based on IHS Markit, Technology Group, Low Power Wide Area (LPWA) Market Report – 2017. Information is not an endorsement of Semtech Corporation. Any reliance on these results is at the third party's own risk.

1,000
The number of proof-of-concepts or POCs using Semtech's LoRa Technology underway throughout the world in early 2018

80 MILLION
LoRa-based end-nodes deployed worldwide used in both private and public networks by 2019

*Source: Semtech Q1FY19 transcript

70,000+
LoRa-based gateways deployed worldwide in early 2018, and expected to reach 200,000 by early 2019

27 BILLION*
Machine-to-Machine connections will grow to 27 billion globally in 2025

*Source: Machina Research

Markets

See how developers are using LoRa everywhere: in the home, office, city, countryside, and in transit. This is how we build a Smart Planet.

SMART CITIES

The world's population is increasingly moving to cities, which has kicked off a quest to use smart city technology to help cities build sustainable infrastructures that provides smart governance, smart energy, smart mobility, smart infrastructure, smart technology, smart healthcare, and smart citizens. Smart city technology is one way that governments and municipalities provide sustainable services required to meet urban influx effectively. Semtech's LoRa Technology and low power, wide area networks (LPWAN) based on the LoRaWAN™ protocol provide a smart sensing and control infrastructure, which allows cities to collect and analyze data from thousands of connected devices in a streamlined manner, in order to make intelligent decisions about the services they need to offer. LoRa Technology delivers solutions that are optimized for smart city applications that rely on battery-powered sensors that need up to 10 years of battery life. Smart city technology is changing the way cities, governments and citizens interact, and LoRa Technology is a contributing enabler of these solutions. Many smart city applications include parking management, water management, sustainability, and gas monitoring.

SMART HOME AND BUILDING

The convergence of various IoT (Internet of Things) technologies will transform the commercial real estate (CRE) industry. The power of data and information collected from hundreds or more sensors within a building enables different business models to also be implemented as real-time, data-based analytics, fueling a tremendous number of potential new service offerings.

SMART SUPPLY CHAIN AND LOGISTICS

IoT has long been an obvious area of focus for organizations looking to reap more value from the supply chain. Very often, however, applications like these have been too expensive or impractical to implement. The ideal wireless linking technology should be inexpensive and secure, work over long distances and have a substantial battery life.

SMART METERING

A smart sensor infrastructure of smart water metering, gas monitoring, and wireless leak detection can combine to provide billions of dollars in operational savings. Smart water metering and leak detection alone can save 20% on water leakage levels, and reduce energy consumption by 30% through smart water infrastructure. Leveraging LoRa Technology, utility companies can monitor rural homes, check device status from the office, and eliminate the need to send out workers into the field to search for problems.

PARKING MANAGEMENT

Until now, cities and parking lot owners had no effective way to remotely inform drivers of vacancies, or notify them that lots were full. As a result, urban drivers spent an average of 20 minutes per trip in search of a parking spot and attributed up to 30% of the unnecessary traffic to cities' already congested streets. By providing a robust connection between a network of vehicle occupancy sensors and a Cloud-based management system, LoRa Technology enables operators to optimize occupancy, reduce operating costs and help calm traffic congestion in urban, industrial and commercial environments.

REAL USE-CASE SOLUTION

PNI Sensor Corporation, a leading manufacturer of precision location and motion tracking systems, needed IoT connectivity for its PlacePod™ solution, a high-accuracy, in-ground or surface-mounted smart parking sensor. Implementing a LoRa-based smart parking solution begins with deploying a robust, high-accuracy wireless occupancy sensor in each parking space. The sensors use LoRa Technology to communicate with a wireless gateway that provides access to IoT. The Cloud-based parking management system shares the occupancy information it collects with third-party applications that notify drivers of open spaces via smartphones or other wireless devices. Cities with over a million citizens have seen up to 25% less traffic congestion and about 15% increase in efficiency of parking metering.

LOW DEPLOYMENT COST

LoRa-enabled applications are self-provisioning to simplify deployment and minimize installation labor. The sensors communicate with PNI's Parking Cloud Service over public infrastructures when they are available, thereby minimizing CAPEX costs. For applications that require a dedicated infrastructure, LoRa Technology's robust, long-range, low-power technology has excellent indoor and outdoor reach that minimizes the number of gateways needed to serve an area.

"An end-to-end smart parking solution is a natural progression for our best-in-class magneto-inductive sensor, which has been embedded in more than 20,000 parking sensors in Shenzhen, China since 2005."

Becky Oh
President and CEO
*PNI Sensor Corporation*

LOW OPERATING COST

PNI's customers enjoy minimal downtime and maintenance costs because LoRa Technology's low-power operation coupled with PNI's high-performance geomagnetic sensor and vehicle detection algorithms, allows the PlacePod sensor to operate up to 10 years depending on configuration and distance from the gateway. Operating labor costs are further reduced because several routine sensor test and maintenance operations are performed remotely.

TWO-WAY COMMUNICATION

The LoRaWAN open protocol supports two-way communication, allowing the system's Parking Cloud Service to positively acknowledge that every sensor event has been successfully received. System-to-sensor communication also enables the parking manager to initiate remote maintenance functions, such as reset and self-test.

WATER MANAGEMENT AND PROTECTION
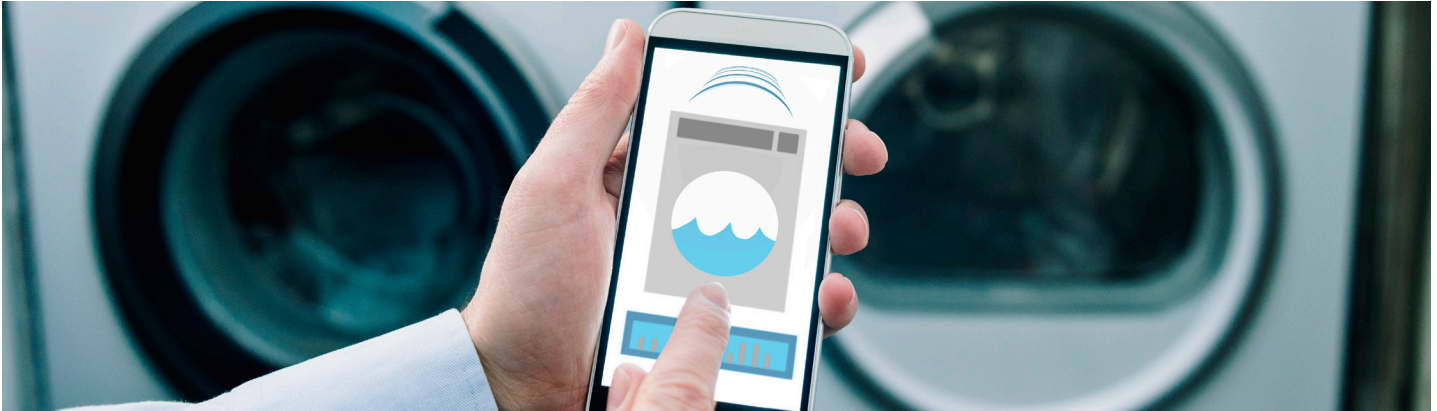
LoRa-enabled water monitoring can provide homeowners and property managers with important insights into their property's water usage. Property managers can use the information to analyze their consumption, identify trends and better conserve. LoRa-enabled wireless sensors share their real-time measurements with a Cloud-based application that looks for patterns indicating a leak, broken pipe or other water-related problem. If a problem is detected, the application can shut off the water supply and alert the homeowner or property manager through their smartphone or personal computer before any additional damage occurs.

REAL USE-CASE SOLUTION

Eddy Smart Home Solutions Inc. (Eddy Home), a leading North American manufacturer of residential and commercial water technologies, evaluated several wireless technologies for use in its new family of water monitoring and management products. In the end, they chose LoRa Technology as the basis for their platform because it offered a unique combination of advantages that competing solutions could not match. Eddy Smart Home products have saved thousands of customers millions of liters of water while alerting them to issues by continuously monitoring the water usage in their homes.

LONG RANGE

The same characteristics that enable LoRa Technology to deliver excellent indoor performance and deep penetration in dense urban environments give it a long reach in more open terrain.

LOW DEPLOYMENT COST

A LoRa-based application can operate over public infrastructures when they are available. This enables Eddy Home to enjoy greatly reduced CAPEX requirements when it can deploy its water management solution over commercial LoRaWAN networks. For applications that require a dedicated infrastructure, LoRa Technology's robust long range, low power capabilities can connect to sensors more than 15-30 miles away, thereby minimizing the number of gateways needed to serve an area.

LOW POWER

In addition to its superior range and performance, LoRa Technology's power conserving features make it possible for a LoRa-enabled wireless sensor to operate for 10+ years on a single battery. This reduces, or even eliminates, one of the biggest causes of costly field support visits.

> "Innovation in smart homes is the key towards smart infrastructure and smart cities, and we're thrilled to have found a technology provider in Semtech."
>
> *Shawn Dym*
> *President*
> *Eddy Home*

ENERGY MANAGEMENT AND SUSTAINABILITY
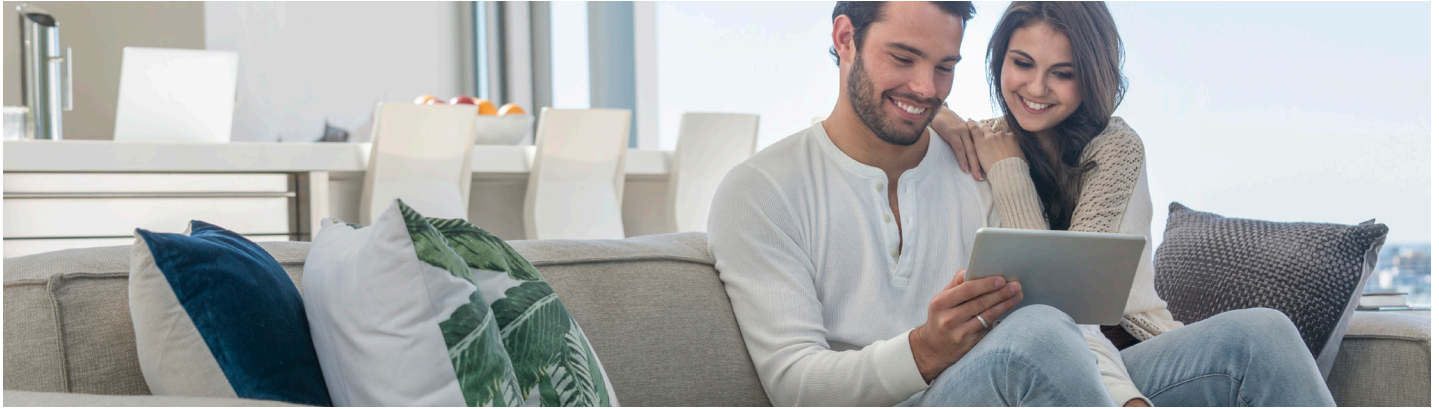
Designed to support robust, long-range wireless communications where Wi-Fi, ZigBee and other wireless technologies cannot, LoRa Technology is becoming the technology of choice for connecting energy management systems with smart thermostats, lighting controls, smart outlet, and other energy-aware devices. The IoT platform helps smart buildings work in concert with smart appliances to manage peak energy consumption and schedule non-essential operations for times when energy demand and pricing are at their lowest.

REAL USE-CASE SOLUTIONS

KingTingTech (YoSmart), a high-tech enterprise company focusing on smart home and life products, developed its next generation smart home solutions with Semtech's LoRa Technology. The LoRa-based smart home is equipped with a central control hub that communicates with embedded wireless sensors to relay data to smart thermostats, wireless sensors and lighting controllers. The home's LoRa-enabled smart thermostats can run pre-programmed energy saving schedules that allow an area to use less heating or cooling during times they are not expected to be occupied, which has contributed up to a 30% energy savings.

LOW PER-UNIT COST

Adding LoRa Technology to an end-node sensor module requires a single low-cost IC, making it easy for YoSmart to offer its products and services at highly competitive prices.

LOW OPERATING COST

YoSmart and its customers enjoy minimal downtime and maintenance costs because LoRa Technology's low-power operation allows a battery-powered sensor end-node module to operate 10+ years between battery replacements.

SECURE

LoRa Technology secures all communications using end-to-end AES128 encryption, making YoSmart's smart home solution system highly resistant to cyber attacks and data.

"Our mission is to help make home life simple. Semtech's LoRa Technology allows us to make products that bring us closer to achieving our mission and our customers are able to achieve a smart life."

John Xu
Chief Technology Officer
YoSmart

WIRELESS GAS MONITORING

Long-range, LoRa-enabled wireless sensors transforms a conventional storage bottle or tank into a smart device, which detects its own state of fill and communicates the information to a Cloud-based inventory management and scheduling application. Self-reporting gas bottles deliver intelligence, efficiency and higher-levels of service that a typical bottled gas distributor is unable to provide.

REAL USE-CASE SOLUTION

Butano24, a division of Serviglp SL, a Spanish company that supplies order processing services for bottled fuel products to energy and utility companies, developed a "Smart Bottle" which reports its state of fill across the LoRaWAN network with the addition of a self-powered, wireless sensor module. The sensor module takes periodic measurements of the gas level and transmits them to the network of LoRa-based gateways within its range, typically 30 miles. If the bottle's level is low, a request for a refill is automatically passed to the system's scheduling and dispatch application, along with the customer's address. The gas distribution system can also analyze information collected by the LoRa network to provide the bottled gas distributors with analysis of their customers' past consumption patterns and predictions of future demand. Butano24's "Smart Bottle" has helped distributors to streamline their operations and increase efficiency up to 20%.

LOW PER-UNIT COST

Adding LoRa Technology to an end-node sensor module requires a single low-cost IC, making it affordable for Butano 24 to quickly add self-reporting capabilities to a distributor's entire fleet of containers and delivery vehicles.

GPS-FREE GEOLOCATION

The LoRaWAN protocol supports radio triangulation techniques that can pinpoint the location of a delivery truck, gas bottle or other assets equipped with an inexpensive, long-lived, battery-powered LoRa transceiver. In addition, LoRa Technology operates in the 900MHz ISM-band that can reach deep into tree-covered roads, steep valleys and other places where weaker, higher frequency GPS signals cannot.

"LoRa Technology is a key platform in our solution, which streamlines tank level monitoring operations.

LoRa's long-range, low-power connectivity is ideal for logistics applications and provides us with a robust, accurate solution that our customers need."

Antonio Martín
Co-founder and Chief Executive Officer
Butano24

STANDARDS-BASED

Because the LoRaWAN protocol is a globally-approved standard, Butano 24, and its parent company Serviglp SL can sell products and services that have assured global interoperability.

IoT Connects Our World

LoRa® Makes It Smart

Connect Data Intelligently

Connecting virtually all things – sensors, gateways, machines, devices, animals, people – LoRa Technology makes it possible to connect to the Cloud, enabling sound decisions and making people's lives better.

Cities

Metering

Industrial Control

Supply Chain & Logistics

Environment

Home & Buildings

Healthcare

Agriculture

LoRa®

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