

Internet of Things World



**Harnessing the Power of LoRaWAN for
Deploying Your LPWAN IoT Applications**

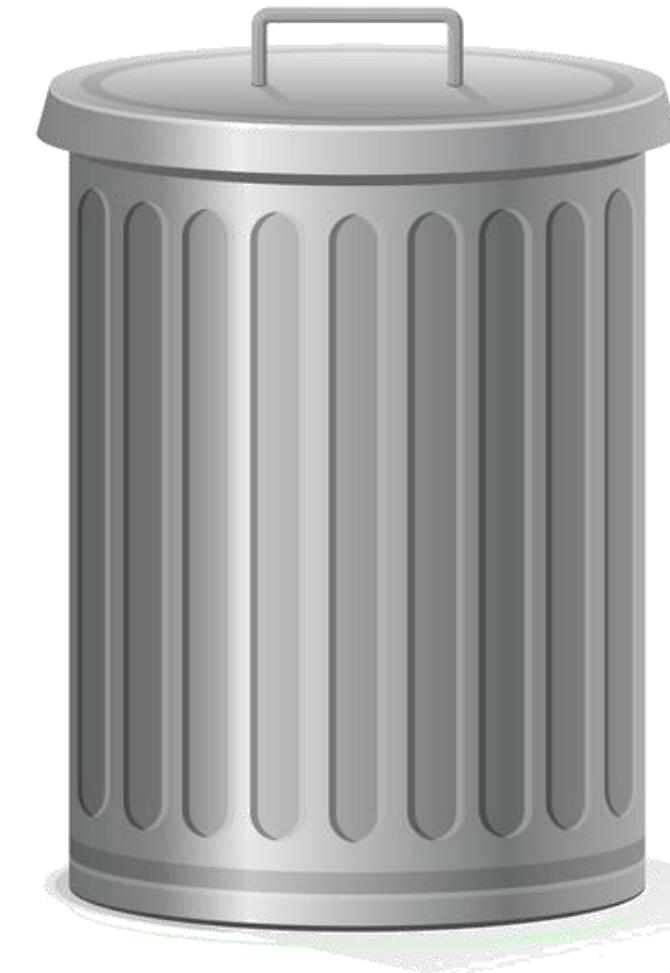
Karthik Ranjan
North America Regional Vice-Chair
LoRa Alliance®

#IoTWorld @iotworldseries

Agenda

- What is LPWAN and why is it important?
- Private vs. Public Networks
- Cost of deployments
- LoRaWAN® Deployment models
 - Device to cloud
 - Device to gateway
 - Device to gateway to cloud
- Examples

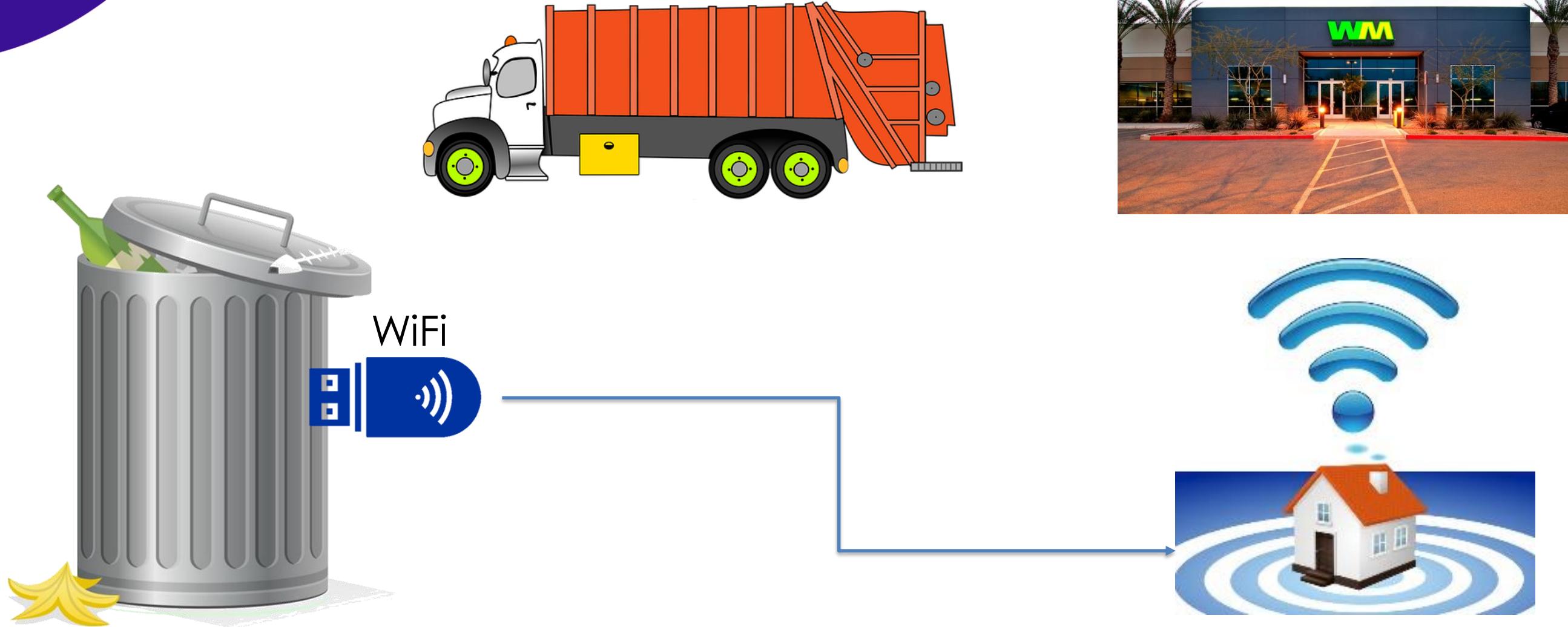
Why do I want to connect things?



Because some weeks it's not fine...



Engineer in me says... easy to fix



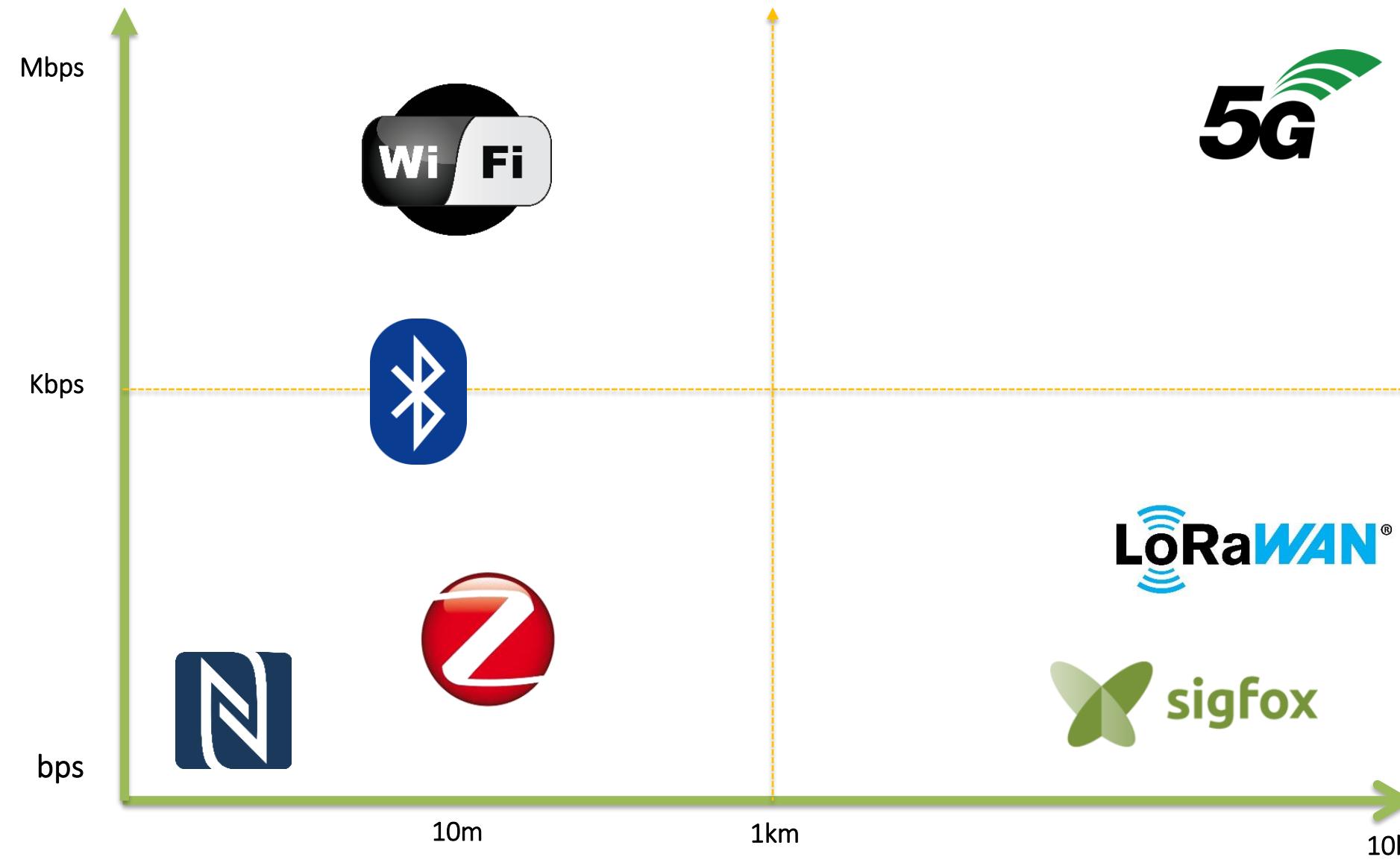
What? My WiFi can't reach the
garbage bin?



What? Battery on garbage bin
died again?



Choosing the right network(s) for the job



LPWAN is a 2 horse race

LPWA Total Connections

 **AT&T**

LTE-M / NB-IoT

Monthly rate - 500KB for \$1/mo.

Price is exclusive of taxes and fees.
Additional terms may apply.

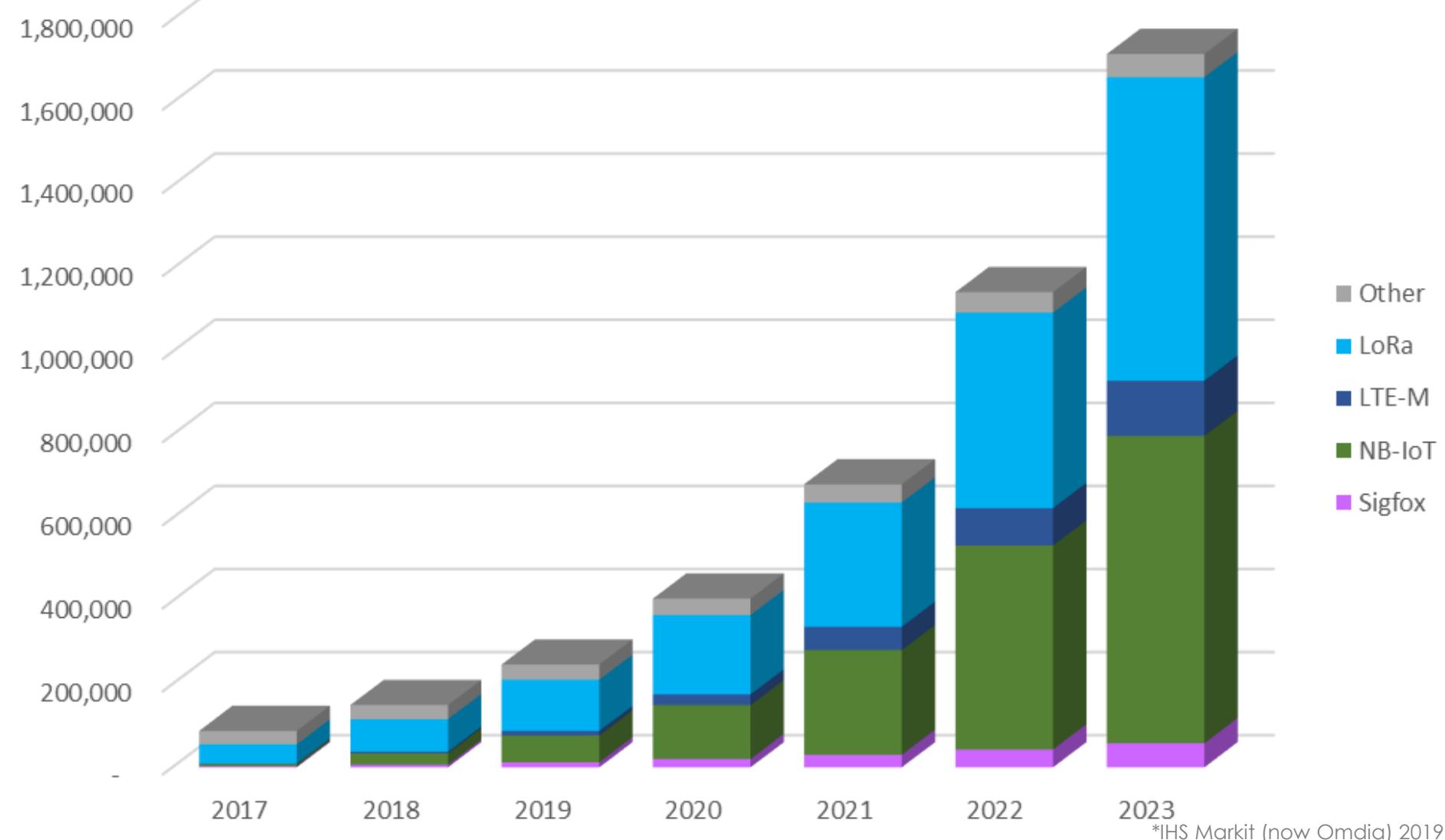
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LTE-M / NB-IoT

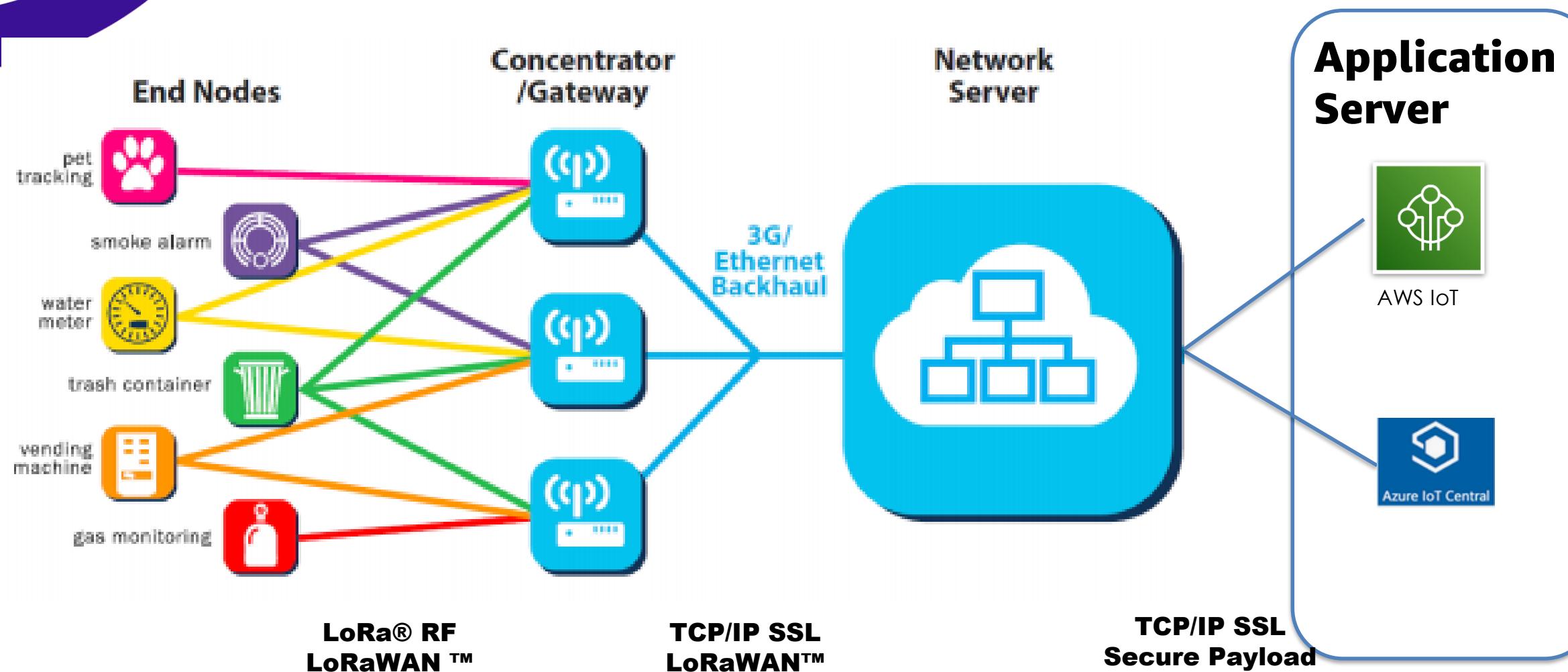
Yearly rate - 12MB for \$12/year

Price is exclusive of taxes and fees.
Additional terms may apply.

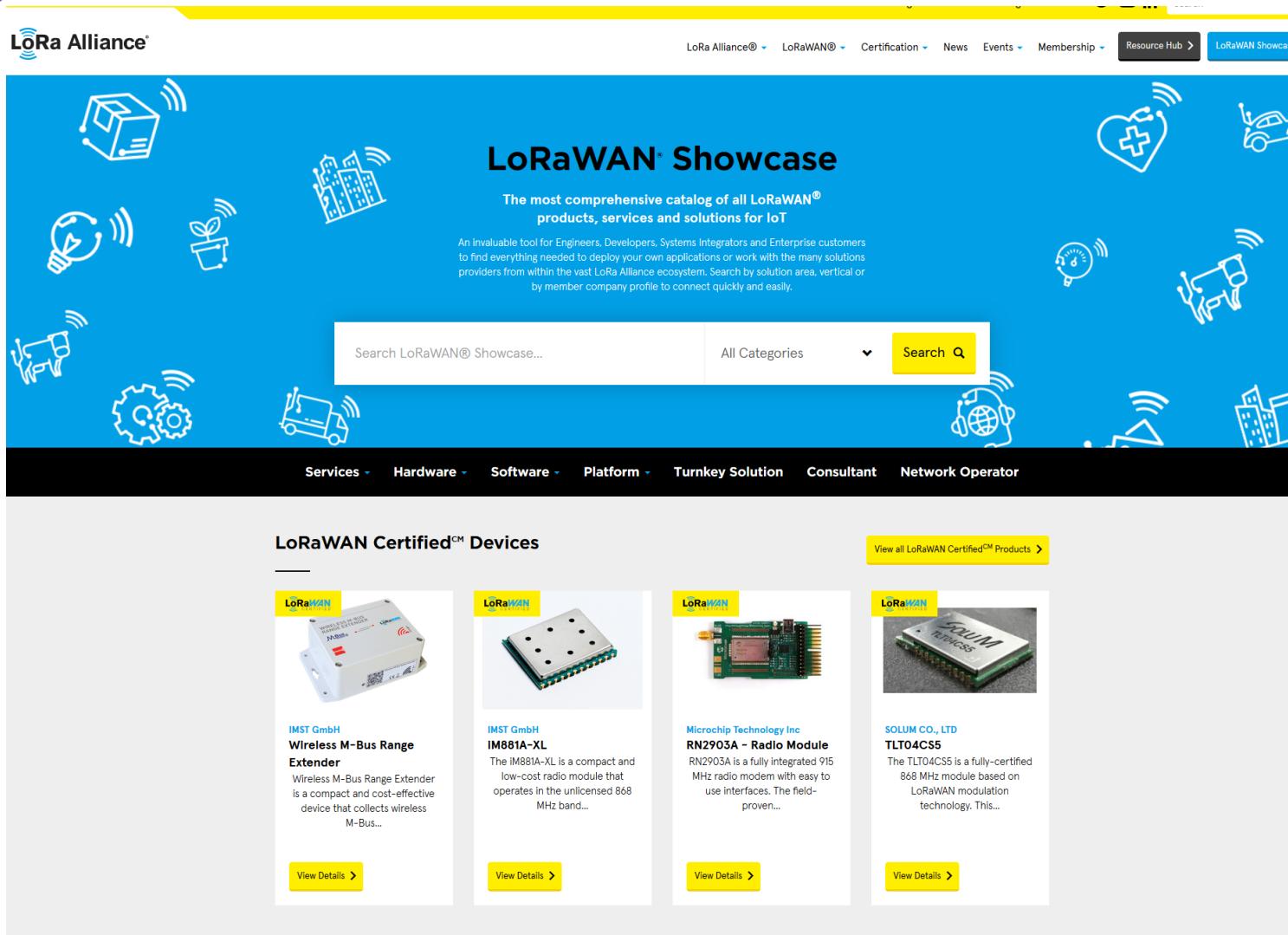
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LoRaWAN Architecture



What device will I use?



The screenshot shows the LoRaWAN Showcase page. At the top, there's a search bar with "Search LoRaWAN® Showcase..." and a "Search" button. Below it is a navigation bar with categories: All Categories, Services, Hardware, Software, Platform, Turnkey Solution, Consultant, and Network Operator. A prominent section titled "LoRaWAN Certified™ Devices" displays four examples:

- IMST GmbH Wireless M-Bus Range Extender**: A compact device for extending wireless M-Bus networks.
- IMST GmbH IM881A-XL**: A compact and low-cost radio module for the 868 MHz band.
- Microchip Technology Inc RN2903A - Radio Module**: A fully integrated 915 MHz radio modem.
- SOLUM CO., LTD TLT04CS5**: A 868 MHz module based on LoRaWAN technology.

Each item has a "View Details >" button below it.

LoRa Alliance® has ecosystem of
270+
certified
devices

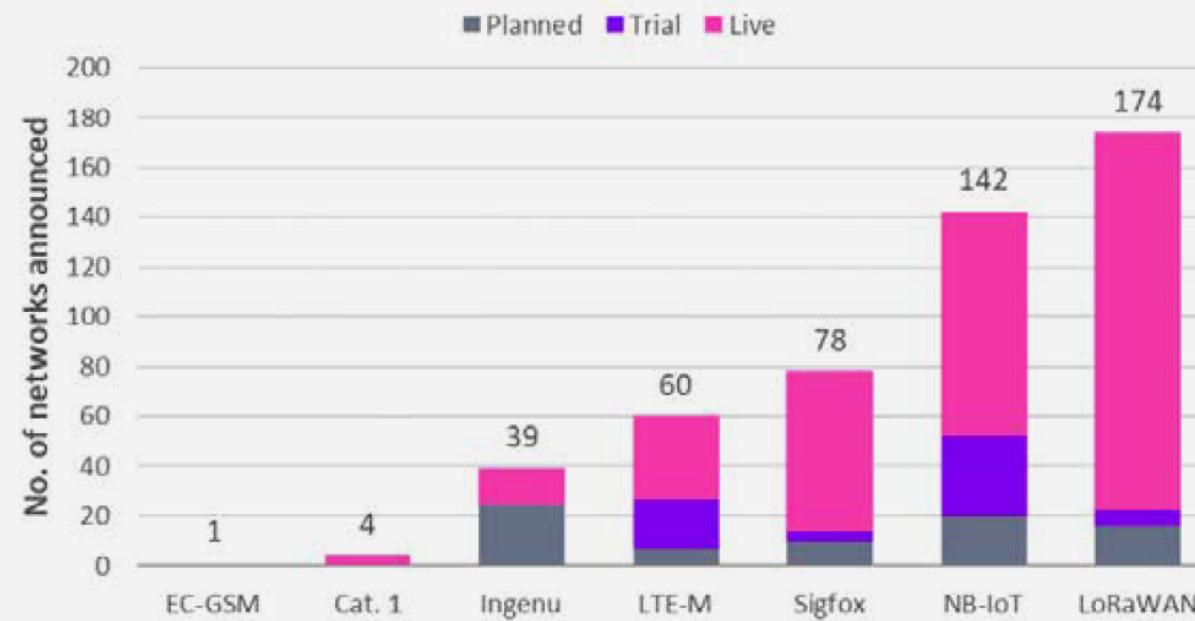
Deployment Consideration 1: Gateway Deployment



- Devices need to talk to a LoRaWAN gateway to get connected: two options
 1. Private Network: Requires deploying & managing gateways
 2. Public Network: Choose operator (if available)
- In some markets, there are LoRaWAN network Operators e.g. Europe – Swisscom, India-SenRa, TATA, US-Senet, Things Network
 - If choosing an operator – first check if there is coverage where you need
- Otherwise – be prepared to install/deploy your own gateways

Operator Managed LoRaWAN

Number of LPWA deployment announcements by technology through Q4 2019



Source: Omdia 2020.

- Simplified deployment as it's nearly identical to NB-IoT model where the operator takes care of:
 - Deploying gateways
 - Managing the LoRa Network Server
- 137+ operators





Private Networks: Choosing the Right LoRa Network Server (LNS)



- Works in locations with poor or no connectivity
- Allows for unpacking for device data on the Gateway for low-latency applications



Security implications to both
Cost considerations to both

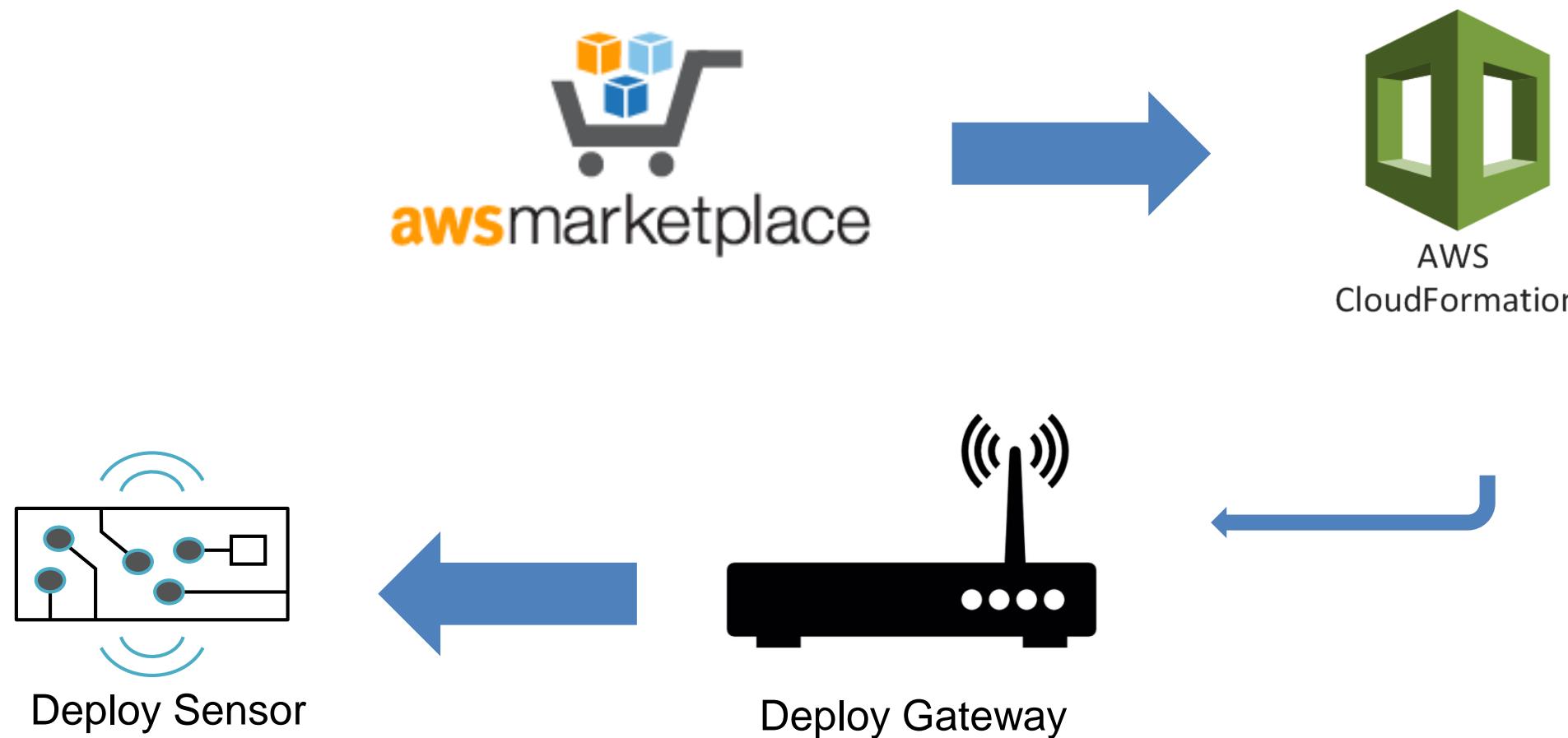
- Reliability – devices can talk to multiple gateways
- SaaS and hosted/licensed software models available
- AI/ML for big data

Private Networks: Choosing the right Gateway



- ✓ LNS-on-Gateway or packet forwarder
 - ✓ Backhaul e.g. Cellular/LTE, Ethernet, WiFi, DOCSIS, etc.
 - ✓ # of channels (8/16/64)
 - ✓ Resistance to interference e.g. to 5G/LTE radios, TV/FM station
- Gateway management
- ✓ Cloud interface, mobile interface
 - ✓ Remote Firmware upgradeable
 - ✓ Telemetry data – CPU, memory, network connection status
 - ✓ Network diagnostics

Private networks: Simplified workflow for adding LoRaWAN example



Private networks: Finding a LNS



The Things Enterprise Stack for LoRaWAN

By: [The Things Industries](#) | Latest Version: 3.8.4

A LoRaWAN Network Server to manage devices, gateways and telemetry data

Linux/Unix |  0 AWS reviews

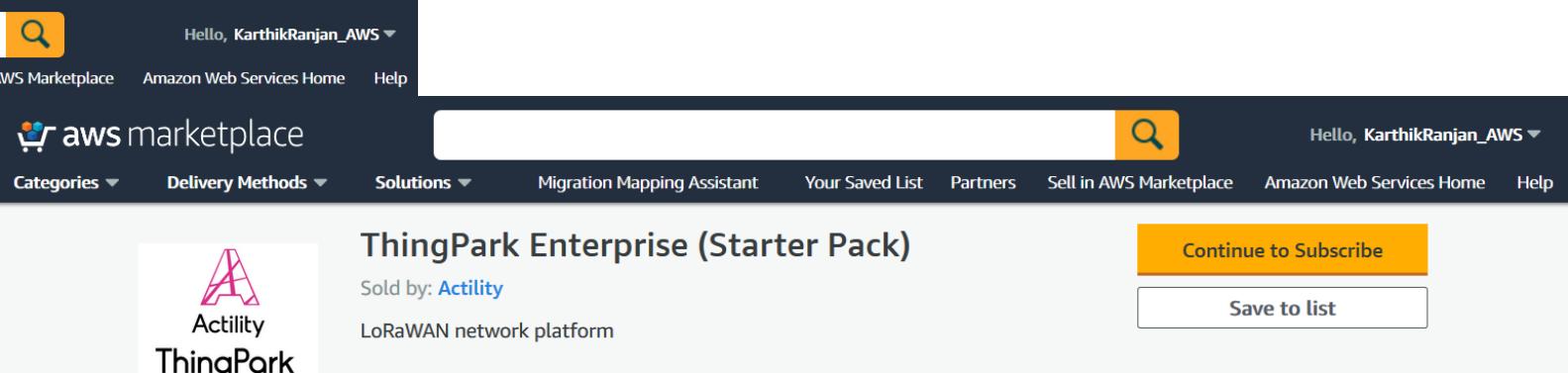
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Product Overview

The Things Enterprise Stack offers the solution to build and operate private LoRaWAN networks. Manage and monitor your remote devices and gateways with an elaborate toolset. Route telemetry data securely to your cloud application, and quickly configure actions in AWS IoT Core.

The Things Enterprise Stack will save developer time and headache: through well-documented APIs and SDKs, device templates, comprehensive debugging tools, per device MAC and PHY settings, configurable channel plans and trusted joins. You will prevent vendor lock-in as it supports the open LoRaWAN protocol versions 1.0.x and 1.1.x and Semtech's open source packet forwarders.

Version	3.8.4
By	The Things Industries
Video	See Product Video
Categories	Device Connectivity Industrial IoT Application Stacks
Operating System	Linux/Unix, Amazon Linux 2019.06.18



ThingPark Enterprise (Starter Pack)

Sold by: [Actility](#)

LoRaWAN network platform

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Product Overview

ThingPark Enterprise is the leading LoRaWAN private networking solution, managing over 35,000 commercial gateways. It streamlines your digital transformation, eliminating wiring for most sensors, enabling indoor/outdoor tracking and many other use cases.

ThingPark Market provides the largest selection of Gateways, Devices and Apps. ThingPark Enterprise delivers carrier-grade technology tailored for the enterprise market.

Streamline IoT network operations. The UI provides wizards to easily build a multi-gateway LoRaWAN network and feed data to IoT applications. Dashboards provide key operational insights & alarm management.

Dependable industrial infrastructure leveraging the same technology trusted by leading service providers to deliver a secure and field-proven solution. Our ISO 9001 QA process (1,000+ tests and 4 weeks of field testing), ensures that you will never have to service thousands of orphaned devices.

Private networks: Finding a Gateway

[Create an AWS Account](#)

AWS Partner Device Catalog Overview Search FAQ Partners

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MiniHub Pro

by Brown Communications Inc.

The Brown Minihub Pro is a low-cost LoRaWAN-compliant gateway design with integrated Wi-Fi networking for local backend connectivity. Its support for FreeRTOS with AWS IoT Core connectivity allows developers to create easy-to-use, cloud connected products with local edge intelligence.

The Minihub Pro offers a very compact wall-plug form factor with interchangeable electrical plugs for easy deployment and use across multiple countries/regions. The gateway also includes a USB-C power port that offers flexibility to locate the device away from electrical outlets (better signal/coverage) as well as for use in mobile applications.

AWS Service FreeRTOS 201912.00 Wi-Fi Integration	Device Type Gateway/Router
Industry Energy / Utilities, Retail, Smart City, Smart Home	Application Appliances, Building Automation, Data Logging, Education, Home Automation, Lighting, Point-of-Sale, Remote Monitoring, Smart Grid

[Shop now](#) [Product page »](#) [Source code access »](#)
[Product data sheet »](#) [Getting started »](#)

Device specifications

Hardware Architecture 32-Bit, Tensilica	Silicon Vendor Espressif	Operating System FreeRTOS	Programming Language C/C++
Network Connectivity LoRa, LoRaWAN, Wi-Fi 2.4 GHz only	I/O Interfaces USB	Security SSL/TLS	Mounting / Form Factor Internal Antenna

Minihub Pro

Minihub Pro
Brown Communications Inc.
\$99.99

1 [Message](#)

Message this seller to ask about the product.

Product Details
The Minihub Pro is designed to enable connection to the AWS IoT Core. It is also a low-cost LoRaWAN compliant gateway utilizing a WiFi backhaul. It is...
[Show More](#)

[Report Product](#)

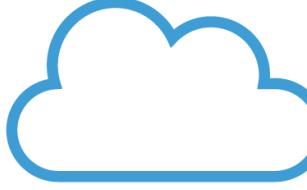
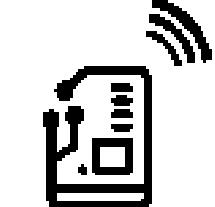
3 Shares

Share



LoRaWAN Deployment Options Summary

Provider Managed
Customer Managed

	Public Network Operator	Private Network LNS on Gateway	Private Network LNS in Cloud
Cloud		Optional	<ul style="list-style-type: none">• LNS SaaS• LNS Customer managed
Gateway			
Device			



VEOLIA WILL DEPLOY OVER 3 MILLION SMART WATER SENSORS IN FRANCE ON ORANGE NETWORK

- Over 3 million LoRaWAN® water sensors will be connected in the next 3 years in France to Orange's LoRaWAN network
- Additional water sensors are scheduled for deployment in order to transition from pure metering to environmental services
- Unify all water sensors in a multiservice connectivity network to support digital transformation of water utilities



Benefit: Reduced water loss, optimised operations, increased customer satisfaction

THINGPARK CHINA DEPLOYS MORE THAN 150,000 LoRaWAN® SENSORS IN SHANGHAI

ThingParkChina



Applications include:

- Smoke detectors giving early warning of fires in office and residential blocks
- Acidity and oxygen sensors monitoring pollution and quality of water in rivers
- Parking space occupancy detectors
- Manhole cover opening detectors to detect and prevent unauthorised access



Benefit: Improved safety, security and city environment for residents

- 18,000 wells and devices in the field to operate and maintain, with many data points still manually collected
- Recently added 'smart lids,' like what you might find at Disney World or in smart cities to monitor trash
- Smart lids take level readings and transmit data over a long range wide area network (LoRaWAN) using nodes with 10-year batteries that can transmit over 10 miles in ideal conditions, which is more cost-effective than cellular alone.
- Now investigating use of LoRaWAN to monitor temperature, pressure, vibration and soil samples



Long-range levels

Figure 1: Pump jacks at Chevron's San Joaquin Valley business unit in California's Central Valley use radios to transmit data from automated testing of groups of wells and managed steam flooding needed by heavy-oil applications, but they're supported by 25-gallon chemical tanks with smart lids that are transitioning to less costly LoRaWAN and LTE cellular to report levels and other data. Source: Chevron

Control Magazine, Nov 2019

"In the end, the economics of these wireless, low-power, WAN opportunities were a no-brainer, so we just did it. We achieved a significant return on investment (ROI) and reduced drive time, while optimizing the supply chain and using easily deployable technology. In general, LoRaWAN is an order of magnitude less costly than traditional radios and wireless, so we're looking at other use cases for it, such as routine operating duties." —*Jonathan Polly, solutions operations architect at Chevron*

Summary

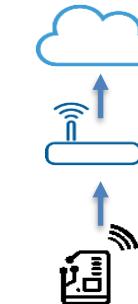
The LoRa Alliance® is an open, nonprofit association focused on standardizing and promoting the LoRaWAN® protocol. We develop and maintain an open specification and make certification available globally for LoRaWAN devices.



Public & Private network deployment options



orange™



Open Standard
supported by a global alliance



Largest IoT group of members



MACHINExQ



100+ million sensors deployed to date



Internet of Things World

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