Technical Article

Connecting Sensors to the Cloud at a Distance

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If you search for examples of devices in the Internet of Things (IoT), you may find mockups of connected toasters, lipstick and toy cars. You may find images of talking fridges that alert you when the milk runs out, or demos of dolls that learn a child's favorite jokes and games. You may find visions of connected factories, farms and cities

Some of these are fun examples you may find when searching about IoT, but sprinkled in with all the fun are the "behind the scenes" devices: the temperature sensor on that toaster and fridge, the accelerometer on that toy car and doll, the pressure sensor on the lipstick. The connected farms may sport humidity sensors for crops, and factories might use accelerometers on machinery for sensing if maintenance is required. All of these sensors need to be connected to the cloud to easily access the data however, connecting them is a challenge that consumes precious time and resources.

TI's Sub-1 GHz Sensor to Cloud with Industrial IoT reference design (TIDEP0084) takes this challenge and streamlines the connectivity process. An engineer looking to connect a device can start working from a proven design instead of having to be the total expert on wireless connectivity. They can easily leverage this reference design as a base or foundation for integrating Sub-1 GHz technology into their current and future products.

The design demonstrates how to connect sensors to the cloud over a long range Sub-1 GHz wireless network, suitable for industrial and consumer applications. It is powered by a TI Sitara™ AM335x processor and SimpleLink™ Sub-1 GHz CC1310 and dual-band CC1350 wireless microcontrollers (MCUs). The reference design pre-integrates the TI 15.4-Stack software for Sub-1 GHz star network connectivity and the Linux® TI Processor SDK. TI Design Network partner stackArmor supports the cloud application services for cloud connectivity and visualization of the sensor node data. **Basically,** the TI Design reference design integrates both hardware and software components for a seamless design experience.

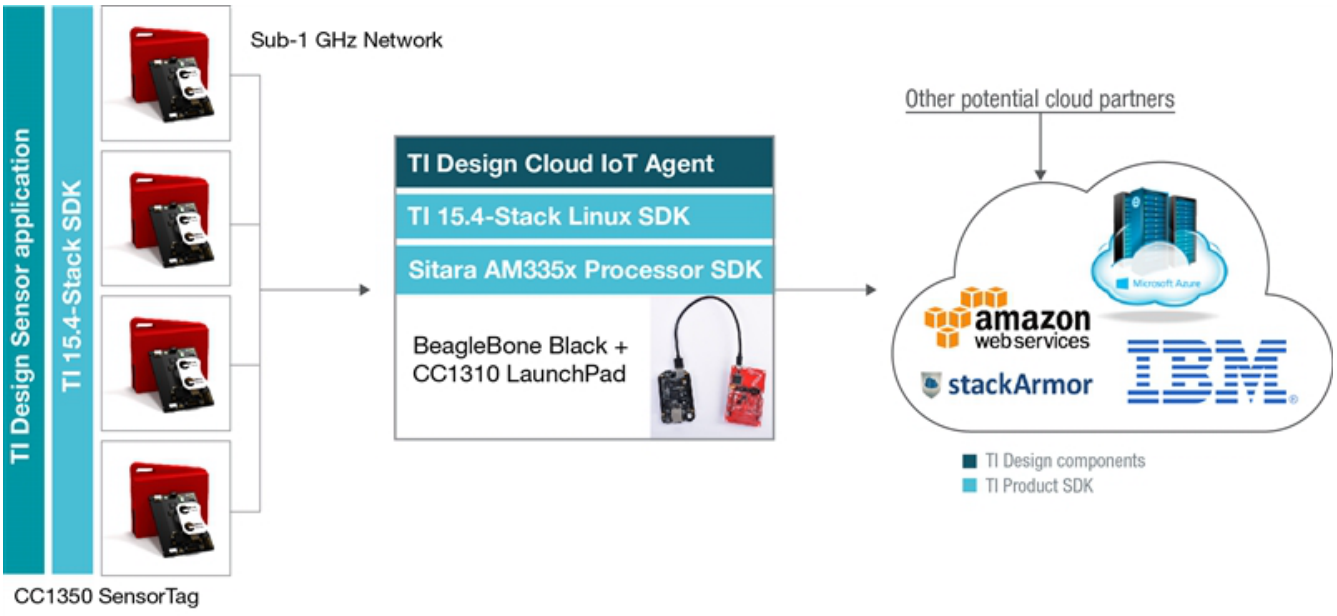

Figure 1. Diagram of the Sub-1 GHz Sensor to Cloud with Industrial IoT Reference Design

Building a scalable network doesn't need to be a cumbersome task. By leveraging the Sub-1 GHZ Sensor to Cloud design, you can easily connect one, two, three, or up to 50 devices in a modular, plug-and-play kind of way. The SensorTag kit in the design comes with infrared, humidity, light, pressure, and more sensors all operating on a single coin cell battery. Every single bit of data seamlessly connects to cloud application providers like Amazon Web Services, Microsoft Azure or any standard cloud interface with the support of stackArmor.

Even with all of this capability, the end goal is to solve a problem. An example used previously was an accelerometer in a factory. A factory using mechanical devices like cranes and lifts will need to service them regularly for performance and safety. How does a technician know it needs to be serviced? Instead of having to react to a breakdown or guess, an accelerometer on the device could detect irregular movements. Instead of having to install expensive wiring to the device, the accelerometer could be connected wirelessly and at a long range. Instead of having to manually download every bit of data, the sensor could stream directly to the cloud and alert the technician instantly. The Sub-1 GHz Sensor to Cloud reference design handles every step in this process seamlessly.

Happy designing! To start, visit Sub-1 GHz products and then order the kits you need:

- SimpleLink CC1350 SensorTag kit
- SimpleLink CC1310 LaunchPad™ development kit
- BeagleBone Black

Enjoyed this topic? You might enjoy reading these other blog posts:

- Tackle the challenges of IoT application development with the Seeed Studio BeagleBone Green Wireless board
- How to build a fully managed and scalable long-range network with low-power nodes
- Why use Sub-1 GHz in your IoT application

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