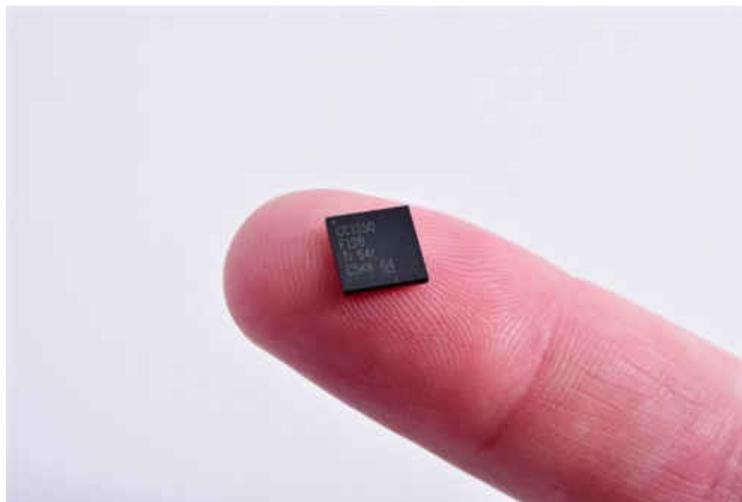


Bringing Bluetooth® Low Energy to Sub-1 GHz Networks with SimpleLink™ CC1350 Wireless MCU



Jeanna Norin

In today's Internet of Things (IoT) world, there is a multitude of new wireless connectivity applications entering the market each day, propelling the continuous gathering of sensors and interactions. From our smartphone reminding us it is time to leave for an event so that we will be on time, to our security system notifying us that no door is left open, we have a safety net of reminders helping us move throughout our day. These IoT devices typically have several hard-to-meet requirements. They need to operate on either Sub-1 GHz or 2.4 GHz RF bands to synchronize with already implemented systems. To encourage seamless, non-invasive sensing, you need a tiny form factor that can go unnoticed in your everyday life. This allows for the magical side of the IoT, where things around you just happen such as your home air conditioning kicks on when you are 20 minutes away, or your refrigerator adds milk to your shopping list because your daughter finished it with her afternoon snack. To accomplish this you need ultra-low power consumption and high integration, all in a tiny form factor. TI's answer is the SimpleLink™ dual-band [CC1350](#) wireless microcontroller (MCU), which is small enough to fit on your fingertip.



Save on size and power with the new [CC1350](#) wireless MCU. The [CC1350](#) solution is the latest device in the SimpleLink wireless MCU family released in early 2015. The [CC1350](#) device is a highly integrated dual-band solution supporting Sub-1 GHz and *Bluetooth*® low energy on the same chip. Like the other devices in the SimpleLink family, it is designed with the same ultra-low power requirements in mind, along with market leading low power MCU and radios. The [CC1350](#) wireless MCU also utilizes the sensor controller to handle analog and digital sensors in a low-power manner. It is designed to run autonomously when the rest of the system is in standby. Perfect for saving power in a sensor node network where power is your main concern. To learn more about enabling longer battery lifetimes read the [“Taking Power to a new low with the SimpleLink ULP wireless MCU platform”](#) blog post.

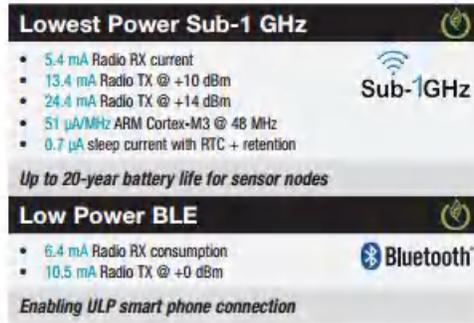


Figure 1. SimpleLink dual-band CC1350 wireless MCU power numbers

We have covered size and power, so what does dual-band bring to the table? How would you utilize Sub-1 GHz + Bluetooth low energy? Let's talk about some of the use cases.

Let's consider a house with a network of three smoke detectors. Typically there are detectors placed in different rooms, such as your kitchen, entry hallway and near the bedroom. The smoke detectors using Sub-1 GHz are connected in a simple star network to a gateway, enabled by the Sub-1 GHz long-range connection.

Installation/commissioning, Maintenance and Diagnostic of a Sub-1 GHz Network

What if you want to add one more detector to your existing network? With Sub-1 GHz this can be tricky, as in some tightly packed neighborhoods you could accidentally connect to your next door neighbor's smoke detector network instead of your own. One way to avoid this is using a Bluetooth low energy connection to give credentials.



Figure 2. Commissioning

Using a Smartphone as a Remote Display

What if you would like to quickly read diagnostics on your smoke detector network? Typically a smoke detector doesn't have a display, but if each smoke detector had dual-band capability your cell phone or tablet becomes a display.

Beacon Alerts

What if your daughter listens to music as she sleeps from her phone with headphones? Or maybe you watch the latest sports game at full volume in the game room. With dual-band functionality, you can get alerts on every Bluetooth low energy smartphone in your home warning you of impending danger.

Let's consider another example, take a museum that has set up beacons on each exhibit. The beacons are there to notify the visitor of interesting facts about each exhibit, or send a wiki link with more information about a painting. Or is someone too close to a frame? A beacon alerts them to take a step back please.

Managing Bluetooth Low Energy Beacon Payloads

Updating a network of this size can be overwhelming - physically approaching each beacon for updates would be time consuming. Dual-band functionality makes this an easy task. The Sub-1 GHz link can be used to connect to the whole network of beacons and give the beacons new payload information.

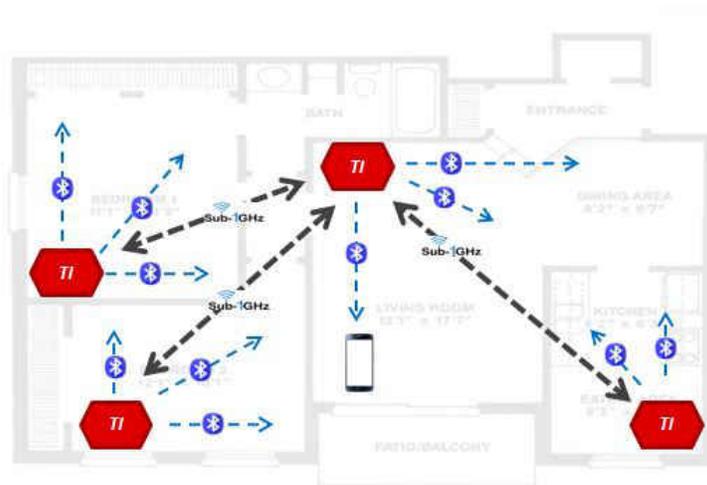


Figure 3. Bluetooth low energy beacon network

Of course, these use cases are just the tip of the iceberg. How will you add Bluetooth low energy to your Sub-1 GHz network? Tell us more in the comments section!

To Learn More

- Read the [CC1350 wireless MCU data sheet](#).
- Download the [Sub-1 GHz long-range communication and smartphone connection for IoT applications white paper](#).
- Watch our [video](#) on why you should use Sub-1 GHz + Bluetooth low energy.

To Get Started Quickly

- Start evaluating with the [CC1350 wireless MCU LaunchPad™ development kit](#).
- Order CC1350 wireless MCU [samples](#).

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2023, Texas Instruments Incorporated