Technical Article

SimpleLink™ Bluetooth® Low Energy Wireless MCUs Now Support Ali Cloud Link IoT Platform

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Smart locks and smart sensors have become trendy. Developers can spend a huge amount of time creating and connecting these popular Internet of Things (IoT) products to the cloud via gateways using wireless technologies such as *Bluetooth*® low energy.

Choosing an easy-to-use cloud service that offers powerful functions, steadiness and multiple cloud-security features can also be a challenge, so TI worked with Alibaba to provide support for the Ali Cloud Link IoT platform on TI's SimpleLink™ Bluetooth low energy CC2640R2F wireless microcontroller (MCU).

TI provides a sample application for the SimpleLink CC2640R2F software development kit (SDK) to support Ali Cloud Link. Through this sample application, you can receive the specific Alibaba profile, which contains a range of security features, over-the-air (OTA) support and good performance for compatibility with iOS and Android platforms. For example, you can use the secure hash algorithm (SHA) 256 security feature and the CC2640R2F wireless MCU's true random number generator (TRNG) to generate keys for Advanced Encryption Standard (AES) encryption, which is included in the CC2640R2F device's hardware encryption engine. This ensures that every communication session gets a different key to improve the security performance for data transmission. With a few simple application programming interfaces (APIs), you can build up a secure Bluetooth low energy product.

The Alibaba OTA protocol is fully supported in this sample application. Compatibility with different Android mobile phones has been optimized, especially for China-brand Android phones. Figure 1 shows the architecture of a sample application with the SimpleLink CC2640R2F SDK.

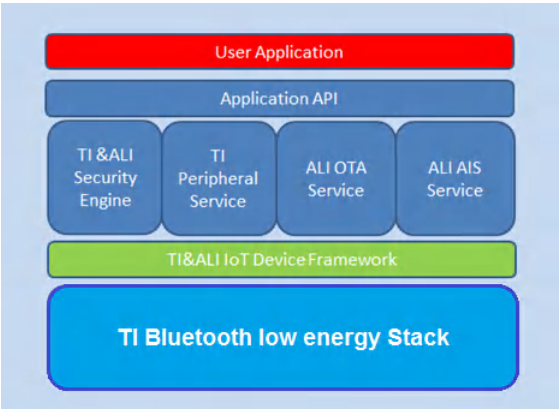

Figure 1. SDK Software Architecture for the CC2640R2F Wireless MCU

The 2.4GHz CC2640R2F wireless MCU supports Bluetooth 4.2 and Bluetooth 5 ultra-low-power applications for IoT applications. The device has extremely low active radio frequency (RF), MCU power and low-power-consumption modes, thus enabling longer battery life. It includes a 32-bit Arm® Cortex®-M3 core as well as many peripheral functions in which there is a unique ultra-low-power sensor controller. The sensor controller is suited for connecting external sensors, and automatically collecting analog and digital data when the rest of the system is in sleep mode.

You do not have to worry about issues like protocol interaction and driver development. The SimpleLink CC2640R2F SDK includes:

- Application code that is 100% portable across the SimpleLink MCU platform from Bluetooth low energy to Sub-1 GHz and more.
- TI drivers that provide a standard and unified API interface for all peripheral interfaces of the SimpleLink MCU platform, enabling you to write code independent of the targeted device.
- The integrated TI real-time operating system (TI-RTOS).
- Other RTOSs like Free RTOS's adapter interface, which is API-compatible to the Portable Operating System Interface for Unix (POSIX).
- A hardware encryption engine that you can leverage to implement security measures.

The combination of the TI CC2640R2F and Ali Cloud Link IoT platform offers an end-to-end solution, with:

- Powerful performance and multiple cloud security features such as device certification, providing device uniqueness.
- Transmission encryption that prevents data tampering.
- Cloud shield and permission authentication to guarantee cloud security.

The solution is suitable for many IoT applications and is already being used in multiple popular IoT applications such as smart locks and wearable devices.

The Ali Cloud Link IoT platform is an overall IoT solution for home, health care and consumer electronics. Ali Cloud Link offers multiple protections, guarantees cloud security for devices and supports the persistent connection of hundreds of millions of devices and the concurrency of millions of messages. The Ali Cloud Link IoT platform features functions like device registration management, account authorization, user management and data statistics, enabling devices to access the IoT and obtain device and user characteristics. Through abundant solutions from third-party partners, the Ali Cloud Link IoT platform can provide differentiating functions and value-added services and help you easily realize customized functions.

With respect to app openness and an ecosystem, the Ali Cloud Link IoT platform's features and advantages include:

- App openness: enable users to use their own apps and accounts and support quick logins via other accounts.
- Ecosystem: There are mature and commercially available solutions such as modules, apps, algorithms, content services, voice recognition, audio and video content, etc.

In addition, the Ali Cloud Link IoT platform can provide an end-to-end Bluetooth solution, as shown in Figure 2 and Figure 3.

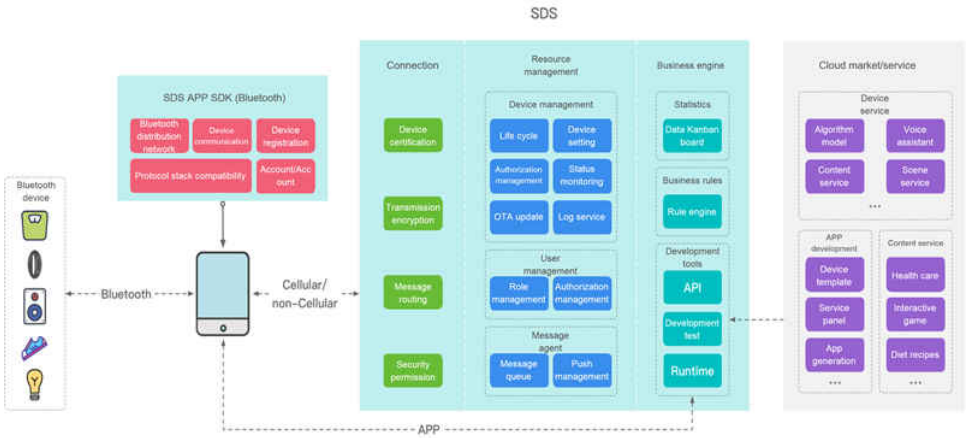

Figure 2. The Ali Cloud Link IoT Platform's End-to-end Bluetooth Solution (Source: Alibaba)

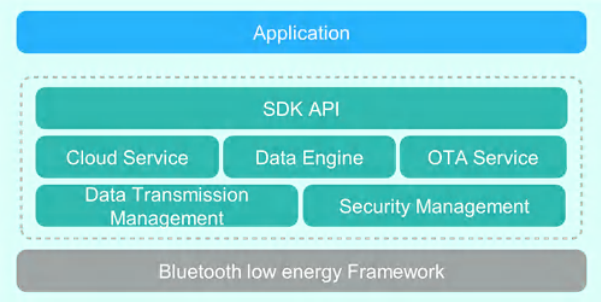

Figure 3. The Main Functions of Bluetooth Devices

This solution helps you leverage cloud and device security features to implement security measures for Bluetooth low energy applications. To get started developing with the CC2640R2F wireless MCU and Ali Cloud Link visit github.com/ti-simplelink/ble_examples.

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