Which TI Bluetooth® Solution Should I Choose?

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Texas Instruments™ offers multiple *Bluetooth*® solutions, so it might be confusing to choose the correct part. Whether you want to add Bluetooth technology to an existing device or create a new Bluetooth product, the question is: *which TI device should be chosen?*

Bluetooth Classic was introduced in the 1990s. It presented effective peer-to-peer communication mainly for audio calls, voice calls, and also for data transfer (for example, files for printers and SMS/vCards for phones). Bluetooth low energy was introduced in 2010 in Bluetooth specification version 4.0, as low-energy technology mainly used for data transfers (for example, from sensors).

The CC256x series presents Bluetooth dual-mode devices (that is, Bluetooth Classic [BR/EDR] and Bluetooth low-energy dual-mode solutions). The solution is a transceiver up to the HCI layer that allows for flexibility in using different application processors and different Bluetooth protocol stacks. For a complete Bluetooth solution, TI offers a royalty-free Bluetooth software stack with dozens of profiles and applications on various platforms, including ARM® Cortex®-M4 microcontrollers (MCUs) and Linux® microprocessors (MPUs). More details about the different solutions can be explored on the Bluetooth dual-mode overview page, Wireless Connectivity: Dual-Mode Bluetooth®.

The CC26xx family of wireless MCUs presents stand-alone Bluetooth low-energy solutions that feature ultra-low power devices with an integrated 32-bit ARM® Cortex®-M3 core, and a unique sensor controller engine that collects data autonomously while the rest of the device is sleeping, which enables maximum coin-cell battery life. Coupled with excellent RF sensitivity and link budget, these powerful devices are highly compatible for a wide variety of applications such as appliances, building automation, and medical. TI offers a flexible, royalty-free software stack that is located internally, which differs from the CC256x device series. To learn more about the key differentiation of TI's Bluetooth low energy solutions, visit Wireless Connectivity: SimpleLink™ CC2640 / CC2640R2F.

The leading principal would be to choose between the CC256x and CC26xx devices according to the application and system requirements:

1. The CC256x family of devices are dual-mode solutions designed to address Bluetooth BR/EDR scenarios. The CC256x devices are the preferred solution in three different scenarios:
   - Audio applications: including Bluetooth speakers, headsets, and sound bars
   - Voice call applications: including infotainment systems and emergency call capabilities
   - Legacy infrastructures that support Bluetooth Classic: including communicating with feature phones and previous-generation devices

2. In comparison, the CC26xx device family presents significant benefits as a stand-alone low-energy device, specifically in terms of power and size. The CC26xx devices are the preferred solution in three different scenarios:
   - For sensor and beacon applications that are highly sensitive to power consumption and size
   - As a complete one-chip Bluetooth low energy solution that offers an embedded application processor with an internal Bluetooth stack and integrated flash
   - For newer Bluetooth low energy data-based applications that support Bluetooth 5 high throughput and long range (such as IoT end nodes, industrial sensors, smart door locks, and more).

NOTE: In case data throughput is critical, a Bluetooth Classic device has almost two times the effective bandwidth compared to a Bluetooth low energy stand-alone device. However, for most applications, Bluetooth low energy should suffice.

Furthermore, when designing a system, consider that the CC256x and CC26xx devices work well together at the overall system level. In many cases, the CC26xx device is in the role of Bluetooth low energy sensor or data source, while the CC256x Bluetooth Classic device acts as the data hub or gateway to another device like a mobile phone (see Figure 1). For example, an application media set-top box connects to a Bluetooth low energy remote control while streaming audio to headphones. In this case, the remote control can also support the *Voice over LE* feature that allows voice command transmissions over Bluetooth low energy.

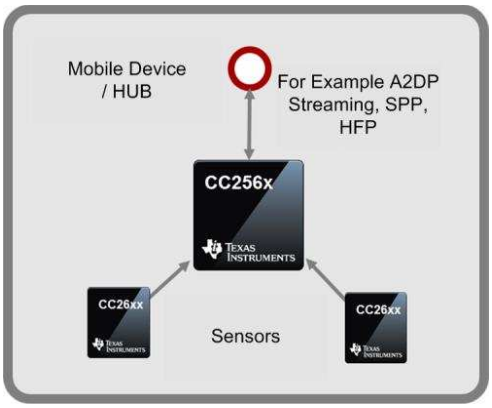

Figure 1. TI Bluetooth System Example

Another example is a personal medical device in the home that is used for monitoring heart rate, body temperature, or blood glucose levels, which captures data through Bluetooth low energy sensors. Then the device can transmit the data to a smartphone and upload the larger data set to a medical hub through the higher throughput and interoperability of Bluetooth Classic.

No matter what your Bluetooth needs are, TI offers a solution to fit your application. Get ready to start your next ground-breaking design—which Bluetooth device will you choose?

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