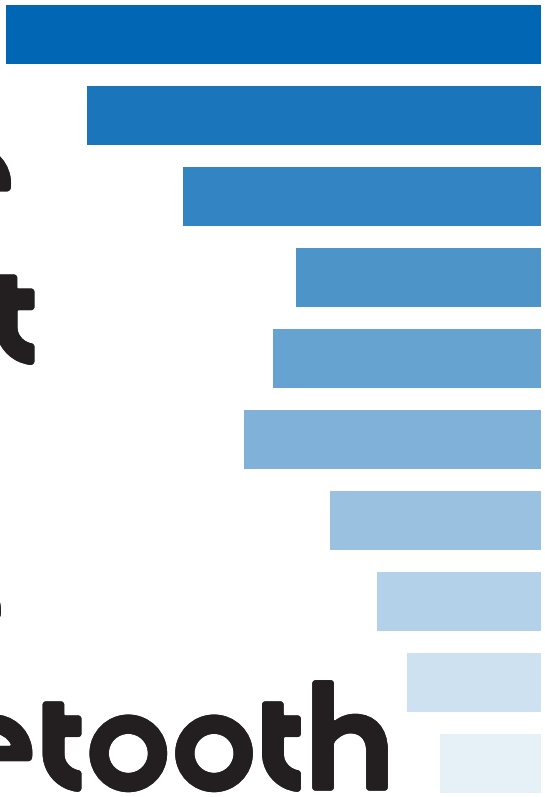
the true cost of free bluetooth



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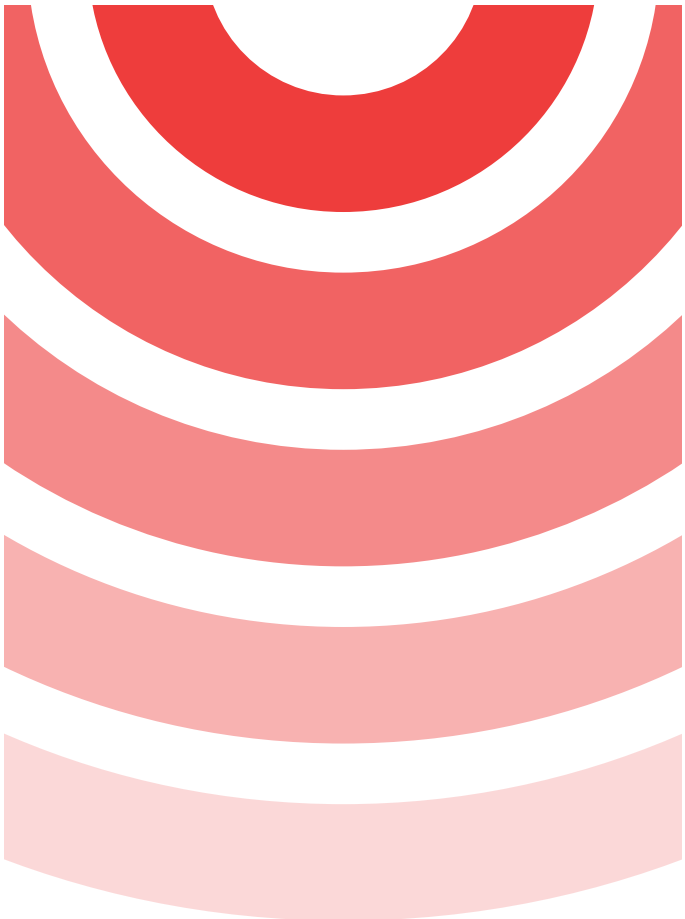
the true cost of free bluetooth

When integrating Bluetooth into a new device or system, project managers and engineers will choose one of the following two options: (1) an open source/ free Bluetooth supplied by the open source community or semiconductor chip manufacturer or (2) a commercial turnkey Bluetooth solution from a specialized provider. Chip manufacturers provide free Bluetooth stacks to ensure a functional product, sell more chips, and increase their revenue. Although the prospect of a free Bluetooth stack is appealing, you should consider the hidden costs that come with such a solution. In other words: What is the true cost of free Bluetooth?

Since the 1999 launch of the first consumer Bluetooth device, a hands-free mobile headset, Bluetooth has been enabled in more Internet of Things (IoT) devices than any other technology. Despite the economic slowdown due to the COVID-19 pandemic, the Bluetooth Special Interest Group (SIG) forecasts that strong demand for connectivity and positioning solutions will accelerate global device shipments over the next five years. The group estimates that 6.4 billion Bluetooth Low Energy (LE), Bluetooth Classic, and dual mode (Bluetooth LE + Bluetooth Classic) devices will ship annually by 2025. Of the three, Bluetooth LE shipments are expected to more than triple over the next five years with 96 percent of all Bluetooth-enabled devices forecast to include Low Energy by 2025.

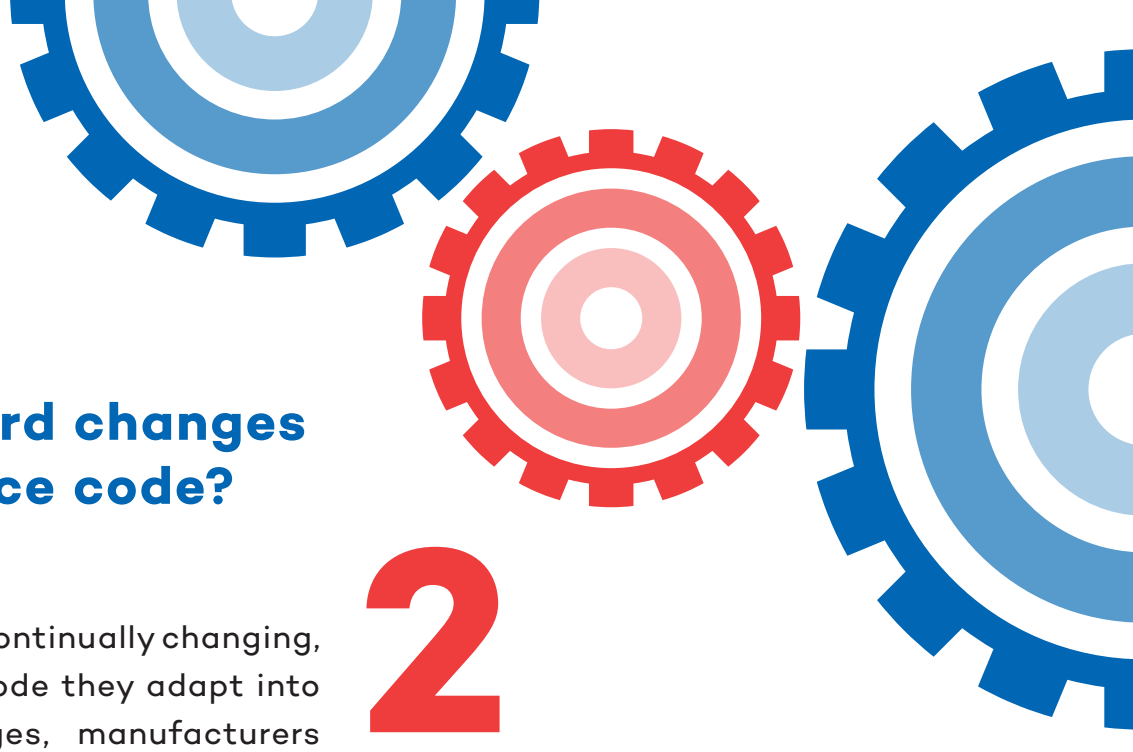


best uses of free bluetooth and commercial bluetooth

Free Bluetooth is a fitting solution for academic research and some types of commercial applications: for example, simple applications that send data from a single sensor to a phone and cost-sensitive applications such as consumer products with low price points.

By contrast, commercial Bluetooth offers advantages for devices with production runs exceeding 10,000 units per year, high-end devices, and specialized equipment for defense, automotive, and healthcare applications where product reliability is especially important. Commercial Bluetooth also caters to a larger range of RTOS and is better suited for complex usage scenarios.

Five factors come into play when you are deciding whether free or commercial Bluetooth is the better fit for your device requirements.



1

can you afford changes to open source code?

Open source code is continually changing, and every time the code they adapt into their product changes, manufacturers must requalify those devices through the Bluetooth SIG. At US$8,000 per qualification plus a few weeks of an engineer's time, qualification is a complex, costly, and time-consuming task.

The qualification process for commercial Bluetooth is simpler. Commercial Bluetooth providers supply a stack that comes as a qualified component backed by engineers experienced with testing and qualification processes. In addition, commercial vendors can provide a stack that is isolated from the hardware and OS/RTOS layer. Developers can upgrade the OS/RTOS (e.g., Linux kernel) without having to change the stack code, thus avoiding requalification costs. Commercial Bluetooth providers are also compliant with the latest Bluetooth v5.2 standard, which features BLE audio profiles and services and LC3 codec.

2

got a complex system? opt for commercial bluetooth

Bluetooth is a complex technology. With a half-million lines of code and more than 50 different profiles that can be combined into a single device, Bluetooth is tricky to integrate within a system. When a device features dual mode Bluetooth or combines Bluetooth and Wi-Fi, developers need to understand two different stacks, two technologies, and two infrastructures. Complex or high-cost systems (e.g., motorbike infotainment systems for rider and pillion passenger) run simultaneous Bluetooth roles. A commercial Bluetooth provider develops the required Bluetooth solution for you and keeps it ahead of the technology curve. The ability to integrate multiple technologies within a single device is yet another advantage of using commercial Bluetooth solutions.

3

how much time do you have?

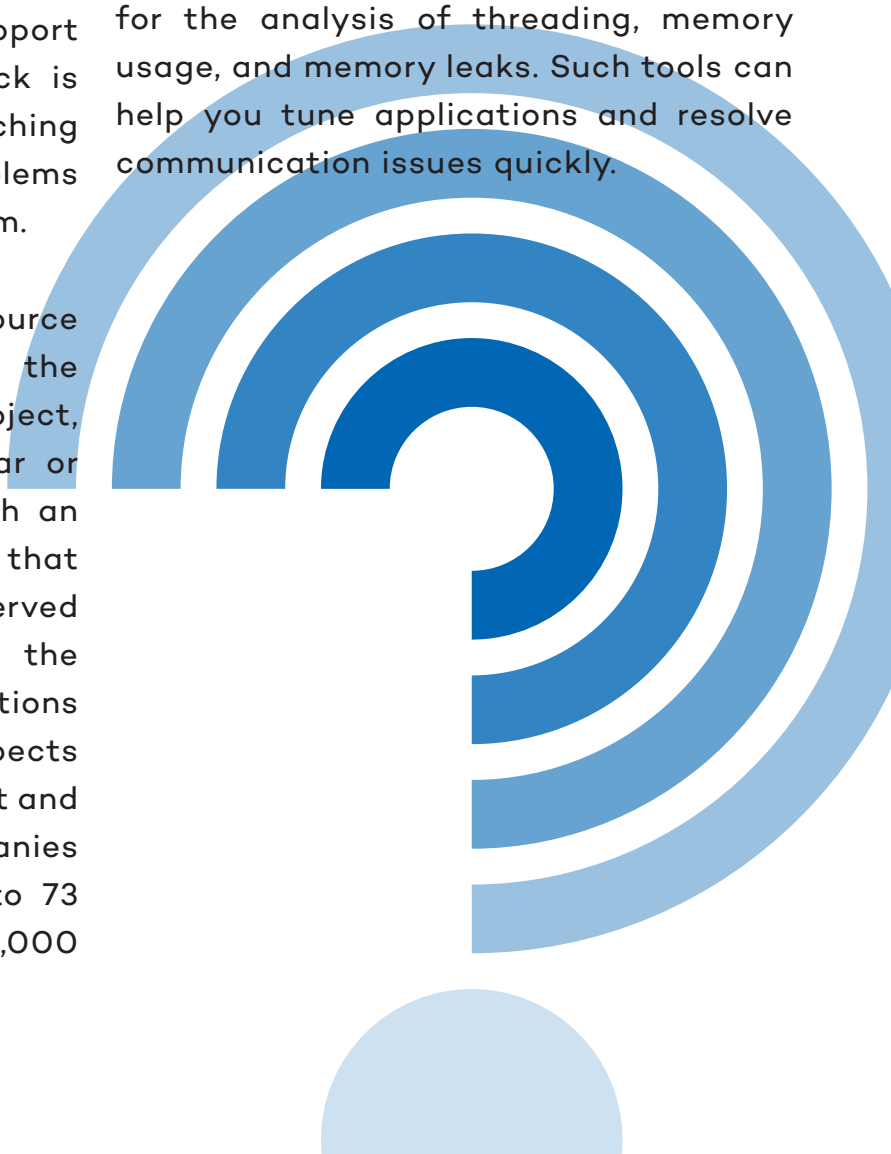
Consultancy for open source projects is costly. Simpler projects typically require 4–5 months of development time, much of it spent on learning about the stack and software. One or more developers working on a project could total more than a thousand engineer hours invested in Bluetooth development. Unlike commercial solutions, technical support for an open source Bluetooth stack is typically provided online. Researching how to fix open source Bluetooth problems can be time consuming for your team.

Companies that opt for open source Bluetooth typically approach the endeavor as a do-it-yourself project, which can then drag on for a year or two before they all too often reach an impasse. By contrast, companies that opt for commercial Bluetooth are served by providers that specialize in the development of custom turnkey solutions at a pre-agreed fee that covers all aspects of the project, including development and annual maintenance. Such companies report per project savings of up to 73 percent on engineering time and $20,000 on tooling.

4

how much help do you want?

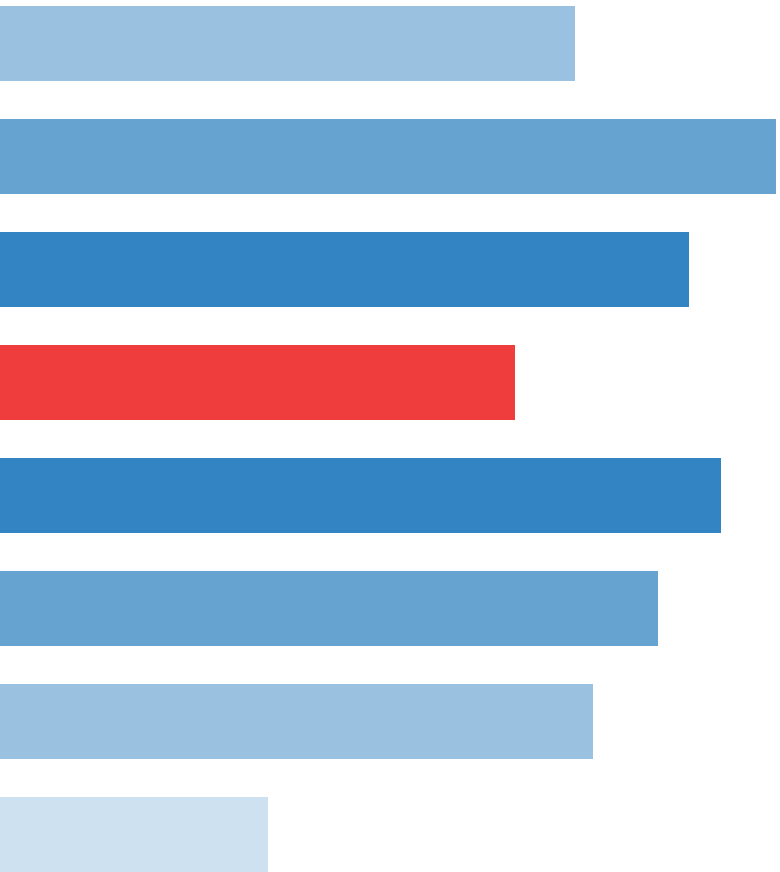
Companies that choose open source code must maintain and update their Bluetooth stack throughout the product life cycle with help from the open source community. By contrast, when your company purchases a Bluetooth stack, you receive technical support from a team of Bluetooth experts for a flat fee. That support may include time-saving debugging tools with a protocol analyzer for faster debugging and tools for the analysis of threading, memory usage, and memory leaks. Such tools can help you tune applications and resolve communication issues quickly.



5

do debugging tools matter?

Debugging can be time-consuming in applications that feature multiple profiles or dual mode Bluetooth. Companies that opt for open source rely on engineers who must spend valuable time researching and fixing issues. By contrast, when a commercial Bluetooth stack is purchased, engineers have access to advanced debugging tools with built-in protocol analyzer support and threading, memory usage, and memory leak analysis tools to help them develop applications faster.



about clarinox technologies pty ltd

Clarinox Technologies Pty Ltd was formed with the aim of providing cost-effective and innovative wireless embedded systems solutions for businesses. Members of the Clarinox team leverage their experience with embedded systems design to develop leading-edge Bluetooth and Wi-Fi solutions. Our ClarinoxBlue solution is certified with Bluetooth 5.2 compliance, which includes BLE audio profiles and services and LC3 codec. We are passionate about delivering flexible and robust wireless protocol software for embedded systems developments. Contact Clarinox today to discuss your next Bluetooth integration system. www.clarinox.com