Silicon Labs' Bluetooth® Channel Sounding Provides Sub-Meter Accuracy to Drive Secure Fine Ranging

Breakthrough Hardware and Software Boosts Bluetooth Device Ranging Accuracy and Security

AUSTIN, Texas, Sept. 3, 2024 /PRNewswire/ -- Silicon Labs (NASDAQ: SLAB), a leader in secure, intelligent wireless technology for a more connected world, today announced its support for Bluetooth® Channel Sounding technology on the xG24 platform.

Bluetooth® Channel Sounding is a new protocol stack designed to enable secure and precise distance measurement between two Bluetooth Low Energy (LE) connected devices. By offering true distance awareness, Bluetooth® Channel Sounding enhances the accuracy and security of Bluetooth device-ranging capabilities.

"In a world where location awareness is critical, Bluetooth® Channel Sounding revolutionizes proximity and location capabilities, propelling Bluetooth technology into a new era," said Ross Sabolcik, Senior Vice President of the Industrial and Commercial Business Unit at Silicon Labs. "With a legacy of empowering developers with the full potential of Bluetooth technology, Silicon Labs' latest hardware and software create an accelerated path to groundbreaking Bluetooth products equipped with Bluetooth® Channel Sounding."

Bluetooth Channel Sounding Enhances Accuracy and Security for Distance Awareness

By helping to estimate the distance between two devices, Bluetooth Received Signal Strength Indicator (RSSI) opened the door for a new wave of applications. From solutions to help locate devices like phones or tablets to digital security enhancements like geofencing, Bluetooth technology has enhanced the convenience and simplicity of everyday tasks. The challenge, however, is that Bluetooth RSSI has relied on estimations to determine location. RSSI is also susceptible to issues like multipath and obstruction which can significantly reduce accuracy. Bluetooth® Channel Sounding addresses this by improving the accuracy to sub-meter and enhancing the security of Bluetooth device ranging capabilities.

Bluetooth® Channel Sounding uses Phased-Based Ranging (PBR) to deliver precise distance measurements between two devices and a secondary ranging method called Round Trip Time (RTT). The independent distance measurements from RTT can then be used to verify and cross-check the PBR measurements. This cross-verification process helps detect anomalies to ensure applications are secure, which is critical when developing access control solutions for hospitals and industrial buildings that must grant or deny access based on proximity.

With PBR and RTT, Bluetooth® Channel Sounding can be used in home and life applications like smart locks, locating consumer electronic devices, and pet trackers, as well as industrial and commercial applications like geofencing, vehicle keyless entry, and access control – all while delivering accurate, secure, and dependable Bluetooth ranging services. With advanced distance estimation techniques, Bluetooth® Channel Sounding can also be used to triangulate the position of commercial infrastructure like wireless access points or luminaires to either meet regulatory requirements or save human labor and costs.

Additionally, Bluetooth® Channel Sounding offers a more convenient and flexible ranging solution for applications that already use Bluetooth LE. In such cases, it can be implemented without the need for extra hardware and design space.

Silicon Labs New xG24 and Antenna Hardware Solutions Support Channel Sounding

Silicon Labs' new xG24 Radio Board and Pro Kit, available to order now, provides a fast and efficient way to create and prototype products using Bluetooth® Channel Sounding for precise distance estimation. The kit includes a BRD4198A EFR32xG24 2.4 GHz +10dBm Radio Board, a Sleeve Dipole Antenna, and reference designs.

Additionally, the xG24 Dev Kit, available inDecember 2024, features a dual antenna PCB design, and a Channel Sounding visualizer tool that allows customers to effortlessly view distance measurements in real time, streamlining the implementation of Bluetooth® Channel Sounding in their products and applications.

Silicon Labs offer customers new and advanced hardware solutions for developing products of varying complexities that support Bluetooth® Channel Sounding:

- **Single Antenna hardware** has fewer antenna paths and limited multipath information, making it more suitable for basic Bluetooth® Channel Sounding applications, where lower power consumption and reliability in simpler environments are prioritized over precise distance measurement.

- **Dual Antenna hardware** will be available for order and use in December 2024. The dual antenna hardware offers higher accuracy, better spatial and enhanced multipath resolution, and is ideal for advanced applications that demand precise distance estimation such as key fobs and tags. The small form-factor of this board makes it ideal for size-constrained applications. The antenna diversity also heightens signal quality and robustness.

Silicon Labs' hardware solution is AEC-Q100 qualified, making it a suitable choice for automotive applications like Passive Entry and Passive Start systems.

Qualification to version 6.0 of the Bluetooth® Core Specification for xG24 host stack and link layer are expected by the end of the year. The qualified stack will support intra-event antenna switching for optimal Non-Line-of-Sight performance and supports Channel Sounding when xG24 is operating in either NCP (Network Co-Processor) mode with an external application MCU (microcontroller unit) or SoC (System on Chip) mode with an integrated application MCU.

Get Started with Bluetooth® Channel Sounding with Silicon Labs

Silicon Labs customers can leverage comprehensive software and hardware solutions, as well as a patent-pending distance estimation algorithm, to develop products that use Bluetooth® Channel Sounding for various day-to-day applications in settings like the home, industrial, commercial, or connected health. To learn more about Bluetooth® Channel Sounding, please visit:

- The Silicon Labs Bluetooth® Channel Sounding blog
- The Silicon Labs Bluetooth® Channel Sounding page
- Watch the Bluetooth® Channel Sounding Tech Talk

About Silicon Labs
Silicon Labs is a trailblazer in wireless connectivity for the Internet of Things. Its integrated hardware and software platform, intuitive development tools, and unmatched ecosystem support make Silicon Labs the ideal long-term partner in building advanced industrial, commercial, and home and life applications. Silicon Labs leads the industry in high performance, low power, and security with support for the broadest set of multi-protocol solutions.

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