

What Drives Bluetooth Evolution?



Market Needs



New applications and use cases



More compute at the edge



Higher data throughput requirements



Member Innovation



Contributions from Bluetooth member companies



New feature development



Ecosystem feedback loop



Bluetooth SIG Leadership



Standards development



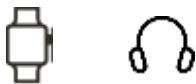
Qualification & Interoperability



Ecosystem growth



Audio Streaming



Data Transfer



Location Services



Device Networks

Channel Sounding

Adds 'spatial' awareness to IoT applications for advanced security, reliability, and responsiveness

WHAT CHANGED



Adopted in 2024



Earlier Bluetooth LE versions lack native support for precise ranging



Enables secure ranging in robust performance, even in NLOS

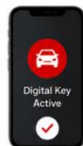


Foundation for Bluetooth spatial awareness and context-aware experiences

WHAT IT ENABLES



Devices can measure relative distance, not just detect presence



2.3 m
Digital Keys



1.2 m
Smart Locks



4.7 m
Asset Tracking



EARLY MARKET ADOPTION



Digital Keys and Access Control



Mobile Platforms



Smart Locks & Smart Home Access



Asset Tracking



Channel Sounding Momentum in the Market



Strong adoption in digital key and access control standards (CSA, CCC, ICCE, ICCOA)



Integrated into Android OS

Early adoption in mobile device platforms



Growing interest in smart locks and smart home access

Improved user experience & security

- **Key Channel Sounding benefits:**
 - **Provides trusted connectivity foundation for digital keys**
 - Adds true distance awareness based on well-proven PBR and RTT methods
 - Multi-level security mitigates wireless ranging attacks
 - Enables more secure, seamless digital key and “Find My” experiences from smartphones

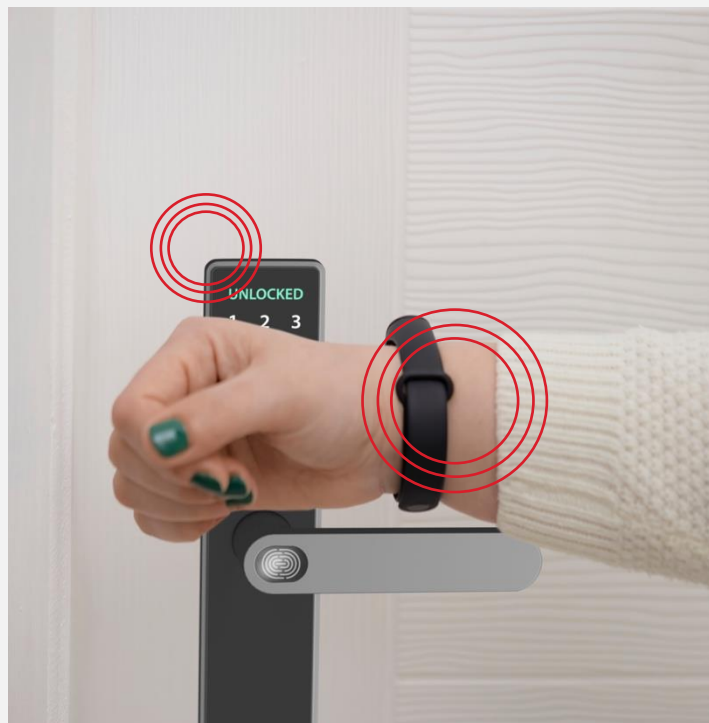
More resources:

www.bluetooth.com/channel-sounding



Channel Sounding is in the market and ready for adoptionx

Bluetooth Channel Sounding - Target Markets & Use Cases



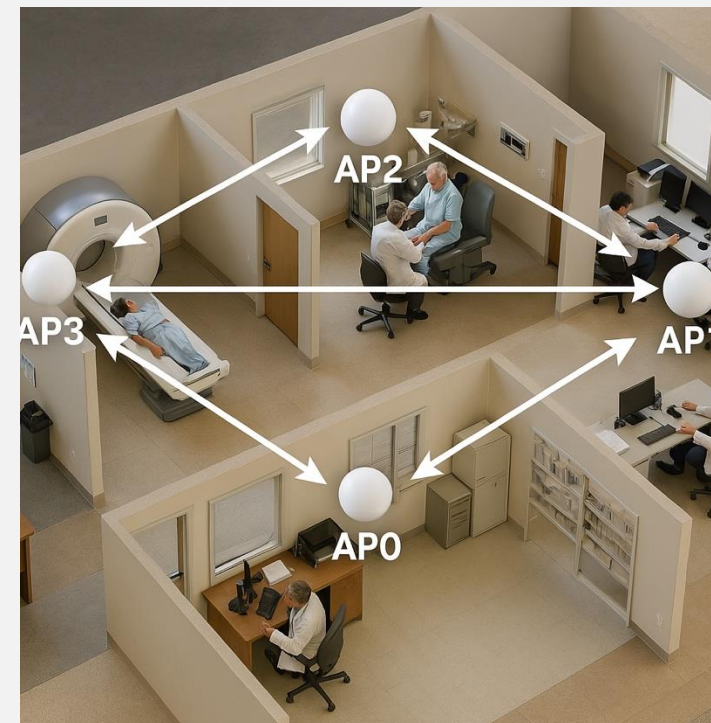
PROXIMITY AWARENESS

Door locks
Keyless entry
Building access systems
Geofencing - security alerts



LOCALIZATION

Indoor asset management -
hospitals, warehouses
Pet tracking inside home
Item finding - wallet, keys

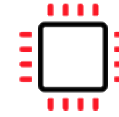


AUTOMAPPING

Solar Trackers
Luminaires, Access Points
Accurate Mapping for Battery
Storage



Bluetooth® ULL HID



What changed?

Two new Bluetooth features to achieve ultra-low latency.

- HID ISO

- HID SCI



What does it enable?

- 1 kHz report rates
- ≤ 1 ms HID latencies
- capabilities and performance to meet the responsiveness needs of next-generation HID designs



Why is matters?

- Closes the latency gap between Bluetooth and wired HID.
- Enables next generation experiences that demand low latency and high responsiveness

Why Ultra Low Latency (ULL)?

Emerging and some traditional wireless HID applications demand higher report rates to minimize latency, achieve best responsiveness, and deliver optimal user experiences



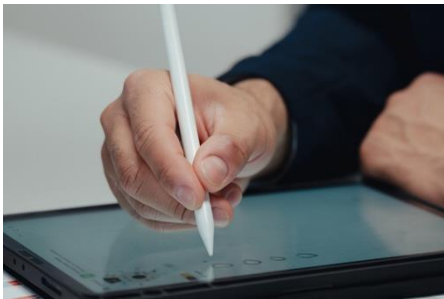
Gaming

- Most first-person shooter (FPS) or rhythm games run at 1 ms granularity for Hit decision
- Latency of gaming peripheral impacts the outcome of such games, esp. if multi-player



XR

- Advanced XR systems require single-digit ms I/O latency for near-real-time responsiveness
- Latency of I/O devices translates to over or undershooting movements from user that impact interaction with virtual objects or environment



Productivity

- I/O devices need higher report rates to catch up with higher refresh rates of displays
- Lower latency mice or styluses give better visual approximation of circles or curved shapes on a screen, which is relevant for HID users working in design, the arts, etc.

ULL HID experiences

TV-based cloud gaming



Productivity



Bluetooth® ULL HID summary

Introduces two new features to HID over GATT profile specification

Profile	HOGP v1.0	HOGP v1.1	HOGP v1.2
Feature		HID ISO	HID SCI
Adoption		August 2025	April 2026
Requirement	mandatory	optional	optional
Transport	LE ACL	LE ACL LE ISO for high report rates	LE ACL LE ACL with SCI for high report rates
Max report rate	133 Hz	up to 1 kHz	≥1 kHz
Report interval	constant	constant	adaptive
Data reliability	LL retransmissions	HID ISO protocol retransmissions	LL retransmissions
Data flushing	none	enabled via ISO	enabled via ACL flush timeout
Data delivery	best-effort	deterministic	best-effort (faster)



High Data Throughput

A major upcoming Bluetooth feature



INCREASED BITRATE

7.5 Mbps

Up to 7.5 Mbps maximum supported bitrate

Delivers significant wireless performance improvements

Higher throughput for demanding data-intensive applications

Will enhance many existing use cases

Better performance and responsiveness

Will enable new Bluetooth use cases

Unlocking new possibilities for high bandwidth applications

Targeted for adoption in Late 2026

Planned availability for future Bluetooth applications

Advancing Bluetooth® technology with HDT



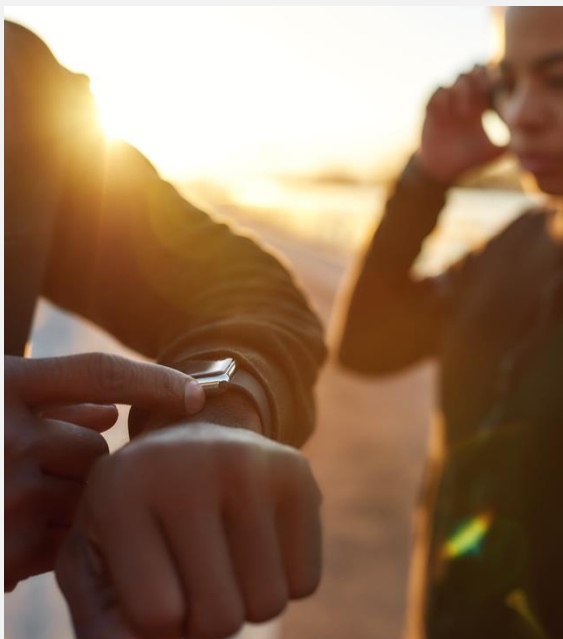
FASTER DATA TRANSFER

- Nearly 4x speed increase
- Higher-order modulations



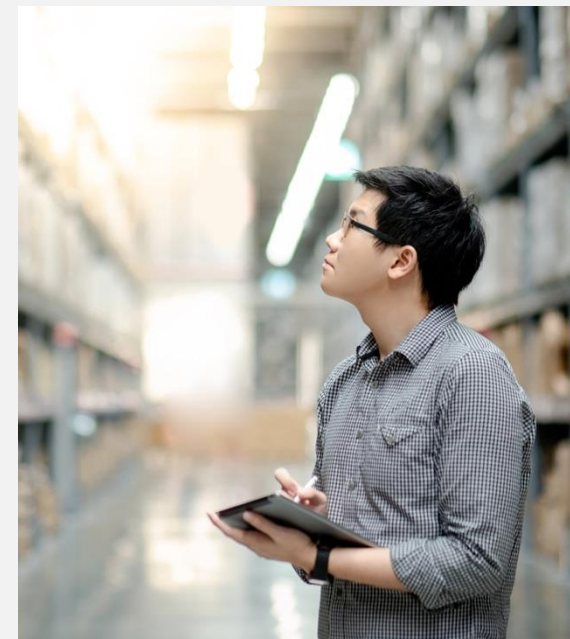
INCREASED CAPACITY

- Nearly 4x throughput increase
- Greater spectral efficiency



BETTER ENERGY EFFICIENCY

- More efficient radio use
- Fewer and shorter retransmissions



ENHANCED RELIABILITY

- Robust RF performance
- Utilizes forward error correction

A bigger data pipe enables richer Bluetooth experiences, from lossless audio to faster OTA updates and file transfers.

High Data Throughput (HDT)

- **Faster data transfer**

- Nearly 4x speed increase
- Higher-order modulations

- **Increased capacity**

- Nearly 4x throughput increase
- Greater spectral efficiency

- **Better energy efficiency**

- More efficient radio use
- Fewer and shorter retransmissions

- **Enhanced reliability**

- Robust RF performance
- Utilizes forward error correction

Target use cases

- Lossless or multi-channel audio
- OTA and file transfer

Note: HDT specification not yet adopted, all info here subject to change

Updates to the Bluetooth Standard

