

The State of the Bluetooth Industry: A Developer's Perspective

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A Bit of History

Bluetooth has officially been around since 1999, so it's been around for a long time (at least as far as technologies go). However, the Bluetooth of 1999 is almost nothing like the Bluetooth of 2020.

Let's talk about some of the major changes it has gone through:

- **Pre- Bluetooth Low Energy Era:**
 - **1999:** Bluetooth v 1.0 was merely used as a cable replacement (think RS-232)
 - **2004:** Bluetooth v 2.0 introduced Enhanced Data Rate (EDR) at 3 Mbps
 - **2009:** Bluetooth v 3.0 introduced High Speed over Wi-Fi
- **Bluetooth Low Energy Era** (most features and updates focused on Bluetooth LE):
 - **2010:** Bluetooth v 4.0 introduced Bluetooth Low Energy
 - **2014:** Bluetooth v 4.2 addressed major security concerns
 - **2016:** Bluetooth v 5.0 introduced new Bluetooth LE features including long-range mode (Coded PHY), high-speed mode (2M PHY), and extended advertisements
 - **2017:** Bluetooth mesh was released as a separate specification and standard, but based on Bluetooth LE
 - **2019:** Bluetooth v 5.1 introduced new direction-finding features for Bluetooth LE
 - **2020:** Bluetooth v 5.2 introduced the foundation for the next generation of Bluetooth audio: LE Audio

As you can see, the versions released after 4.0 have focused on the relatively new Bluetooth LE standard. Bluetooth LE offers developers a lot more control and flexibility in their designs compared to Bluetooth Classic (BR/EDR).

Why Should Developers Care?

In the past decade or two, more and more electronic devices have added some form of wireless connectivity. If you look at most wireless technologies, you'll see that they tend to focus on a few limited use cases and sometimes certain vertical markets. Of course, no technology is perfect or a one-size-fits-all solution, but I believe Bluetooth has proven its strength in offering developers a solution that can satisfy a variety of use cases from audio streaming to wearables

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to medical devices to industrial and commercial applications. It also helps that it provides true worldwide multi-vendor interoperability.

Here are some reasons why you should care about learning Bluetooth Low Energy development:

- Bluetooth LE can achieve impressive low power consumption levels, even compared to other low-power technologies.
- The power of flexibility. The ability to utilize Bluetooth LE for different use cases using the same protocol.
- This can reduce the learning curve for you once you're familiar with developing Bluetooth Low Energy solutions. Now you can apply most of this acquired knowledge to developing new applications much quicker than learning another new technology.
- 100% of new smartphones support both Bluetooth Classic (BR/EDR) and Bluetooth LE. If you need to develop a small device that has limited space for a screen and buttons, then considering Bluetooth LE connectivity and a companion mobile app is the best solution with the most intuitive user interface.
- Bluetooth has proven its ability to keep up with the changes and demands in the market by releasing updates and new versions that address those needs.

Opportunities in LE Audio

The biggest news for Bluetooth technology in 2020 was the announcement of the next generation of Bluetooth audio: **LE Audio**. This is basically audio streaming on Bluetooth Low Energy. The major features and enhancements that LE Audio offers include:

- Adding support for hearing aids
- Multi-stream audio
- New audio codec (*new LC3 Codec*)
- Introduce audio sharing capabilities

Some examples of LE Audio use cases include:

- Streaming PA announcements (e.g. in an airport) directly to a user's Bluetooth headphones.
- Museums and lecture halls sharing audio to assist visitors with hearing loss, even in multiple languages (e.g. live translations).
- In a gym setting, tuning into a specific TV's audio stream directly from your Bluetooth headphones.



Here are a few reasons why I think LE Audio will be a game-changer for developers:

- Most current wireless audio solutions are implemented using Bluetooth Classic (BR/EDR) and so most commonly you'll find developers who may be experienced with audio, but not familiar with developing Bluetooth Low Energy applications. On the other end, traditionally, Bluetooth LE developers are not involved with developing audio applications.
- Bluetooth Classic developers will bring audio knowledge as well as familiarity with the overlapping parts of Bluetooth LE and BR/EDR. Bluetooth LE developers will bring LE knowledge and experience.
- This leaves a gap between these two types of developers and their unique skillsets, which creates a unique opportunity for early-adopters and being ahead of the curve.



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