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ConnecTooth

Introducing the short range wireless technology.

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Bluetooth's introduction into Apple has significantly altered the way we interact with devices, rapidly growing to become an essential part of everyday life. Bluetooth is a short- range wireless technology that uses a radio frequency to exchange data between devices over short distances, eliminating the need for wires. Instead of using cables to transmit data between mobile devices to share documents or to connect to other Bluetooth-enabled components such as the printer, mouse, etc, it is a small and inexpensive radio chip that can be plugged into these components, making it a cable-replacement technology that is efficient and accessible to use. For information to securely transfer, the devices must detect and connect to one another first before allowing the transfer process to begin.

Bluetooth was developed by Jaap Haartsen in 1994, experimenting with a variety of methods to enable short-range radio connections and the system of wireless communication, ultimately establishing Bluetooth. The initial name 'Bluetooth' was used as a code name, but as time went by, they decided to keep that name for the development. The technology was named after the 10th Danish King, Herald Bluetooth, who brought Scandinavian Europe together when it was divided by uniting Denmark and Norway in the 10th century. At the time, Bluetooth was aimed to replace RS-232 telecommunications cables, an older version of cables for old devices, that used short-range UHF radio waves between 2.4 and 2.485 GHz.

Bluetooth is built into Apple's devices, advancing its connectivity and efficiency to transfer data between other Apple products that requires Bluetooth connection to work. Apple has eliminated the need for wires for their devices and instead created Bluetooth based devices to accessibly operate devices such as AirPods, Apple Watches, etc, constructing new effortless ways to use technology.

As technology evolves over time, so does Bluetooth. The need to constantly improve the efficiency and security of the connection between devices increases, thus leading to new versions of Bluetooth

being created. The initial version of this technology was the Bluetooth 2.0 that had the features of the Basic Rate/Enhanced Data Rate, which can also be referred to as the Bluetooth Classic radio and it supported Apple's first iPhone in 2007. This version provides moderate security and maintains a high throughput and the simplest way of connection between devices, out of all its versions. Which is mainly capable of using wireless audio streaming, wireless speakers, headphones, in-car entertainment systems and data transferring applications like mobile printing. Its low power radio is also able to stream data over 79 channels in the 2.4GHz ISM band (unlicensed industrial, scientific and medical frequency band). The following years later, a new version called Bluetooth Low Energy was created which supported Apple's 2nd generation iPod Touch and iPhone 4s. Bluetooth 3.0 and 4.0 had these features and offered fast communications and fewer power consumptions to make connectivity effortless while minimising active radio usage. Transmitting data over 40 channels in the 2.4GHz ISM band and assisting with

the creation of reliable and large scale device networks. Bluetooth LE features can also be used as a device positioning to increase the accuracy for indoor location services and support simple presence and proximity capabilities. Furthermore, Bluetooth 5.0-5.2, the latest version, boosts its connectivity in speed, bandwidth and enhances the range to up to 240m, making it more efficient to transfer data from one device to another. Supporting all of Apple's newest products such as iPad, AirPod, Apple TV, etc. It also offers Low Complexity Communication Codec (LC3) which is an audio protocol that transfers audio data at lower bitrates without corrupting the audio quality. This version also comes with the Slot Availability Mask (SAM) that helps lessons the interference with the wireless broadband communications for devices (LTE).

Bluetooth has significantly altered connection and the way people use technology, and knowing Apple, they will continue to develop new devices that will effortlessly transfer data within the future.

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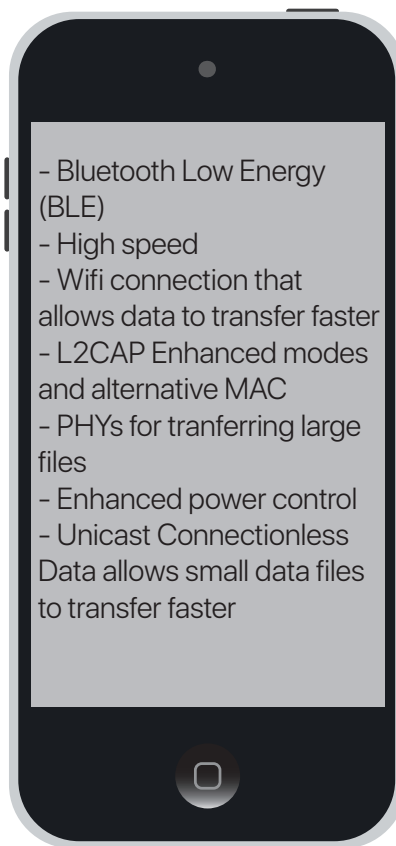
Evolution of Bluetooth
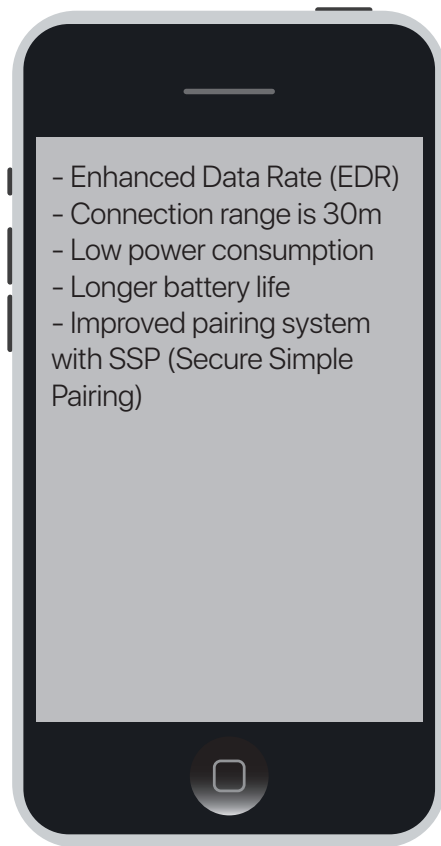
- Enhanced Data Rate (EDR)
- Connection range is 30m
- Low power consumption
- Longer battery life
- Improved pairing system with SSP (Secure Simple Pairing)

- Bluetooth Low Energy (BLE)
- High speed
- Wifi connection that allows data to transfer faster
- L2CAP Enhanced modes and alternative MAC
- PHYs for tranferring large files
- Enhanced power control
- Unicast Connectionless Data allows small data files to transfer faster
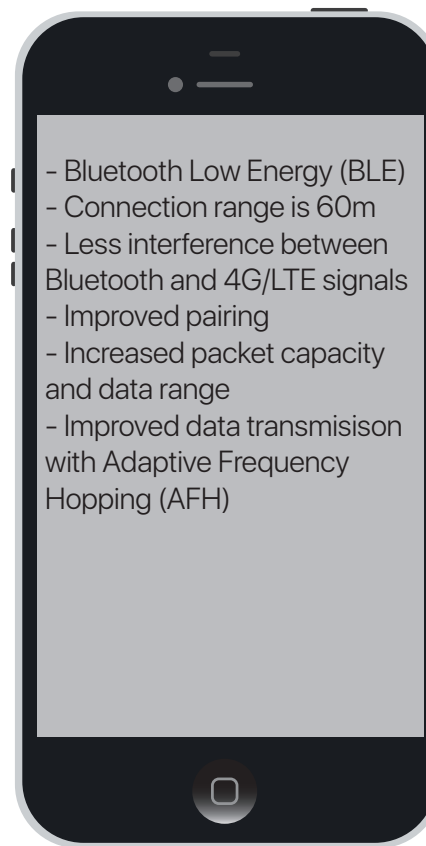
- Bluetooth Low Energy (BLE)
- Connection range is 60m
- Less interference between Bluetooth and 4G/LTE signals
- Improved pairing
- Increased packet capacity and data range
- Improved data transmisison with Adaptive Frequency Hopping (AFH)
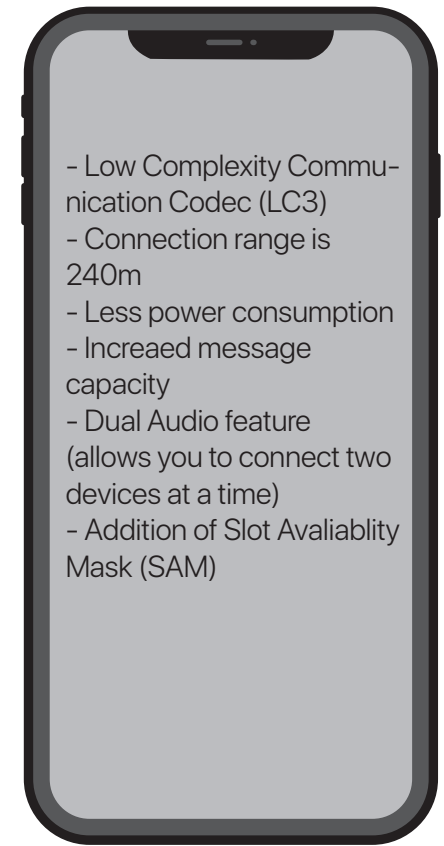
- Low Complexity Communication Codec (LC3)
- Connection range is 240m
- Less power consumption
- Increaed message capacity
- Dual Audio feature (allows you to connect two devices at a time)
- Addition of Slot Avaliablity Mask (SAM)

Bluetooth 2.0

Bluetooth 3.0

Bluetooth 4.0

Bluetooth 5.0