

Assignment 8.2 —

Option 1: Writing a Mechanism Description

NOTE: Audience and Type of Description

The audience for this assignment's *general description* of Bluetooth technology is general readers from North America that may be familiar with Bluetooth, but are wanting a more in-depth understanding of how it works. This type of description could be available on a website as a general interest feature – perhaps part of promoting a new product that has recently adopted Bluetooth technology.

How Bluetooth Technology Works

What is Bluetooth technology?

Bluetooth is a technology standard for a type of wireless connection between devices in close proximity (usually 10 to 30 feet). Unlike communication between two devices using a Wi-Fi internet connection, Bluetooth does not require an in-between device such as a wireless router. This direct communication is convenient, and also means less power usage, as the transmitters don't need to carry signals very far. Bluetooth technology allows the following and many other applications to be wireless:

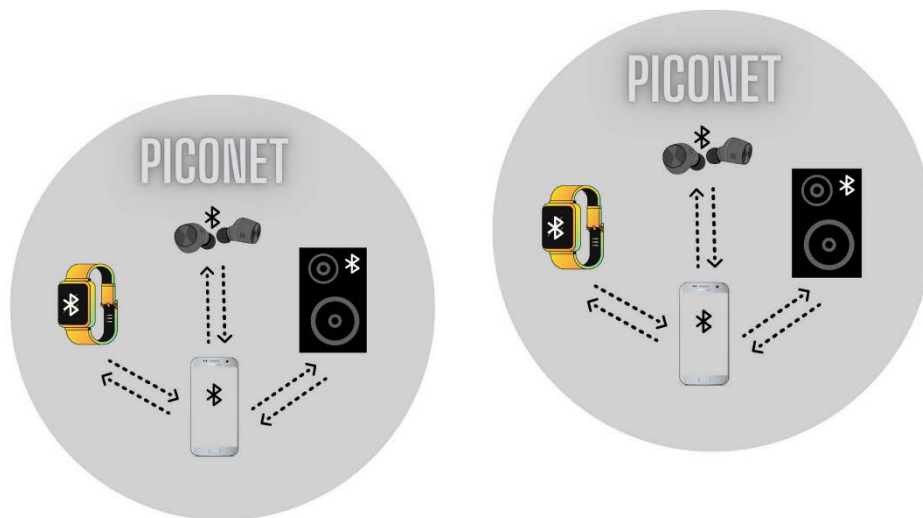
- A phone conversation on a wireless headset
- Wireless mouse for a PC
- Synchronization of information between a smart phone and a PC
- Operation of a car stereo or wireless speaker from a smart phone

How Bluetooth operates: devices, the frequency band, and piconets

Bluetooth devices have a microchip containing the Bluetooth radio antennas (transmitters and receivers) and software which make connectivity between compatible devices in close proximity possible.

An international agreement has set aside a radio wave **frequency band** (between 2.400 GHz and 2.483.5 GHz) of 79 channels for use by industrial, scientific, and medical devices. Bluetooth shares this band with microwaves and Wi-Fi, and devices such as baby monitors and garage door openers.

A **piconet** or personal-area network (PAN) is composed of one or more peripheral devices, such as a wireless speaker and a smartwatch, and a central device such as a smartphone. Several Bluetooth piconets may be operating in one space.



To avoid interference and loss of connection, Bluetooth technology uses **adaptive frequency hopping** to allow the group of devices on a piconet to find and jump together to the best channels.

Two types: Bluetooth LE and Bluetooth BR/EDR (or Classic)

Both types of Bluetooth use the same frequency band. Manufacturers select the type based on the suitability of its characteristics to the product.

Bluetooth Basic Rate/Enhanced Data Rate (BR/EDR) also known as Bluetooth Classic. This type requires more energy but provides a slightly higher data rate. Connectivity, or **pairing**, between compatible devices in close proximity is an automatic, or by button push, electronic conversation to determine whether to trust each other to safely exchange encrypted data. Bluetooth BR/EDR devices must always be paired, becoming a network.

Bluetooth Low Energy (LE). This more popular type requires less energy and can be used for broadcast or mesh networks (a group of devices that act as a single Wi-Fi network). Bluetooth LE devices may use pairing, but some products broadcast, or **advertise**, useful information packets about themselves that can be **found** by a compatible device that is scanning on known frequencies, usually once a user has pushed a button. The device then displays the information about the found devices and the user can select to connect to them.

Conclusion

Bluetooth technology effectively, securely, and often automatically, transmits and receives small amounts of data over short distances using little power. Bluetooth is a great complement to Wi-Fi, and continues to evolve to meet the increasing demand to work with more devices, at greater range, more quickly, and more securely.

Sources

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