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Bluetooth 5.0 – Improved Wireless Technology

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Bluetooth 5.0 is a noticeable improvement over the previous version and is finally finding its way into new devices. If you have had problems with Bluetooth pairing or staying connected in the past, Bluetooth 5.0 may improve or even fix the problem. But, both devices will probably have to be up to the new standard.



Bluetooth is a wireless technology standard used for exchanging data between fixed and mobile devices over short distances. Both Bluetooth and Wi-Fi are examples of wireless technology that use the unlicensed 2.4GHz frequency spectrum. Both have many applications in today's offices and homes such as: setting up networks, printing, connecting cooperating devices, and transferring data files among computers and smart devices.

Wi-Fi vs. Bluetooth.

Wi-Fi is intended as a replacement for cabling in large work areas. Bluetooth is intended as a replacement for cabling among equipment in close proximity. Wi-Fi is intended for use as a local area network (LAN). Bluetooth is intended for use in a smaller, personal area network (PAN). (Just for completeness, a Wide Area Network (WAN) is a communications network that spans large geographic areas such as cities, states, or even countries – think Internet.)

Bluetooth, nowadays, can typically be found in smartphones, laptop computers, tablets, headphones, and almost all new cars. Seven years ago I explored Bluetooth and reassured everyone that it was not a dental diagnosis. At that time, it was at version 4.0 so it’s probably time to take another look. Technology is always evolving and hopefully improving.

Here is a little history for you tech history buffs. Bluetooth has been around for quite a while. Work on Bluetooth was started in 1994 and the Bluetooth 1.0 specification was released in May 1998. The initial Version specified a data rate of fewer than 1 Mbps (Megabits per second). It had many problems, and manufacturers had difficulty making their products interoperable. Bluetooth 2.0 was released in November 2004 with a faster data rate (approx. 2 Mbps). Bluetooth 3.0 was released in April 2009. Bluetooth 4.0 was released in June 2010. Bluetooth 5.0 was released in June 2016 with increased range, speed and capacity, and is the current standard. Bluetooth 5.0 is improved in many categories as shown below:

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| Feature | Bluetooth 5.0 | Bluetooth 4.0 |
| Speed | 2 Mbps | 1 Mbps |
| Range | 40 Meters | 10 Meters |
| Message Capacity | Larger | Small |
| Battery Life | Longer | Shorter |
| Reliability | Higher | Low |
| Security Control | Better | Less secure |

Bluetooth was originally conceived as a wireless alternative to the old serial RS-232 data cables. Bluetooth is a network and thus can connect many devices, unlike RS-232 which was strictly serial point-to-point. Bluetooth is a wireless technology that uses short-range radio links and is intended to replace the cable(s) connecting portable and/or fixed electronic devices. The hope is that it will allow for the replacement of the many proprietary cables with one universal radio link. Bluetooth can provide a way to connect and exchange information between devices such as Smartphones, laptops, personal computers, printers, Global Positioning System (GPS) receivers, digital cameras, video games, et al.

So, Bluetooth is a communications standard for interconnecting electronic devices. To that end, it uses a form of data packet switching to transmit digital data via the wireless communications link. Bluetooth operates in the unlicensed ISM (Industrial, Scientific, and Medical) 2.4GHz frequency band, and avoids interference from other signals in that band by hopping to a new frequency after transmitting or receiving each packet. This radio technology is called frequency-hopping spread spectrum. It chops up the data being sent and transmits chunks of it on up to 79 different frequencies. (Guess who invented frequency hopping? Answer at the end of the article.)

Bluetooth is primarily designed for short-range communications with low power consumption. There are three power levels defined in the standard, 100 mW (Class 1), 2.5 mW (Class 2), and 1 mW (Class 3) where mW (milliwatt) is a measure of transmitter output power. The higher the power level, the further the data can possibly be transmitted. Class 1 suggests an operating range of up to 100 meters, Class 2 suggests 10 meters, and Class 3 suggests 1 meter. Most of the devices I’ve used have been Class 2.

Because Bluetooth devices use radio (broadcast) communications, they do not have to be in the line of sight of each other. Bluetooth makes it possible for these devices to communicate with each other and transfer the information as long as they are in range.

A PC uses a Bluetooth adapter to communicate with other Bluetooth devices. While some desktop computers and most recent laptops come with a built-in Bluetooth adapter, others require an external adapter, usually in the form of a Bluetooth Dongle. Bluetooth allows multiple devices to communicate with a computer over a single adapter. Microsoft Windows 10 supports Bluetooth 5.0, but your computer may have a Bluetooth device that was built to an earlier Bluetooth version. (Along with the Bluetooth version, there are Bluetooth Profiles, but we’ll leave that as a subject for a future article.)

Though you may not have thought about it, here are some of the more common applications of Bluetooth:

Wireless control of, and communications between, a mobile phone and a hands-free headset. This was one of the earliest applications.

Wireless communications with PC input and output devices, the most common being the mouse and keyboard.

Replacement of traditional wired serial communications used in test equipment, GPS receivers, medical equipment, Bar code scanners, and traffic control devices.

A link between game consoles such as the Nintendo Wii, and the Sony PlayStation and their respective controllers.

A link between a video camera and a remote Baby or Pet Monitor.

A link between a Garage Door Opener Motor and the Remote Garage Door Opener Controller.

An audio link between a Smartphone and speaker or headphones.

 

As you can see from this list, there are many reasons for computing devices to communicate with each other. And as more devices become smart, there will probably be more uses for the Bluetooth wireless technology.

(Hedy Lamarr)