ARYAMAN MISHRA

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PICONET

A PICONET is an ad hoc(means ‘to this) network (An ad hoc network refers to technologies that allow network communications on an ad hoc basis) that links a wireless user group of devices using Bluetooth technology protocols. A piconet consists of two or more devices occupying the same physical channel (synchronized to a common clock and hopping sequence). It allows one master device to interconnect with up to seven active **slave** devices. Up to 255 further slave devices can be inactive, or parked, which the master device can bring into active status at any time, but an active station must go into parked first.

Some examples of piconets include a cell phone connected to a computer, a laptop and a Bluetooth-enabled digital camera, or several Personal digital assistants that are connected to each other.

A group of devices are connected via Bluetooth technology in an ad hoc fashion. A piconet starts with two connected devices, and may grow to eight connected devices. Bluetooth communication always designates one of the Bluetooth devices as a main controlling unit or master unit. Other devices that follow the master unit are slave units. This allows the Bluetooth system to be non-contention based (no collisions). This means that after a Bluetooth device has been added to the piconet, each device is assigned a specific time period to transmit and they do not collide or overlap with other units operating within the same piconet.

Piconet range varies according to the class of the Bluetooth device. Data transfer rates vary between about 200 and 2100 kilobits per second.

Because the Bluetooth system hops over 79 channels, the probability of interfering with another Bluetooth system is less than 1.5%. This allows several Bluetooth piconets to operate in the same area at the same time with minimal interference.

IEEE 802.15.1

Also known as WPAN(wireless personal area network),It is a personal area network-a network for interconnecting devices centred around an individual person’s workspace-in which the connections are wireless.

Task group one is based on Bluetooth technology. It defines physical layer (PHY) and Media Access Control (MAC) specification for wireless connectivity with fixed, portable and moving devices within or entering personal operating space. Standards were issued in 2002 and 2005.

In IEEE 802 LAN/MAN standards, the **medium access control** (**MAC**, also called **media access control**) sublayer is the layer that controls the hardware responsible for interaction with the wired, optical or wireless transmission medium. The MAC sublayer and the logical link control (LLC) sublayer together make up the data link layer. Within the data link layer, the LLC provides flow control and multiplexing for the logical link (i.e. EtherType, 802.1Q VLAN tag etc), while the MAC provides flow control and multiplexing for the transmission medium.

**Bluetooth** is a wireless technology standard used for exchanging data between fixed and mobile devices over short distances using short-wavelength UHF radio waves in the industrial, scientific and medical radio bands, from 2.402 GHz to 2.480 GHz, and building personal area networks (PANs). It was originally conceived as a wireless alternative to RS-232 data cables.

Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 35,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. The IEEE standardized Bluetooth as **IEEE 802.15.1**, but no longer maintains the standard. The Bluetooth SIG oversees development of the specification, manages the qualification program, and protects the trademarks. A manufacturer must meet Bluetooth SIG standards to market it as a Bluetooth device. A network of patents apply to the technology, which are licensed to individual qualifying devices. As of 2009, Bluetooth integrated circuit chips ship approximately 920 million units annually.

The new IEEE Std 802.15-2002 standard is an additional resource for those who implement Bluetooth devices.

The lower transport layers (L2CAP, LMP, Baseband, and radio) of the Bluetooth wireless technology are defined. Bluetooth is an industry specification for short-range RF-based connectivity for portable personal devices. The IEEE has reviewed and provided a standard adaptation of the Bluetooth Specification v1.1 Foundation MAC (L2CAP, LMP, and Baseband) and PHY (Radio). Also specified is a clause on SAPs which includes a LLC/MAC interface for the ISO/IEC 8802-2 LLC. Also specified is an normative annex which provides a Protocol Implementation Conformance Statement (PICS) proforma. Also specified is a informative high level behavioral ITU-T Z.100 Specification and description language (SDL) model for an integrated Bluetooth MAC Sublayer.

Bluetooth operates at frequencies between 2.402 and 2.480 GHz, or 2.400 and 2.4835 GHz including guard bands 2 MHz wide at the bottom end and 3.5 MHz wide at the top. This is in the globally unlicensed (but not unregulated) industrial, scientific and medical (ISM) 2.4 GHz short-range radio frequency band. Bluetooth uses a radio technology called frequency-hopping spread spectrum. Bluetooth divides transmitted data into packets, and transmits each packet on one of 79 designated Bluetooth channels. Each channel has a bandwidth of 1 MHz. It usually performs 1600 hops per second, with adaptive frequency-hopping (AFH) enabled- Bluetooth Low Energy uses 2 MHz spacing, which accommodates 40 channels.

Bluetooth is a packet-based protocol with a master/slave architecture. One master may communicate with up to seven slaves in a piconet. All devices within a given piconet use the clock provided by the master as the base for packet exchange. The master clock ticks with a period of 312.5 μs, two clock ticks then make up a slot of 625 µs, and two slots make up a slot pair of 1250 µs. In the simple case of single-slot packets, the master transmits in even slots and receives in odd slots. The slave, conversely, receives in even slots and transmits in odd slots. Packets may be 1, 3 or 5 slots long, but in all cases the master's transmission begins in even slots and the slave's in odd slots.

**Communication and connection**

A master BR/EDR Bluetooth device can communicate with a maximum of seven devices in a piconet (an ad-hoc computer network using Bluetooth technology), though not all devices reach this maximum. The devices can switch roles, by agreement, and the slave can become the master (for example, a headset initiating a connection to a phone necessarily begins as master—as an initiator of the connection—but may subsequently operate as the slave).

The Bluetooth Core Specification provides for the connection of two or more piconets to form a scatternet, in which certain devices simultaneously play the master role in one piconet and the slave role in another.

At any given time, data can be transferred between the master and one other device (except for the little-used broadcast mode). The master chooses which slave device to address; typically, it switches rapidly from one device to another in a round-robin fashion. Since it is the master that chooses which slave to address, whereas a slave is (in theory) supposed to listen in each receive slot, being a master is a lighter burden than being a slave. Being a master of seven slaves is possible; being a slave of more than one master is possible. The specification is vague as to required behavior in scatternets.

**List of applications**

[](https://en.wikipedia.org/wiki/File:Bluetooth_headset.jpg)A typical Bluetooth mobile phone headset

1.Wireless control and communication between a mobile phone and a handsfree headset. This was one of the earliest applications to become popular.

2.Wireless control of and communication between a mobile phone and a Bluetooth compatible car stereo system (and sometimes between the SIM card and the car phone .

3.Wireless communication between a smartphone and a smart lock for unlocking doors.

4.Wireless control of and communication with iOS and Android device phones, tablets and portable wireless speakers.

5.Wireless Bluetooth headset and Intercom. Idiomatically, a headset is sometimes called "a Bluetooth".

6.Wireless streaming of audio to headphones with or without communication capabilities.

7.Wireless streaming of data collected by Bluetooth-enabled fitness devices to phone or PC.

8.Wireless networking between PCs in a confined space and where little bandwidth is required.

9.Wireless communication with PC input and output devices, the most common being the mouse, keyboard and printer.

10.Wireless user input for video game consoles.