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Bluetooth vs BLE-difference between Bluetooth and BLE(Bluetooth Low Energy)

This page Bluetooth vs BLE(Bluetooth Low Energy) covers **difference between bluetooth and BLE** (Bluetooth Low Energy) technologies.The difference between various terms are also provided here.

Bluetooth and BLE(Bluetooth Low Energy) are Wireless Personal Area Network(WPAN) standards. Bluetooth Low Energy is developed to take care of sending small chunks of data. It's designed to run Internet of Things(IoT) devices using coin cells.

As we know bluetooth is used for network requiring data exchange as well as wireless headset and other consumer devices. BLE is used for applications such as mobile payment, healthcare, ticketing or access control. Both technology based devices are low cost. Both bluetooth and BLE networks consist of master and slave devices.

Bluetooth

It is a wireless technology around us in all the mobile devices. As we know using bluetooth we can transfer text files, photos, videos and more between mobile phones and other electronic devices. It operates in 2.4 GHz band and it forms PAN (Personal Area Network) for communication.

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As bluetooth is a Connection Oriented technology, connection need to be established first between bluetooth compliant devices before data transfer takes place. The standard is managed by Bluetooth SIG. There are various versions of bluetooth based on speed and coverage range.
Refer Bluetooth tutorial and versions.

BLE-Bluetooth Low Energy

Bluetooth version 4.0 is known as Bluetooth Low Energy or BLE. It is also referred by other names such as Bluetooth smart or Wibree. It is low power variation of original traditional bluetooth standard. Like Bluetooth, it is also managed and maintained by Bluetooth SIG. Due to low power consumption and low power sleep modes, BLE devices can be operated using coin cell for years.

It operates in the same band as standard bluetooth but uses different FHSS scheme. As BLE devices are incompatible with standard bluetooth devices, they will not interoperate with them. In order to have interoperability between classic or traditional bluetooth and BLE devices dual mode devices having protocol stack of both need to be developed. Dual mode BLE hardware chips have been developed by many vendors such as CSR, Broadcom, Nordic semiconductor, EM Microelectronics, Texas Instruments etc.
Refer BLE basics.

Tabular difference between Bluetooth and BLE

Following table mentions difference between bluetooth and BLE technologies.

Specifications	Bluetooth	BLE(Bluetooth Low Energy)
Network/Topology	Scatternet	Star Bus
Power consumption	Low (less than 30 mA)	Very Low (less than 15 mA)
Speed	700 Kbps	1 Mbps
Range	<30 m	50 meters(150 meters in open field)
RF Frequency band	2400 MHz	2400 MHz

Frequency Channels	79 channels from 2.400 GHz to 2.4835 GHz with 1 MHz spacing	40 channels from 2402MHz to 2480 MHz (includes 3 advertising and 37 data channels)
Modulation	GFSK (modulation index 0.35) , π/4 DQPSK, 8DPSK	GFSK (modulation index 0.5)
Latency in data transfer between two devices	Approx. 100 ms	Approx. 3 ms
Spreading	FHSS (1MHz channel)	FHSS (2MHz channel)
Link layer	TDMA	TDMA
message size(bytes)	358 (Max)	8 to 47
Error detection/correction	8 bit CRC(header), 16 bit CRC, 2/3 FEC(payload), ACKs	24 bit CRC, ACKs
Security	64b/128b, user defined application layer	128 bits AES, user defined application layer
Application throughput	0.7 to 2.1 Mbps	less than 0.3 Mbps
Nodes/Active Slaves	7	Unlimited

Bluetooth BLE Related Links

Also refer bluetooth tutorial covering following sub topics:

Main Page Frequency PHY Layer MAC layer Stack Power classes Security products versions Bluetooth Vs BLE

What is Difference between

Following are useful difference between terminologies on various wireless standards/technologies.

difference between FDM and OFDM

Difference between SC-FDMA and OFDM

Difference between SISO and MIMO

Difference between TDD and FDD

Difference between 802.11 standards viz.11-a,11-b,11-g and 11-n

OFDM vs OFDMA

LAN vs PAN| NFC Tag vs Reader| VDSL vs G.fast| Sensors| wireless PHY| Diac vs Triac| JUGFET vs MOSFET| IoT Wireless| RF Over Fiber| IP2 vs IP3| ASK FSK PSK

CDMA vs GSM

Bluetooth vs zigbee

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RF and Wireless Terminologies

SATELLITE RF Antenna Avionics Wireless LiFi vs WiFi MiFi vs WiFi BPSK vs QPSK BJT vs FET PDH vs SDH CS vs PS MS vs PS

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