

# technology

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## Radio Versions

The right radio, for the right job.

Operating in the 2.4GHz unlicensed industrial, scientific, and medical (ISM) frequency band, *Bluetooth®* technology supports multiple radio options that enable developers to build products meeting the unique connectivity requirements of their market.

Whether a product streams high-quality audio between a smartphone and speaker, transfers data between a tablet and medical device, or sends messages between thousands of nodes in a building automation solution, the Bluetooth Low Energy (LE) and Basic Rate/Enhanced Data Rate (BR/EDR) radios are designed to meet the unique needs of developers worldwide.



Bluetooth Low Energy (LE)

The Bluetooth Low Energy (LE) radio is designed for very low power operation. To enable reliable operation in the 2.4 GHz frequency band, it leverages a robust frequency-hopping spread spectrum approach that transmits data over 40 channels. The Bluetooth LE radio provides developers a tremendous amount of flexibility, including multiple PHY options that support data rates from 125 Kb/s to 2 Mb/s, multiple power levels, from 1mW to 100 mW, as well as multiple security options up to government grade.

Bluetooth LE also supports multiple network topologies, including a point-to-point option used for data transfer, a broadcast option used for location services and a mesh option used for creating large-scale device networks.



Bluetooth Basic Rate/Enhanced Data Rate (BR/EDR)

The Bluetooth BR/EDR radio is designed for low power operation and also leverages a robust Adaptive Frequency Hopping approach, transmitting data over 79 channels. The Bluetooth BR/EDR radio includes multiple PHY options that support data rates from 1 Mb/s to 3 Mb/s, and supports multiple power levels, from 1mW to 100 mW, as well as multiple security options. It supports a point-to-point network topology that is optimized for audio streaming.

	Bluetooth Low Energy (LE)	Bluetooth Basic Rate/ Enhanced Data Rate (BR/EDR)
Optimized For...	Short burst data transmission	Continuous data streaming
Frequency Band	2.4GHz ISM Band (2.402 – 2.480 GHz Utilized)	2.4GHz ISM Band (2.402 – 2.480 GHz Utilized)
Channels	40 channels with 2 MHz spacing (3 advertising channels/37 data channels)	79 channels with 1 MHz spacing

Channel Usage	Frequency-Hopping Spread Spectrum (FHSS)	Frequency-Hopping Spread Spectrum (FHSS)
Modulation	GFSK	GFSK, $\pi/4$ DQPSK, 8DPSK
Power Consumption	~0.01x to 0.5x of reference (depending on use case)	1 (reference value)
Data Rate	LE 2M PHY: 2 Mb/s LE 1M PHY: 1 Mb/s LE Coded PHY (S=2): 500 Kb/s LE Coded PHY (S=8): 125 Kb/s	EDR PHY (8DPSK): 3 Mb/s EDR PHY ( $\pi/4$ DQPSK): 2 Mb/s BR PHY (GFSK): 1 Mb/s
Max Tx Power*	Class 1: 100 mW (+20 dBm) Class 1.5: 10 mW (+10 dBm) Class 2: 2.5 mW (+4 dBm) Class 3: 1 mW (0 dBm)	Class 1: 100 mW (+20 dBm) Class 2: 2.5 mW (+4 dBm) Class 3: 1 mW (0 dBm)
Network Topologies	Point-to-Point (including piconet) Broadcast Mesh	Point-to-Point (including piconet)

\* Devices shall not exceed the maximum allowed transmit power levels set by the regulatory bodies that have jurisdiction over the locales in which the device is to be sold or intended to operate. Implementers should be aware that the maximum transmit power level permitted under a given set of regulations might not be the same for all modulation modes.

## Related Resources

### DOWNLOAD

**Bluetooth Core Specification**



### PAPER

**Bluetooth 5 - Go Faster. Go Further**



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