**FINAL REPORT**

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**iBeacon**[[edit](https://en.wikipedia.org/w/index.php?title=Bluetooth_low_energy_beacon&action=edit&section=14)]

In mid-2013 [Apple](https://en.wikipedia.org/wiki/Apple_Inc.) introduced [iBeacons](https://en.wikipedia.org/wiki/IBeacon" \o "IBeacon) and experts wrote about how it is designed to help the retail industry by simplifying payments and enabling on-site offers. On December 6, 2013, Apple activated iBeacons across its 254 US retail stores.[[23]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-23) McDonald's has used the devices to give special offers to consumers in its fast-food stores.[[8]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-mcforbes-8) As of May 2014, different hardware iBeacons can be purchased for as little as $5 per device to more than $30 per device.[[24]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-24) Each of these different iBeacons have varying default settings for their default transmit power and iBeacon advertisement frequency. Some hardware iBeacons advertise at as low as 1 Hz while others can be as fast as 10 Hz[[25]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-25). iBeacon technology is still in its infancy. One well reported software quirk exists on 4.2 and 4.3 Android systems whereby the system's bluetooth stack crashes when presented with many iBeacons.[[26]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-26) This was reportedly fixed in Android 4.4.4.[[27]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-27)

**AltBeacon**[[edit](https://en.wikipedia.org/w/index.php?title=Bluetooth_low_energy_beacon&action=edit&section=15)]

AltBeacon is an open source alternative to iBeacon created by Radius Networks[[28]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-:2-28)

**URIBeacon**[[edit](https://en.wikipedia.org/w/index.php?title=Bluetooth_low_energy_beacon&action=edit&section=16)]

URIBeacons are different from iBeacons and AltBeacons because rather than broadcasting an identifier, they send a URL which can be understood immediately.[[28]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-:2-28)

**Eddystone**[[edit](https://en.wikipedia.org/w/index.php?title=Bluetooth_low_energy_beacon&action=edit&section=17)]

Eddystone is a Google's standard for Bluetooth beacons. It supports three types of packets, Eddystone-UID, Eddystone-URL, and Eddystone-TLM.[[16]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-:8-16) Eddystone-UID functions in a very similar way to Apple's iBeacon, however, it supports additional telemetry data with Eddystone-TLM. The telemetry information is sent along with the UID data. The beacon information available includes battery voltage, beacon temperature, number of packets sent since last startup, and beacon uptime.[[16]](https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon#cite_note-:8-16)

Here is a summary of key BLE terms and concepts:

* **Generic Attribute Profile (GATT)**—The GATT profile is a general specification for sending and receiving short pieces of data known as "attributes" over a BLE link. All current Low Energy application profiles are based on GATT.
  + The Bluetooth SIG defines many [profiles](https://www.bluetooth.org/en-us/specification/adopted-specifications) for Low Energy devices. A profile is a specification for how a device works in a particular application. Note that a device can implement more than one profile. For example, a device could contain a heart rate monitor and a battery level detector.
* **Attribute Protocol (ATT)**—GATT is built on top of the Attribute Protocol (ATT). This is also referred to as GATT/ATT. ATT is optimized to run on BLE devices. To this end, it uses as few bytes as possible. Each attribute is uniquely identified by a Universally Unique Identifier (UUID), which is a standardized 128-bit format for a string ID used to uniquely identify information. The *attributes* transported by ATT are formatted as *characteristics* and *services*.
* **Characteristic**—A characteristic contains a single value and 0-n descriptors that describe the characteristic's value. A characteristic can be thought of as a type, analogous to a class.
* **Descriptor**—Descriptors are defined attributes that describe a characteristic value. For example, a descriptor might specify a human-readable description, an acceptable range for a characteristic's value, or a unit of measure that is specific to a characteristic's value.
* **Service**—A service is a collection of characteristics. For example, you could have a service called "Heart Rate Monitor" that includes characteristics such as "heart rate measurement." You can find a list of existing GATT-based profiles and services on