Beacons

What is Beacon?
A Beacon is a small **Radio Transmitter**. Beacon is in **Broadcast only mode**.
Beacons internally consist of:

- **CPU**
- **Radio**(for Transmission)
- **Battery**(Lithium Chip Batteries)

Beacons are one way transmitting devices, which can only transmit the information but can not listen to it. **Beacons do not require paired connection** like previous Bluetooth devices.

There are different types of protocols available for transmitting the information:

- **iBeacon**(Apple)
- **Eddystone**(Google)
- **AltBeacon**(Radius Networks)
- **GeoBeacon**(Techno-World)
- **URIBeacons**

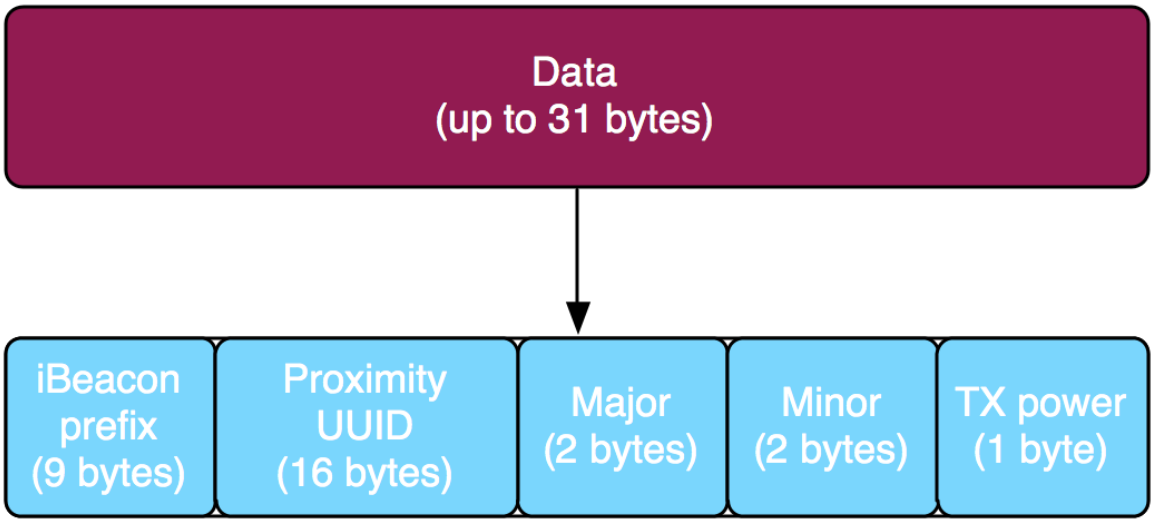
What is Beacon Transmitting?
Beacon is transmitting unique ID number to tell which beacon it is next to. The ID however is having less meaning it totally depends on the app which recognises the ID and triggers the action related to the ID. The ID's of the Beacons are registered in the application on the central device devices(Mobile phone, Tablet, etc). It's not compulsory that the Beacon will always broadcast the ID, it can also transmit the URL. This totally depends on the manufacturers and the application for which it is designed.

Why is it said Bluetooth Low Energy Beacons?
Bluetooth Low Energy or Bluetooth Smart is the energy efficient version of the Bluetooth and fulfils the needs of the beacons. The coin shaped batteries are able to run the beacons for 2-3 years depending on the **range** and the **amount of information transmitting speed**.

Working of Beacons:

- **iBeacons(Apple):**

iBeacons transmits the information in the following format:



UUID stands for Universally Unique Identifier. But this not the unique id transmittted by the beacon. Beacons have three ID's:

- **UUID**: This 16 bytes field is used to identify the group of beacons in an Organisation/Company. It can also happen that all beacons of the Company would have same UUID.
- **Major**: This 2 bytes field helps in going down the hierarchy and identifying the beacons more accurately. The major value can be used to identify group of beacons at particular space in the Company. All beacons in the store may have same UUID and Major value.
- **Minor**: This Minor value is used to specify or accurately identify the beacon from which the signal is coming located in the particular Department in a Region of Company. This Minor value can be used to differentiate between the beacons having same **UUID** and **Major**

iBeacon is compatible with Android and iOS but, Native for iOS.
Reference to above content: https://yalantis.com/blog/7-things-to-learn-about-ibeacon-and-beacons/

- **Eddystone(Google):**

Eddystone is a **Open Source** Bluetooth Low Energy profile released by Google. Google standards for Bluetooth beacons.
Eddystone can advertise three types of packets:

- **Eddystone-UID**: It is similar to the iBeacon which transmit the UID. This UID's are registered in the Google's Database. So, to take action associated with the UID.

- **Eddystone-EID**: Ephemeral Identifiers are used which broadcast an encrypted rotating identifier which increase the security of the protocol, otherwise acts similar to the UID frame.
- **Eddystone-URL**: No need of dedicated app for this type of packet. This packet when received from beacons trigger the central devices to open the URL.
- **Eddystone-TLM**: It sends sensor data. The diagnostics data and beacon health statistics is transmitted by the beacon.

Compatible with any platform that supports BLE beacons.

- **AltBeacon(Radius Networks)**:

It is a Open Source alternative to the iBeacon developed by Radius Networks.

- **URIBeacons**:

Instead of sending identifiers the URIBeacons send URL(Link to an HTTPS URL).

Points to remember:

- The Beacons format for transmitting the advertisement differ from manufactures to manufactures depending on the application.
- Beacons **don't transmit rich content.**
- Beacons generally **don't use GATT** or Bluetooth profiles.
- **No Connection is established** by the BLE beacons with other bluetooth devices.

Beacon Sample Advertising Packet:
https://www.silabs.com/community/wireless/bluetooth/knowledge-base.entry.html/2017/11/14/bluetooth_advertisin-zCHh