AJCSE
ASIAN JOURNAL OF COMPUTER SCIENCE ENGINEERING

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*Asian Journal of Computer Science Engineering 2016;1(1):9-12*

**REVIEW ARTICLE**

# Beacon Technology

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Received on: 02/07/2016, Revised on: 10/10/2016, Accepted on: 15/10/2016

**ABSTRACT**

This paper will tell about the beacon technology. Beacon technology starts in the year 2013. Beacons don't have any data on them. They do not usually connect to the internet. They are very simple device. They have universally unique identifier, a major and minor.

**Keywords:** BLE- Bluetooth low energy, Internet of things (iot) - a network of physical objects that can exchange data via the existing internet infrastructure.

## INTRODUCTION

### What are beacons??

Beacons are small and simple devices which are wireless. Beacons broadcast signals using Bluetooth Low Energy (BLE) or Bluetooth SMART technology. Beacon is an apparent device designed to attract attention to a specific location. Beacons are the latest concept and portable device to hit internet of things. Beacons don't have any data on them. They don't usually connect to the internet. They have universally unique ID.


### Beacons are platform independent.

Usually beacons are pretty platform independent. A beacon is a physical device with the antenna and the Bluetooth Low Energy stack that can send out packets. Once you position beacons, they are like a lighthouse. They send out a signal.

### Bluetooth lower energy (BLE)

BLE or Bluetooth smart is an intelligent and power friendly version of Bluetooth wireless technology and exchanges data over short distances using radio transmissions. The power of BLE is in its ability to work with an app on a Smartphone, tablet or any other compatible mobile devices. The technology is itself simple and secure. It is highly likely that BLE will be one of the key technologies behind the growth of Internet of things. BLE aims to replace the cables that connect devices.

### How do beacons work? The physics of beacon technology.

The principles are pretty easy. Under the silicone casing, there is small ARM computer, which is combined with a Bluetooth smart connectivity module, powered by the battery. Software is installed in beacons that make sure that they know exactly how to behave. On thinner side of the beacon, there is a short wire sticking out of the CPU: antenna. It is nothing like the old TV set or radio set had. It is twisted and looks like zigzag. There is a reason behind it. The electromagnetic field around a straight wire is shaped like a donut- the waves do not propagate in every direction with the same strength. The best solution is to achieve a spherical field. However, it is not possible to attain ideal condition but research is going on to figure out the right shape.

Beacons are energy efficient, which means it allows for broadcasting only small amounts of data. The reach and stability of beacon's signal depends on two main factors:

Advertising interval & broadcasting power. The beacon is not broadcasting continuously- it's blinking instead. Advertising interval describes the amount of time between each blink. The more frequent the blinks, the more reliable the signal

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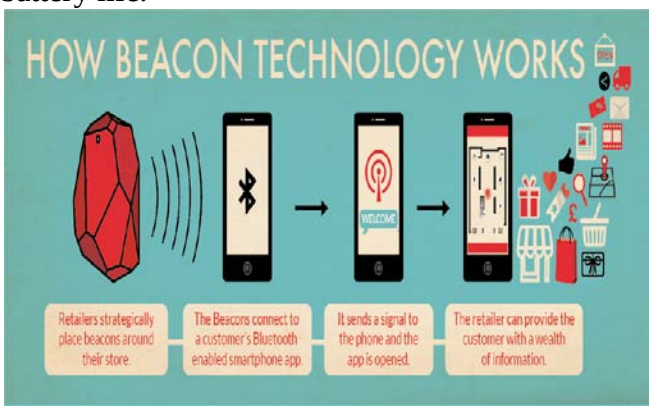
detection. In noisy environments, it might be possible that the advertising packet simply doesn't make it to the device, for example: somebody breaks the line of sight between the device and the beacon. One idea to improve detection stability is to simply increase the advertising frequency, by decreasing the advertising interval. But more blinks equals to greater power consumption. The closer you are to a beacon, the more accurate the distance estimates will be, because of higher signal density in the vicinity of the source.

For example: If you are in a restaurant and want to order food, you don't have to call waiter, just enable your Smartphone and check out for nearby beacon device and send message. The order is placed. That is the reason beacon device is a turning point in this century. Beacons technology uses a feature of Bluetooth v4 called BLE (Bluetooth lower energy) which is a variation on the Bluetooth we all know that is used for wireless sharing or equipment, but unlike the original Bluetooth the new BLE uses far less battery and can be left on all time without affecting device's battery life.





**Understanding beacon ID's:**

There are three different ID's that make a beacon unique. These are the UUID, Major and Minor values.

UUID: This is a 16 byte string used to differentiate a large group of related beacons. For example, if McDonalds deployed a network of beacons across many franchises, all of their beacons would share the same UUID. This allows the McDonald's Smartphone app to know which signals come from McDonald's owned beacons.

Major: This is a 2 byte string used to differentiate a smaller subset of beacons within the larger group. For example, if McDonalds had 5 beacons in a restaurant, all 5 would share the same Major. This allows the McDonald's app to know which store the customer is in.

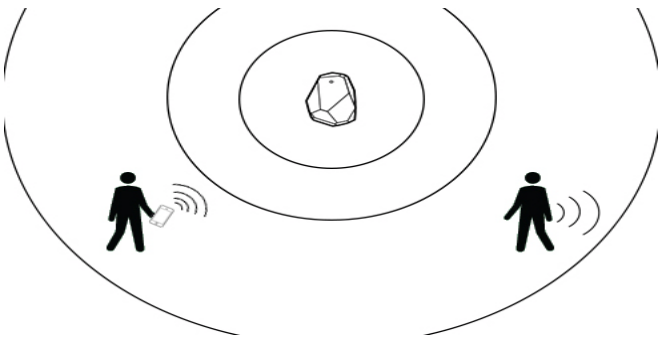
Minor: This is a 2 byte string that is used to identify individual beacons. For example, if McDonalds had 5 beacons in a restaurant, each beacon would have its own unique Minor. This allows the McDonald's app to know exactly where the customer is in the restaurant e.g. at the cashier.

**Why beacons??**

1) In this century of science and technology human spend most of their time on Smartphone and indoors. But indoor spaces often block cell signals and also make it almost impossible to locate devices via GPS. Beacons are the solution.
2) Beacons are low cost piece of hardware- a small enough to attach to a wall or countertop, it can also be put in a bag- that utilize battery friendly Bluetooth connections to transmit messages or prompts directly to Smartphone or tablet.Consumers might even want to deploy them as part of home automation system.

**Privacy concerns.**

In terms of privacy concern, beacons can only be used as a form of voluntary communication between whoever owns the beacon and the owner of a receiving Smartphone or similar mobile devices. The beacon communication frequently relies on an app, especially in the case of retail marketing via beacons. Beacons do not steal data from the operating system. It just sends the signal.







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**At present**

**1) Retail industry**

- Send offers and discounts to the customers when near a product on a certain shelf
- Send a push when the old customer is nearby. After greeting, you can also check previous searches in your shop to let him know if what he was searching for is now in stock or on sale.
- Allow shop to venue employees to bring up the information about the customers prefferd menu, name, what he ate last time.
- Get relavant data about slow days and full days to optimize flow and services.
- Offer coupons to customers after purchase to share with your friends thus encouraging others to visit during a sale or special events.
- Shoppers can upwards or downwards their experience in shops and malls.
- Street side vendors will able to announce their arrival for anyone within a 200 ft. radius of the beacon.
- Offer stickers and collectable items that they can only receive if they visit certain parts of the store or attend certain events or sales.


**2) Tourism and tourist attraction**

- Allow visitors to read and write comment's attach to the exposition items that other people nearby or in the future will be able to access.
- Show how much time have left based on distance from beacon plaaced along the queue.
- Take self guide tours.
- Find points of interests or receive maps and information when walking into a museum.
- On beaches shows weather information and a map with important location for tourist near beach: lifeguard, police, doctors on medical store.

**3) Education industry**

- Use the beacons as digital bulletin boards for courses or building for students.
- Teachers can broadcast information about their classes or exams.

**4) Health care**

- Hospitals can offer detailed maps with elevators and guides.
- Hospitals can promote any event taking place. For example: free checkups for diabetic patient.
- Ambulance can send warning to the vehicle in front of it.

**5) Travels**

- Install beacons in airports to offer information about their location and where the check-in gates or exits.
- Place beacons near the security check, to find out any of the airline passanger are at risks of loosing of flight.
- In train station passanger can receive information about any delays and what track they should be on.
- Better tracking and less lost luggage at airports.

**6) Corporate**

- Track items within the company. If there is a projector or travel laptp being used, find out who's got it.
- Let employees be aware of each others location, specially useful with big multinational companies.
- better networking at conference and events using beacons for location and information.
- Deliver slides after a presentation using a beacon.

**7) Automotive**

- Unlock the car, pop the truck aand similar actions using beacons and dedicate app like silvercar.
- Better traffic estimation and forecasts using beacons.

**Benefits**

- High degree of accuracy:
  Beacons technology allow a mobile device to understand its exact position, even indor where smartphones are not able to pick up GPS signals from satellits.This means beacons technology offers a high level of accuracy when compare other geo location technology.





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- Low impact on battery life:
  Bluetooth technology is designed to have low power consumption, which means that beacon power apps have minimal impact on devices.
- App engagement/ wake up:
  Mobile devices automatically wake up when they come within ranges of beacon, even if the mobile app that is listening is fully closed.
- No internet connection required:
  Mobile apps can pick up beacons signals without any internet connections and store data locally on the device. This means beacons are great proximity trigger I area where stable internet connection is not available. It is technically possible to run an entire beacon experience without any internet connection.

## CONCLUSION

Beacons are small device which are platform independent. Beacons are on internet connected. Beacons, once you position them, are like a lighthouse. They send out a signal to any other device that are around them. Beacons do not steal data of your device. It only send signals. In the age of beacons random, impersonal and contextually irrelavant content and service will become annoying and may deter user.

## REFERENCE

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