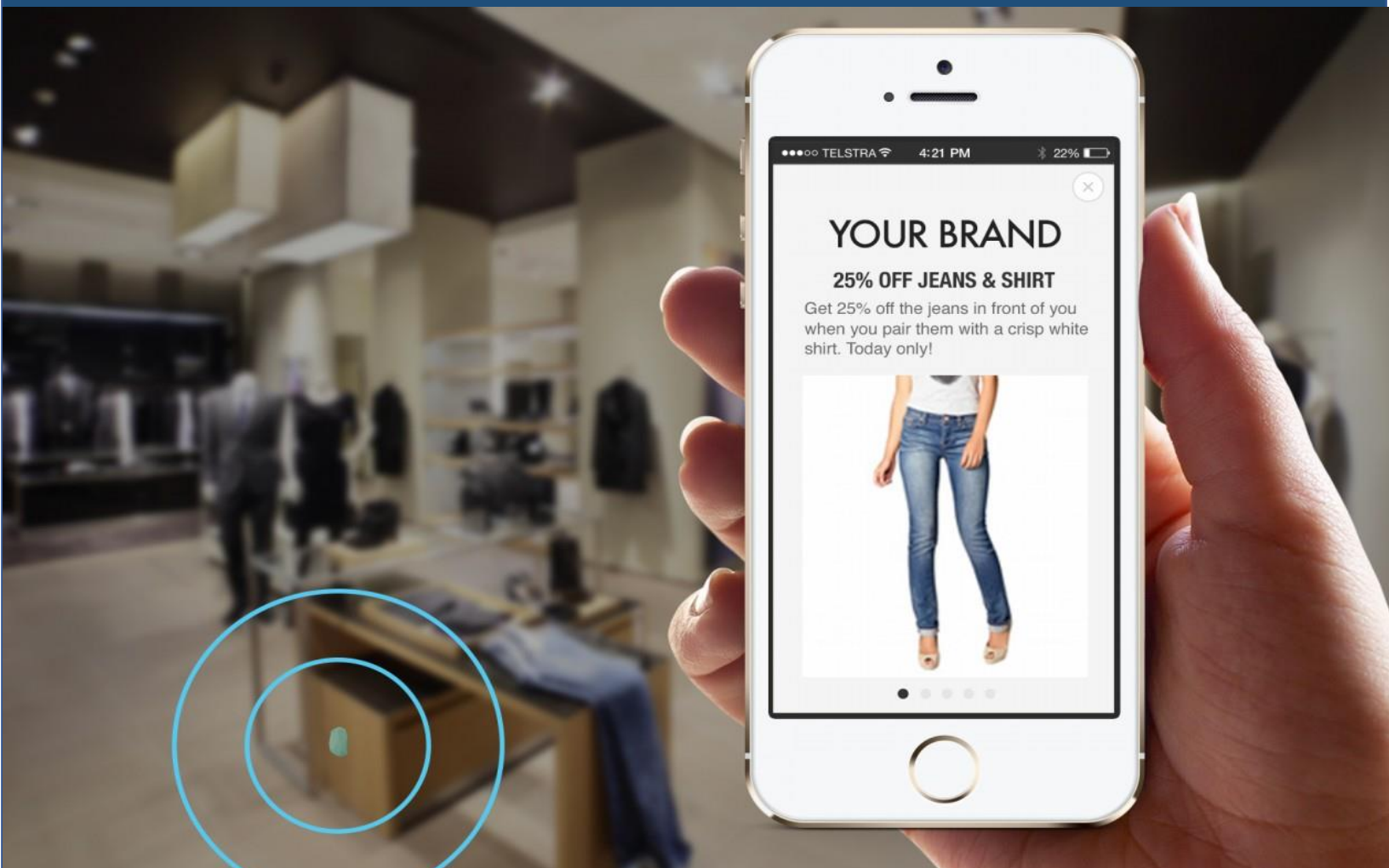
ChromeInfo Technologies

Lighting the Beacons – Understanding & Getting Ready for Online-Offline Integration



Executive Summary

Businesses are constantly on the lookout for the latest piece of technology, to gain a larger share of the market. Beacons hold an attractive promise for retail, healthcare, travel and educational businesses.

The white paper takes you on a journey involving Beacons. It illustrates the why, how, where who and what of the beaconing phenomenon in great detail. With practical examples and case studies, the white paper presents a synopsis on beacons to help you decide if you should jump on the bandwagon, just yet.

You'll find answers to the following questions:

- Why are beacons important and what makes them attractive for the marketplace?
- How do beacons work? How do you decide if your business is ready to use beacons?
- What are the problems that beacons can help you solve in your business?
- Where are beacons being used in retail, healthcare, hospitality, travel, and education industry?
- Who are the people and businesses responsible to bring Beacon technology to the market?

Contents

Introduction

Beacon

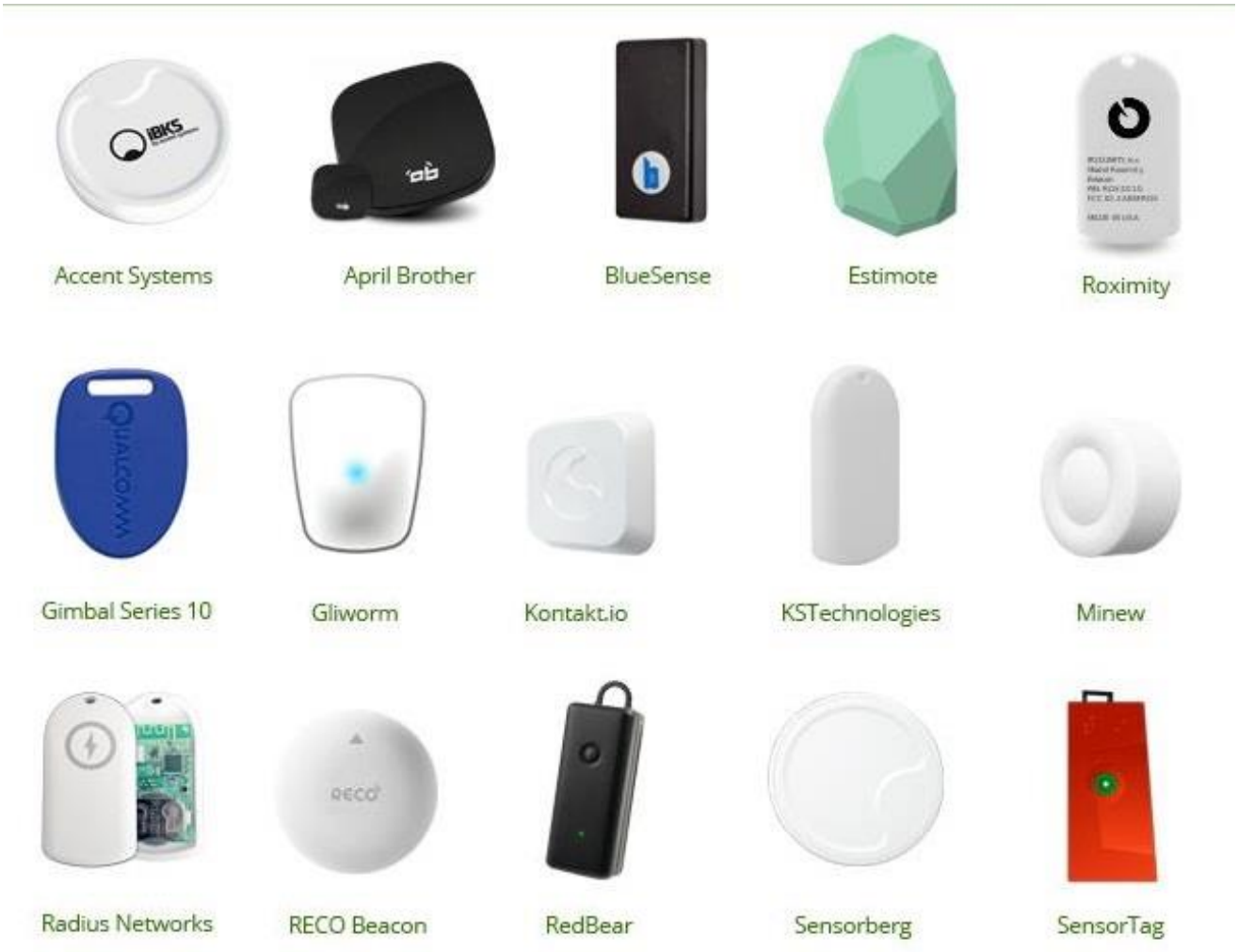
Noun |bea·con | \ˈbē-kən\

“an intentionally conspicuous device designed to attract attention to a specific location”

How it All Began

Beacons are designed to attract notice or attention. When used in marine navigation, beacons are light houses that emit visible light to beware sailors of the shoreline. In commercial application, though, beacons are small bluetooth radio transmitters of signals that other bluetooth-enabled device, like your smartphone can “see”.

The beacons that we discuss in the whitepaper started at the Apple Worldwide Developers Conference in 2013. Apple pioneered the concept and launched its proprietary protocol, iBeacon. Google followed with Eddystone, an alternative protocol that is pitched as an open and cross-platform protocol. What’s interesting to note, is that none of the two companies make Beacons themselves. As it is, most beacons can broadcast in both the formats and you just need a click to switch between the two.



Since then, Beacons are being touted as "the missing piece in the whole mobile-shopping puzzle". Online to Offline, or O2O commerce, has largely been a myth until now. Beacons offer simple and practical ways to integrate the two experiences for consumers. Beacons are positioned to change not only how we shop, but also how we travel, attend events and avail medical care.

Statistics to show the scale of Beacon adoption (# of devices, beacon-enabled sales, infographic of all organizations using Beacons)

- 570 million Android and Apple smartphones are compatible with Bluetooth low energy (BLE)
- Beacons are expected to generate $44 Billion worth of sales in 2016, compared to $4 billion in 2015
- 6,061,500 beacons deployed currently, projected to increase to 400 million+ by 2020
- Millenials estimated to spend about $200 billion annually, by 2017

How beacons work?

To understand how beacons work, consider beacons as micro-computers. A beacon's processor is designed to transmit an ID using Bluetooth Low Energy (BLE). Since it performs only a single type of computer instruction, it can perform a high number of computations, consuming only a fraction of power as compared to other devices.

A beacon operates on a battery and transmits IDs using radiowaves. These waves can be picked by your smartphone, if it is enabled by Bluetooth Low Energy. Your smartphone understands the IDs transmitted by these waves, and uses the information in the ID to execute certain instructions that you have defined separately on the app server.

The ID transmitted by the beacon has a different structure, depending upon the Beacon protocol you're using. In case of iBeacon protocol, the ID contains information about the retailer that the beacon is associated with ***(Universally Unique Identifier or UUID)***, the store you're in ***(major)***, and your location within that store ***(Minor).*** Eddystone adds a compressed web URL to this information. Beacons using Eddystone framework don't need a dedicated app to communicate with a smartphone. Instead, they make use of the Physical web and send you directly to a website.

While selecting a Beacon, and deploying them physically, you also need to consider the advertising interval and broadcasting power of the beacon.

The advertising interval determines how frequently the beacon transmits IDs to the smartphone. It ranges from 20 ms to 2000 ms. An iPhone detects a new message every second. If the beacon has an advertising interval of 350 ms, its optimal setting, it will send 3 message to your iphone every second. You need a higher advertising interval of the beacon where you suspect a higher level of noise between the beacon and a customer's smartphone.

The broadcasting power of a beacon tells you the relative power or strength of the signal that the beacon will transmit. A beacon with high broadcasting power has a higher chance to get heard in noisy settings, but also consumes more power. The broadcasting power is measured in dBm and ranges from -40 to +4.

When the smartphone receives a signal, it assesses the strength of the signal to determine how close you are to the beacon. It uses a value called the RSSI – Received Signal Strength Indicator, for the purpose. It compares the received signal against the benchmark RSSI for a distance of 1 metre from the beacon. Instead of calculating the exact distance, iBeacon framework assigns the received signal into a proximity zone. The following table illlustrates the 4 proximity zones. You can trigger a different action for each of the 4 zones.

Proximity Zone	Distance from the Beacon
Immediate	Very close to the beacon
Near	About 1 to 3 meters from the Beacon
Far	More than 3 meters, or it represents that the signal is fluctuating too much to estimate accurately
Unknown	This happens if either the smartphone is too far away from the beacon, or the environment has too much noise

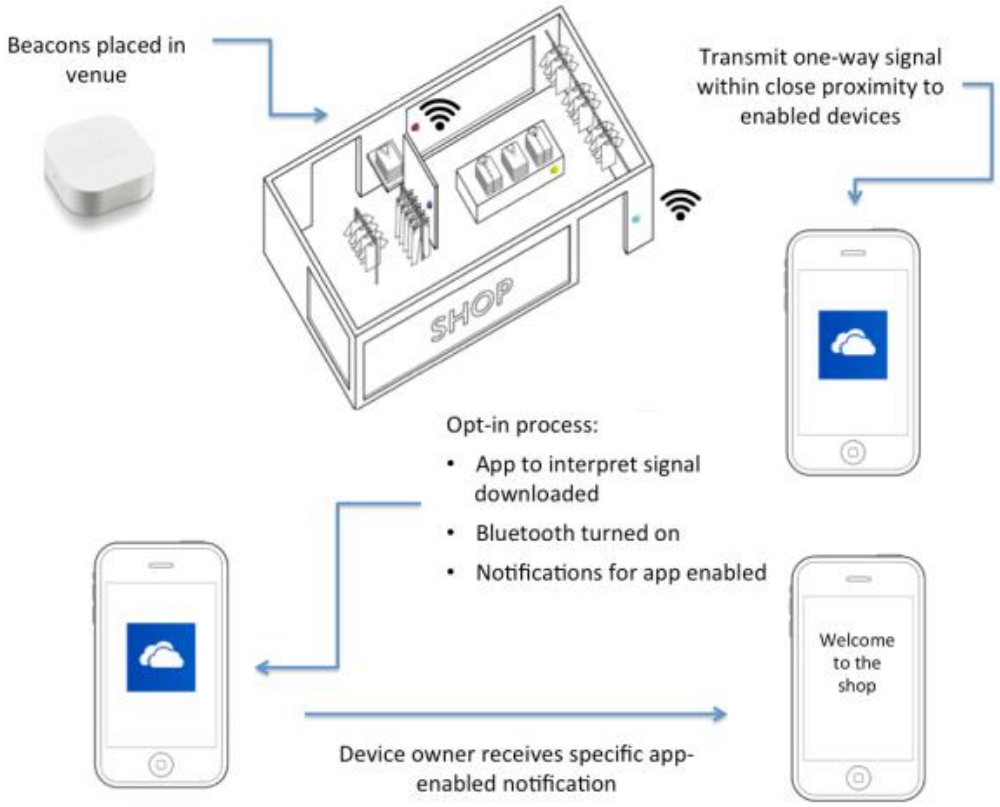


Image source

- **Beacon manufacturers** - *Aruba, Estimote, Kontakt.io, Radius Networks* - design and manufacture beacons and offer software development kits in line with the beacon protocols
- **Beacon protocols** – *Google's EddyStone and Apple's iBeacons* – offer guidelines for the IDs transmitted by beacons to smartphones
- **Beacon platforms** – *inMarket, BeaconStac* – help customize marketing messages, inline with the beacon protocol that the beacon uses
- **App development Agency** – *ChromeInfo Technologies* – an alternative to beacon platform for large businesses that intend to own the entire user experience

Industry Spotlight

Retail

Events

Education

Offices

Culture

Hospitality

Airport

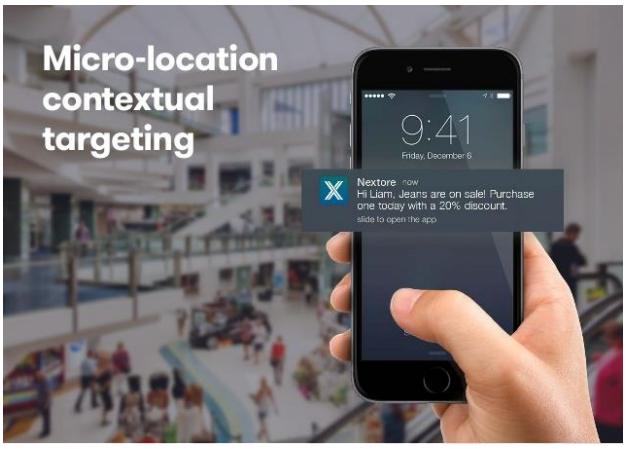
Retail

70% of the total beacons installed are being used by retail locations. Retailers who are using beacons see users spending more time on their digital assets and interacting more with advertised products. The open rates on push notifications are at 8%, compared to email marketing with 3% open rate.

If you're a retailer, beacons can help your repeat customers check-in automatically as they approach the store. You can help customers navigate the store aisles based on the product or category that they are looking for. Customers will love to discover deals, discounts and reviews on products that they are most interested in. Lastly, your customers can checkout by paying for the products they picked without even contacting the cashier through mobile payments.

In a retail setting, customers expect that you implement safeguards to protect their information, avoid serving them too many messages. To implement contactless payment specifically, you'll need to make investments in security infrastructure to protect data that rightfully belongs to your customers.

(source)



(source)

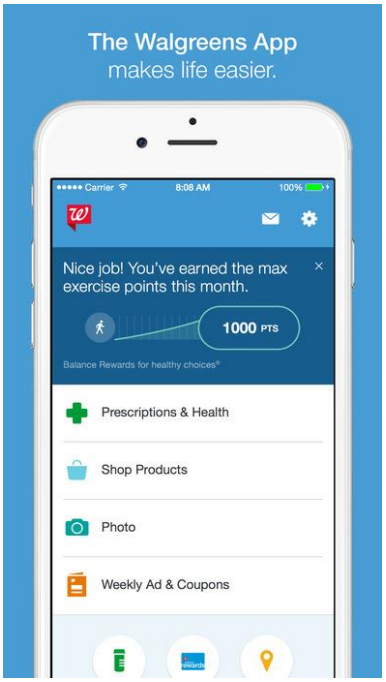
Lord & Taylor and Macy's pioneered the adoption of beacons in their retail stores. Macy's installed 4,000+ beacons in over 700 stores across the US. Rite Aid adopted beacons at an even larger scale including over 4,500 stores in the US. Target limits its push notifications to a maximum of 2 notifications per shopping trip and tested the technology in 50 stores, earlier this year. Walmart used lightbulbs provided by General Electric to house its beacons, thus avoiding the cost of a separate beacon-related hardware.

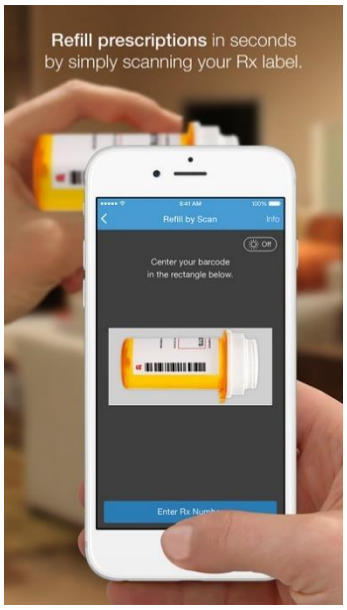
Hospitals

Beacons can facilitate better patient experience and streamline operations in medical centres and patient care facilities.

From the time that a patient enters a large super-specialty hospital, beacons can help patients find OPD or doctors' cabins. This eliminates signages, direction boads and physical maps. The use case also covers family members who can directly find their way to a patient's room.

The hospital staff, on the other hand, can be notified of their daily duties and emergency duties, depending upon their location in the premises. The patient's information can be displayed on the doctor's smartphone when he visits the patient. This ensures that patient receives the best service that hospital has to offer, without excessively depending upon the doctor assigned to the case.





Images - Wayfinding, Exercise Points, Refill subscriptions

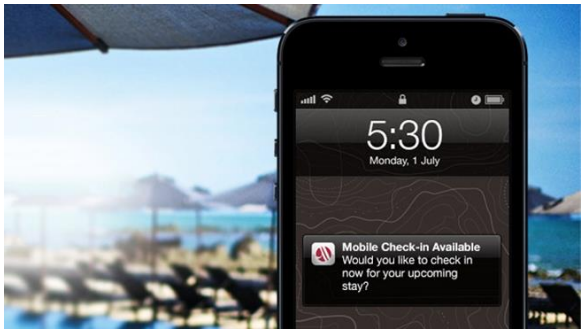
The cardiology department at Leiden University Medical Centre makes sure that patients suffering from Acute Myocardial Infection are treated at the earliest. When a patient arrives in an ambulance, a wristband with a built-in BLE beacon is attached to the individual's arm. The wristband communicates with beacons located inside the centre to communicate the whereabouts and updates on treatment for the patient.

Hospitality

Along with Augmented Reality, Beacons are being touted as the latest and greatest hospitality trends of the time.

Once a guest enters your hotel lobby, the receptionist can learn about him instantly and extend a personalized welcome. Once receptionist checks the guest in, beacons can help the guest find the way to rooms and facilitate a keyless entry.

Beacons control the light and energy appliances inside the room, in the presence and absence of guest, to increase energy efficiency. The housekeeping team can be notified of the guests' presence to schedule their work in a more efficient manner. The hotel management can make use of analytics to understand how guests spend time within the hotel premises.



Images – Room upgrade, mobile check-in,

The story illustrated above builds on the experiences that guests are already availing at Marriot, Starwoods and James Hotels.

While Starwoods enjoys more efficient check-in and housekeeping with beacons, Marriot serves foods and spa discounts to guests around these centres. James Hotels prides itself on its art collection and offers its guests a personal tour, based on the individual's location on the premises.

Travel

Travel industry is unique in the sense that the use of beacons is a collaborative initiative between the airlines, airports and other vendors on the premises. For the purpose, Société Internationale de Télécommunications Aéronautiques (SITA) has designed and setup a common-use Beacon Registry that airports can share with airlines and other partners.

Beacons can be used in a number of interesting ways by both the airport as well as the airlines. They can help flyers get to boarding gates faster, eliminating the need and reliance on signages. The beacon data can help estimate wait queues, and intimate flyers without ever standing in queues physically. Beacons can extend the same convenience at baggage claims during checkout.

Flyers can avail special offers on duty free shops and receive personalized content based on their location inside the airport.

Images – Boarding Request, Baggage Claim

Beacons are being used in a number of interesting ways by both the airport as well as the airlines.

Côte d'Azur Airport at Nice – Paris and Hong Kong International Airport sends personalized content to its users. Miami International Airport and Dallas Fort Worth airport help navigate the airport premises, which can easily intimidate travelers. Hamad International Airport sends duty free offers to travelers when they are near the shops. Tokyo Haneda Airport uses beacons along with smartwatches given to its staff to give instructions specific to the individual's location in the airport. JFK uses beacons to show wait times to passengers and allocates staff according to the crowd at terminals.

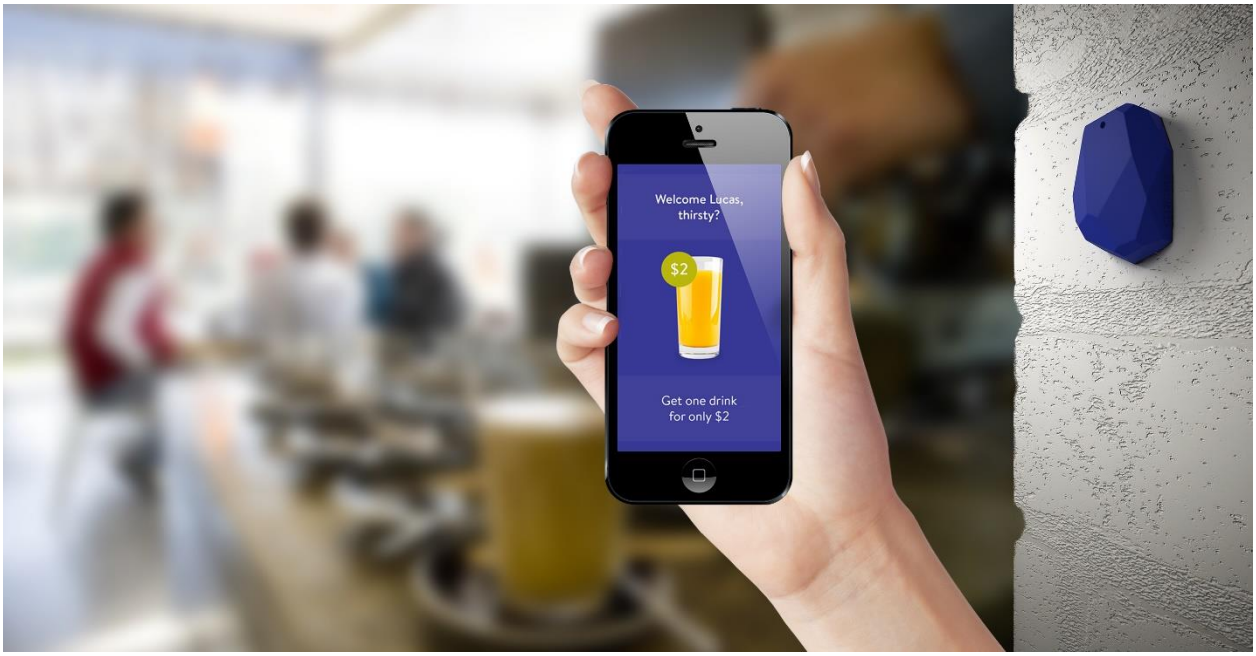
Virgin Atlantic used beacons to alert their passengers to keep electronic boarding passes ready and send tailored offers to their frequent flyers. American Airlines collaborated with Dallas Fort Worth airport to help flyers reach their boarding gates faster.

Schools & Libraries

You can use beacons to setup augmented learning zones inside classrooms, as well as in the surrounding environment. Beacons can detect a student's location and serve content that's relevant to the learning zone that the student is present in.

Faculty can do away with attendance records, since students can use beacons to record attendance in classrooms, examination halls and campus events. Inside an examination hall, beacons can also help you restrict device access.

Using beacons, you can authenticate students and offer them building access and eliminate badge readers altogether. The safety department at a school or university can identify how people are located within premises and use data to design premises as well as plan evacuation routes.



Images – Café Offers

Students and faculty at Clevedon School implemented learning zones in a K-12 setting. Univeristy of Oklahoma created a guided tour so students could explore its collection of Galileo books and manuscripts on campus. Stony Brook University offers campus tours to new admits with the help of beacons. University of Maryland at Baltimore County (UMBC) has successfully used the technology to inform students about campus events.

Banks

For a bank, or another institution, you can use beacons to remind customers, who are passing by, to visit the bank and complete tasks on their to-do lists. You can personalize their welcoming experience by integrating data from their smartphone app with the bank's Customer Relationship Management data.

Once inside the premises, you can use the customer's location to assign them clerks and notify their account manager. You can authenticate people and offer services like an access to ATM lobby after hours.

Banks can also collaborate with offline retail stores who are also using beacons to enable mobile payments.

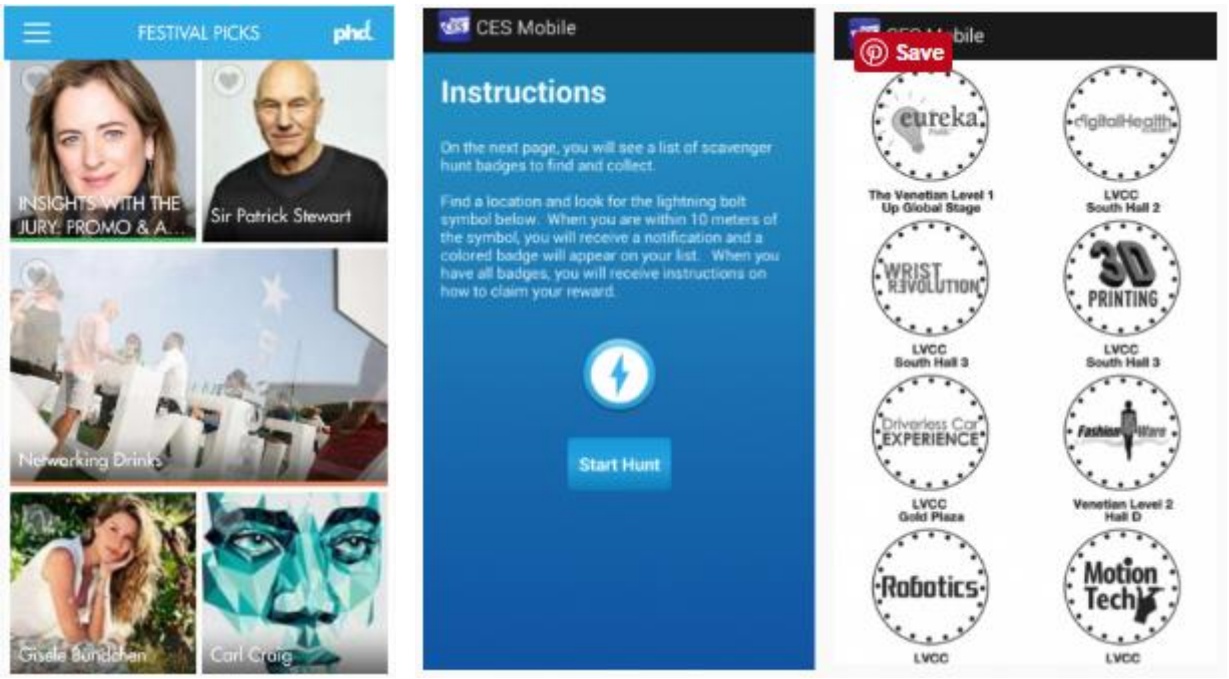
Images – Faster checkouts, Cardless entry to ATMs

Barclays uses beacons to make its premises more accessible for visually challenged. DenizBank intimates customers about their queue number without actually standing in a queue. Danske Bank helps its customers checkout faster at offline retail stores. Citibank allows cardless entry into ATM Lobbies after hours.

Events

For your next event, beacons can help manage registration in a frictionless manner. Once inside, visitors can use instructions on their smartphone to navigate the event smoothly. You can also use beacons to assess which regions have more footfall, and use the data to control the crowd at the event.

People can discover influencers in locations around them and network more effectively by accessing information from your app. Visitors who are passing by the sponsors' stalls can receive promotional offers. After a speaker session or a panel discussion, you can distribute the session content instantly to the visitors' smartphones.



Images – Cannes Lion Festival 2014, CES 2014

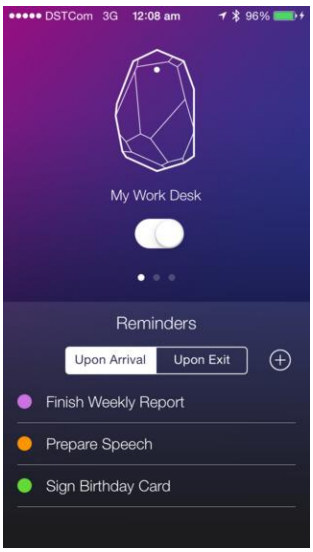
CES 2014 deployed a scavenger hunt to mark places that they wanted people to visit. Visitors remarked that the app took them to stalls they'd never visit otherwise. SXSW 2014 allowed attendees to gain easy and quick access to their registration codes when they were near the registration area. Cannes Lion Festival 2014 featured an about me section in their app to tell people about influencers in their vicinity and helping them make a connection.

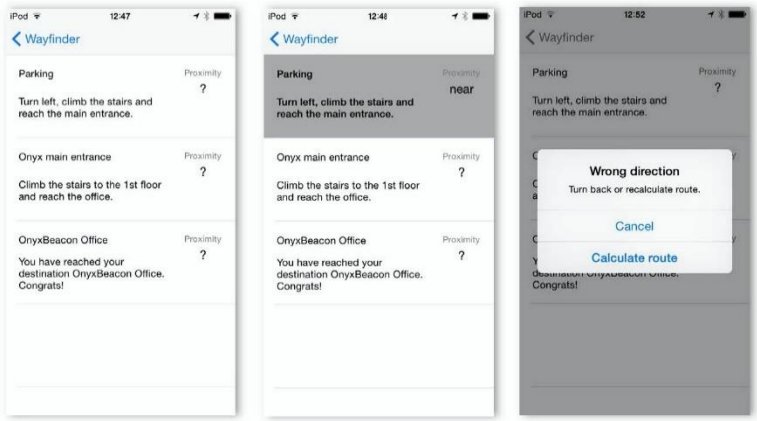
Offices

Beacons can really turn you and your team into a group of superheroes.

You can have slides play out automagically, as soon as you enter the conference room. Your receptionist can find where you are in the office and redirect the phone call to the nearest phone, instead of a "I'm sorry, he's not at his desk. Can I take your message?" With a beacon, you'll actually get someone when you say "Can someone get me a person from the marketing team?"

For a services business, beacons can help you discard employee badges altogether, and track their time more efficiently with a direct impact on your revenues. Your team can use beacons to remind themselves of their daily tasks. You can control energy consumption in the office, by simply turning off the lights and printers in the office when the team has left.





Images – [to-do lists](), [office navigation]()

Replicon, a cloud based time tracking software integrates with beacons in your offices to log your people's time efficiently. DigitasLBi recently used beacons to understand how and where their 700 employees meet with each other, in their Boston office. Jan-Piet Mens uses a beacon to catch up with his teammate, as soon as she enters the office premises, not a minute sooner.

Conclusion

Beacons have surfaced recently and are logging a growth chart that's literally through the roof. How does Beacon sit with other near field communication (NFC) technologies that we have? What promise does it hold and should you start to see Beacons as more than just a hype?

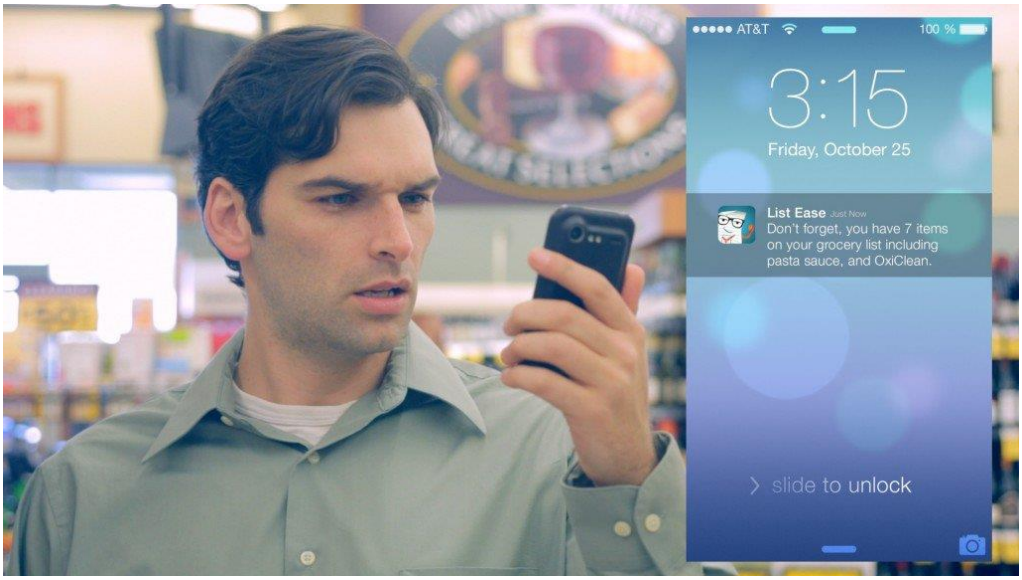
Let's dive in deeper.

The Beacon Promise

Beacons have a well-defined edge on other geo-fencing technologies like Wi-fi and NFC. It is versatile, smaller in size, costs less and can actually instruct a smartphone or another bluetooth enabled device. That is in fact a serious limitation, and an opportunity to integrate with its geofencing competitors.

You can set a geofence around your store and prompt users to turn on bluetooth on their devices as they enter the zone. Also, a wi-fi connection is better positioned to collect user data than beacons, by themselves. We suggest that you use the two technologies in tandem for best results..

We also noticed above that beacons usually trigger an action on your device through a mobile app. While this limitation holds for iBeacon protocol, Google is trying to remove apps from the ecosystem and leverage the mobile web instead. While a mobile app allows you greater control over the user experience, mobile web offers consumers more liberty. The verdict isn't out yet. It'll be interesting to see which side the scale tips.



Source: OpenXcell

The whitepaper has illustrated 100+ use cases across 8 industry verticals. It feels intuitive now that beacons can significantly enhance the person-to-person interaction between your sales rep and the customer. They can help customers navigate your store, like an in-store GPS. The data collected via beacons can be a Google Analytics equivalent for the physical world. Games like Scavenger Hunt will become more exciting for people to participate. It is no surprise, as well, that consumers will soon be willing, and able to pay for a beacon-enabled experience without going to your cash counter.

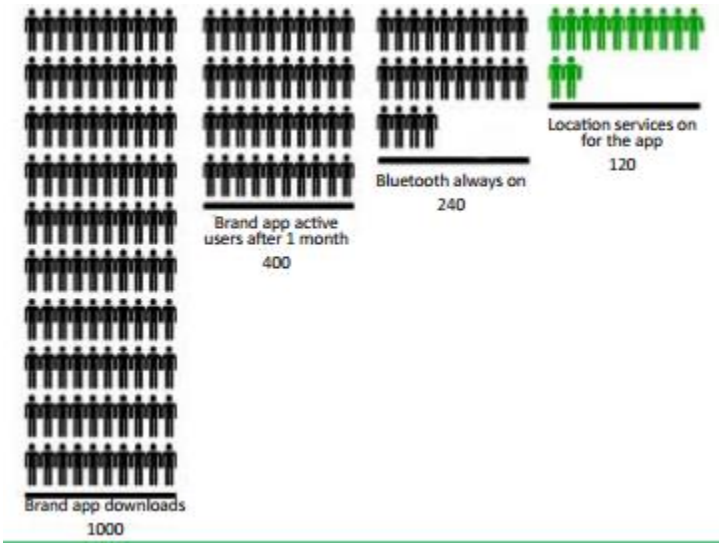
Despite how intuitive it may seem, there are people who consider beacons as fad and call it dead when Amazon Go is launched. What's their rationale?

Is it a Hype?

We looked up some of the common objections to the beaconing phenomenon and people had this to tell about it.

Not enough people are using or talking about it

eMarketer put together an interesting infographic on the relative audience scale for location services, including Beacon. It's estimated that only about 12% people are going to be available for location based targeting, a month after they downloaded the beacon-enabled app on their smartphone.



Source

3 pivotal things need to happen to change this scenario. More people need to use the app actively. More app users need to keep their bluetooth on and even more of them need to opt in for location based notifications. Here's how we see it happening.

The Eddystone protocol will take beaconing experience to users outside the apple ecosystem, and maybe eliminate using an app altogether. Beacon platforms like inMarket and BeaconStac will help smaller businesses adopt beacons in their premises, in addition to the enterprises. More importantly, beacon platforms can also help in managing the beacons through a centralized system and hence, making them easy to use for businesses.

An integration with geofencing technology and a coordinated marketing campaign will help increase awareness among consumers. This will eliminate trust-related fears and misconceptions among consumers. Lastly, the advent of location-enabled Uber-for-X apps will increase the likelihood of people using Bluetooth and location-based notifications on their smartphones.

Push notifications can easily offend people

Jen wrote about her experience with RetailMeNot, when the app bombarded her with discounts and offers upon entering a retail premises. We see that businesses like Target, are already implementing guidelines to not push more than 2 notifications per store visit. This makes us believe that this is another misplaced fear related to Beacons.

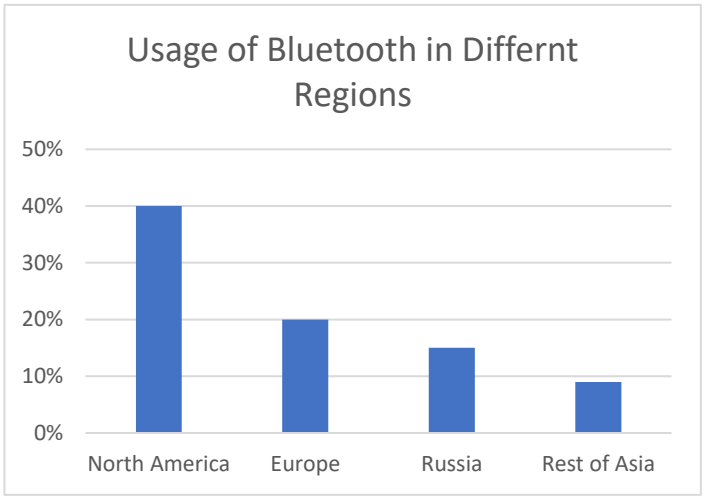
Beacon Technology is not there, yet

People like @SnowShoeStamp and companies like MindBowser have expressed concern that consumers need upgraded handset to experience the phenomenon, and that repair and maintenance of beacons is not worth compromising for some businesses. This is not as much a fear, as a mass majority sentiment. Beacon technology is still in its early phase, and yet to mature for every handset and use case outlined in this white paper and elsewhere.

At the same time, technologies like that of IndoorAtlas are competing with Beacons for mind share. However, such a technology is even younger than Beacons and requires a unique ecosystem of its own. More importantly, IndoorAtlas might only be able to solve one particular use case well, that of indoor navigation.

Stats:

70% of consumers don't know what beacons are. The problem with that level of awareness means consumers don't expect to have beacon-powered experiences.



Only about 40% of users across all devices use Bluetooh in North America, with rates dropping to 15-20% in Eastern Europe and Russia

The future is beaconable

Though it has been 3 years that the technology was first made public to consumers, Beacons are still an early technology. If projections are true, Beacons will enable $44 billion in retail sales in 2016. Beacons already enabled more than $14 billion in sales, this Black Friday. $44 billion is still a small share of the overall US retail sales of ~$5 Trillion and beaconing phenomenon has a long way to go.

What you do with the technology is essentially a function of the size of your business and the part of customer experience that you want to own. Large companies enjoy a large userbase who can install and use their apps, whereas small businesses are better off relying on super apps and integrating with beacon platforms like inMarket.

As we have seen in the white paper, applications and use cases are aplenty and businesses must not shy away from offering futuristic experiences to their customers.

“Beacons are beckoning your attention”

About ChromeInfotech

ChromeInfotech is India's leading Mobile App Development Company serving clients internationally from US, Europe, Middle East and Australia. We deliver apps with exceptional design and functionality, while keeping focus on business ROI.

We excel in assisting startups with disruptive ideas and enterprises looking to innovate their businesses with mobile-first technology. We are practitioners of AGILE development and can help you build your Uber for X business, in as early as 90 days.

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Sources & Further Reading

How it All Began?

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iBeacon and Eddystone? – Beacon Basics – Kontakt.io
How Beacons Are Changing the Shopping Experience
Connecting to Passengers – Are Beacons the Breakthrough?
Beacons. Promise, Present, Future. Q1 2016
THE BEACONS REPORT: Growth Forecasts For The Most Important Retail Technology Since The Mobile Credit Card Reader
This year, beacons will help big retailers collect data, push coupons, and generate billions in in-store sales
Top 20 iBeacon Trends for 2016
Retail 2016: Why Retailers should use Beacons to Target Millennials

How beacons work

What is iBeacon? A guide to Beacons
Beacon Configuration Strategy Guide – Beacon Interval
Beacon Configuration Strategy Guide – Transmission Power
How do beacons work? The physics of beacon tech

Industry Spotlight

15 Companies From Airports to Retail Already Using Beacon Technology

Retail:

A Primer on Beacons in Retail: What They Are and How to Decide If They're Right for You
Retail Beacons Are Becoming More Popular, but Their Effectiveness Is Debated
25 Retailers Nailing it with their Proximity Marketing Campaigns

Hospitals:

Dutch Hospital Uses Beacons to Track Treatment for Cardiac Patients
How Beacons can Revolutionise Healthcare

Hospitality

Hotel Technology Innovations That Will Drive Business In 2016
How Hotels Are Using Beacons and Augmented Reality

Travel:

SITA shows the way for iBeacon technology at airports
10 Airports Using Beacons to Take Passenger Experience to the Next Level

Schools & Libraries

iBeacon Technology in Education Demonstration
BeHere app uses iBeacons to identify which students are attending classroom sessions
Using iBeacons to Disable Apps and Phone Features
3 Brilliant Examples Of How Beacon Technology Is Transforming Mobility
Beacons Guide and Inform University of Oklahoma Students
Stony Brook University taps beacons to enhance campus life
University Of Maryland, Baltimore County: Making UMBC students' lives more eventful

Banks:

7 Banks Trialing Beacons for In-Branch Engagement
Citi trials in-branch beacon technology

Events:

How Beacons can Transform Event Management and Trade Shows

Offices:

How Beacons Will Transform Your Office
Beacons in the Workplace: Employee time tracking and more
Beacons in the office

The Beacon Promise

Mobile marketing trends and the future of Beacons
The Future of Beacons and Mobile

Is it a Hype?

Is World Accepting the Beacons ? Opportunities & Challenges in Beacon Technology
Problems faced in Beacon Technology Implementation
The 6 Big Problems With Beacons
True Detective: First Insight Finds What Consumers Really Want from Retailers
The Straight Goods on Bluetooth: How Many Consumers Have it on?

The future is beaconable:

What does the future look like for ibeacon (ble)?