iBeacon Bible 2.0

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What readers say about "iBeacon Bible"

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Some feedbacks & comments *New/updated content*	"Hey Andy, I was just reading your document, the 'iBeacon Bible' and thought it was very well done. I spend a lot of time talking to people about iBeacon technology, Bluetooth LE, etc., and I thought your piece was excellent." **David Cunningham**, Co-founder The Code Project "Oh! I know the Bible well – great great work!!" **Doug Thompson**, "BEEKn" publisher "I just wanted to say thank you for publishing the iBeacon Bible. It's really helped me to craft a better conversation with my clients along with communicating ideas & concepts better with my engineers." **Alexander Kim**, VP Mobile Partnerships, Blue Bite "Your Gaia-Matrix website on iBeacons and iBeacon Bible is the most helpful I have seen." **Sean Kenealy**, Sales Marketing Manager, Google360 "I downloaded the 'iBeacons Guide 1.0' and I'm impressed by the huge amount of useful information it delivers. It's more than just overview of the iBeacon technology , It's an enabler. Great guide Andy." **Marco Dini**, Software Engineer, Telepass

Others…
 	
New/updated content
	iBeacon Bible was cited by:
	
	• "iBeacon" on Wikipedia
	  (https://en.wikipedia.org/wiki/Ibeacon)
	
	• "Hyping the iBeacon" on labs@tmw
	  (http://labs.tmw.co.uk/2014/01/hyping-the-ibeacon/)
	
	• The Code Project
	  (http://www.codeproject.com/Articles/732709/iBeacon-Bible-1-0)
	
	A Korean translation of iBeacon Bible 1.0 is available on:
	http://www.ibeaconskorea.com/

Preface

Who is Andy Cavallini and what's Gaia-Matrix?	**Andy Cavallini** is a Computer Engineer involved in • designing, managing, implementing software projects • building digital solutions and products for worldwide companies and organizations such as **Nectar – Aimia Group** (loyalty management), **Vibram** (high performance rubber soles), the **Chamber of Commerce of Milan**, **Toshiba Global Commerce Solutions** (IT solutions for retail), **Coop** (*big-box* retailer), etc. As a Sr. Project Manager and Business Analyst, under the **Gaia-Matrix** brand, Andy Cavallini works with many international Business and IT professionals.
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Introduction to iBeacon technology
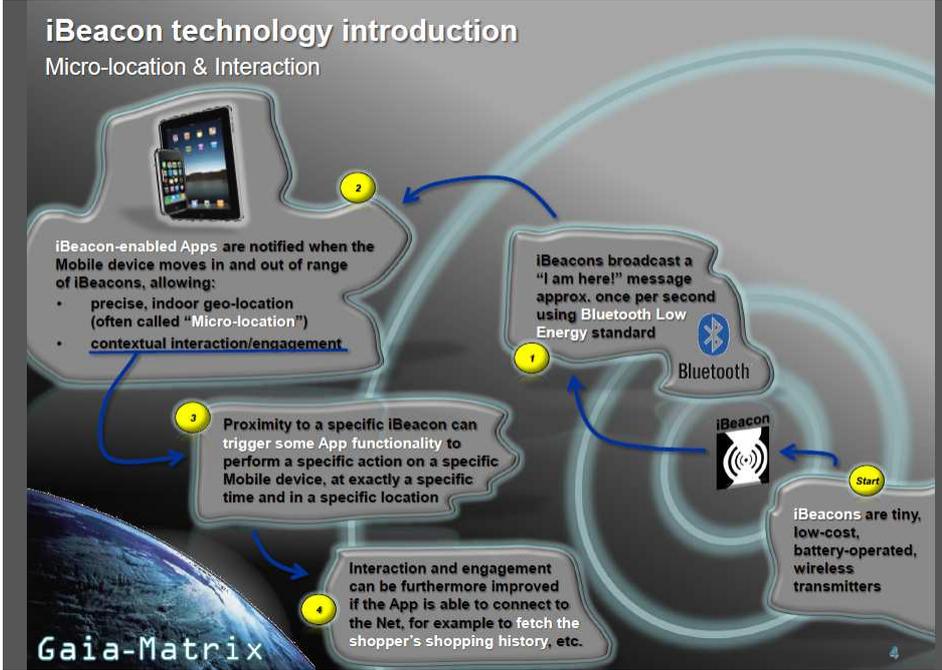
A very simplified explanation of iBeacon technology at work   ← *New/updated content*

iBeacon technology in a few words	"**iBeacons**" is the name **Apple** chose for a particular technology that allows Mobile Apps (running on millions of recent iPhones, iPads, etc.) to know how close they are to tiny, low-cost, wireless transmitters called "hardware iBeacons" (or just "iBeacons"). It's important to note that iBeacon technology isn't an Apple's monopoly: all recent **Android** devices already support it too.
	iBeacons broadcast signals using the well-known Bluetooth Low Energy (BLE) standard, allowing precise, indoor geo-location (often called "Micro-location"), but also contextual interaction/engagement, as proximity to an iBeacon can trigger some specific App functionalities.
	***Digression*: iBeacons (*short*) story** Last year Apple subtly introduced iBeacons as part of iOS 7 at WWDC 2013 (Worldwide Developers Conference), though it revealed the feature only in a single keynote slide and didn't go into detail at all…

Of course there is more to iBeacon technology, but before entering into the details, let's see in advance a simple Use Case to understand the benefits of this technology (more Use Cases are described later on).

[To know more about support and compatibility, refer to the **iBeacons hardware and software support** section]
[To read additional interesting Use Cases, refer to the **iBeacons Use Cases** section]

Fancy a simple iBeacon Use Case as a starter?

Let's pretend that Joe is a shoes store-owner and that Jane is a loyal shopper who installed Joe's store iBeacon-enabled Mobile App on her iPhone (or Galaxy S3).
Jane is visiting Joe's store; an iBeacon mounted under a store-shelf will alert Jane's iPhone that she (Jane, loyalty-card #28746) is in a particular physical location, for example in front of Nike shoes, and allows Joe to monitor her behaviour (for how long is she looking at Nike shoes?).
Thanks to this technology, Joe is able to serve Jane customized offers (for example a discount-coupon for Nike shoes) according to her behaviour, shopping history, etc.
That's just the tip of the iceberg – there is a lot more Joe could do using iBeacon technology.

[To read additional interesting Use Cases, refer to the **iBeacons Use Cases** section]

Let's get back to iBeacon technology: two valuable key concepts…

To better figure out how iBeacon technology works, we have to understand two key concepts: **Micro-location** and **Interaction/Engagement/Context**.

First key concept: Micro-location
iBeacon technology allows your Mobile device to understand its position, even in indoor locations where smartphones or tablets are not able to pick up GPS signals from satellites overhead – that's geo-location with a very high level of granularity, conventionally known as **Micro-location**.

> *Digression*: **about current geo-location technologies**
> It's difficult for radio signals to go through the bricks, steel and glass of buildings, that's why GPS doesn't work well indoors; moreover Global Positioning System is not suitable for reliably determining distances within 15/20 meters – so road-navigation is ok, indoor location (especially in multi-floor buildings) is not.
> You could object that modern geo-location technologies also triangulates signals from cellular towers or WiFi hotspots where GPS is partially available (or not available at all); that's true, but anyway the results are quite approximate considering both stability and precision.

How does fine-granularity positioning work? It's simple, iBeacons-enabled Apps on your Mobile device are notified when the device moves in and out of range of iBeacons, and are able to monitor the distance as their proximity changes over time.

This allows Apps to know precisely where they are not in terms of a map-location using longitude and latitude (like GPS does), but considering where the Mobile device is relative to known points.

> *Digression*: **iBeacon-enabling a Mobile App**
> Existing Mobile Apps need to be upgraded to be iBeacon-enabled, but fortunately the impact from a software development point of view is quite limited.
> For example, a retailer may already have a Mobile App shoppers use to manage their loyalty-card and to receive coupons; this App could be easily upgraded to also interact with iBeacons installed in the retailer's chain of stores.

Let's talk about hardware iBeacons: they are little battery-operated radios you can place wherever you want; if your Mobile device gets within range, it senses iBeacons and locates itself.
iBeacons broadcast a "I am here!" message more or less ten times per second to any device within range of the Bluetooth Low Energy radio signal; since each iBeacon has its own ID, the Mobile device can tell them apart and recognize the context of the world around itself.
Note that iBeacons broadcasts have no data payload: they just identify themselves via customizable IDs.

[To know more about iBeacons IDs, refer to the **iBeacons IDs** section]

Using strategically installed iBeacons, your smartphone or tablet work out where it is with an extraordinary degree of precision – an accuracy far higher than that of GPS.

[To know more about iBeacons spatial accuracy, refer to the **iBeacons location precision** section]

Second key concept: Interaction/Engagement/Context
After understanding the first key concept (Micro-location), let's now talk about the second key concept: **Interaction/Engagement/Context**.
The iBeacons signals enable interaction with Mobile Apps, for example triggering some App functionality to perform a specific action on a specific Mobile device – at exactly a specific time and in a specific location.
In other words, iBeacons signals express two valuable concepts at the same time: "This is where you are" and "This is what you (can) do".
iBeacons therefore make it possible to effortlessly engage with people in a physical space through their Mobile devices.

Two key concepts recap
Creating a smart location-oriented infrastructure provides Mobile devices with contextual info based on the environment they move through; iBeacon technology can be leveraged to make Apps aware of the user's context: who is she AND where is she (at a specific time); this feature allows a new level of interaction and engagement – that can be furthermore improved if the App is able to connect to the Net, for example to fetch the user's shopping history, updated info about traffic or meteo, etc.

Features of the iBeacon technology

Let's shed some light on other interesting features of the iBeacon technology: here we have a list of items in no particular order.

Item #1: Mobile App automatic start
Mobile devices will automatically react to when they come within range of iBeacons: there is no need to take your iPhone or Galaxy S3 out of the pocket to manually start the pertinent iBeacon-enabled App.
iBeacons are identified in the background by iOS or Android, and the right App is started when necessary; in technical words, an App can register with iOS/Android to be started when specific types of iBeacons move in the range of the device.
Of course you have to install the relevant iBeacons-enabled App before you can actually enjoy iBeacons benefits – currently there is no mechanism to auto-install Apps.

Item #2: Energy consumption
I know what you are thinking: geo-location and Bluetooth combined are batteries drainers.
Don't worry, actually Bluetooth Low Energy standard (*…as the name implies…*) is very, very battery friendly.

Item #3: Hardware iBeacons deployment
Hardware iBeacons are very easy to set-up and deploy; consider also that they are quite low-cost and will become almost free when critical mass (and economies of scale) will be reached; there are already a number of hardware companies selling iBeacons on the web.

Item #4: Internet connection
No connection to the Net is necessary (even though accessing valuable resources in the cloud is always beneficial), so your 3G data-plan won't be affected – and there is no need to switch WiFi on as well.

Item #5: From listening to broadcasting
So far we have considered Mobile devices passively receiving signals from hardware iBeacons, but Mobile devices can also actively transmit signals and become *de facto* iBeacons – opening your Mobile world to new useful possibilities.
A person with a Mobile device in the pocket performing as an iBeacon is able to trigger action around her (for example switching lights on, unlocking doors, etc.) just by announcing her vicinity to devices listening for it via Bluetooth Low Energy.
By the way, many desktop/laptop computers are iBeacons-enabled too, and that opens up further opportunities.

> ***Digression*: iOS vs. Android**
> Currently, Android 4.4 devices (*differently from iOS devices*) cannot pose as hardware iBeacons.

New/updated content →

Thinking about it, iBeacons could significantly push the concept of **Internet of Things**, a network of connected "smart" physical objects we can interact with.

[To know more about support and compatibility, refer to the **iBeacons hardware and software support** section]

	Item #6: Steps to have a fully functional iBeacon-enabled App
	There are actually four steps that must be taken by the final user to have a fully functional iBeacon-enabled App:
	
	    1. have the App downloaded and installed
	    2. have Bluetooth on
	    3. the App must be able to access location data ← opt-in
	    4. the App must be able to receive notifications ← opt-in
	
	Any additional privacy-related authorization depends on the specific application.

	Item #7: "Monitoring" vs. "Ranging"
	When you get into the details of iBeacon technology, two verbs – "monitoring" and "ranging" – are quite often abused; let me shed some light:
	
	• monitoring – determining when a device has entered or left an iBeacon's coverage area (monitoring is typically performed by the operative system in the background)
	• ranging – determining the distance (Immediate, Near, Far) from an iBeacon (it's not possible to perform this activity in the background on iOS; it is doable on Android)
	
	    ***Digression*: iOS vs. Android**
	    iOS doesn't allow to sense iBeacons around if you ignore their Proximity UUID; in other words, you need to know the Proximity UUID of the iBeacons beforehand in order to detect them; on the contrary, Android allow you to see any iBeacon regardless of its Proximity UUID.

iBeacons Use Cases

iBeacons for retail	**Are iBeacons born for retail?** The level of targeting that iBeacon technology provide could greatly change how brands and companies interact with customers and improve their shopping experience; that's why retailers – above all others – are paying so much attention, and some proofs of concepts are already underway in selected stores in Europe and in the USA. Marketers want to join the party too, since iBeacon technology is sparking new marketing ideas: advertising probably won't be the same any more. Let's see some interesting Use Cases. **Contextualized deals** iBeacon technology allows to convey specific, customized deals to shoppers based on the time/day/…, which aisle they're in (remember the first key concept, **Micro-location**?), their purchase history, their loyalty profile, etc. (apply here the second key concept, **Interaction/Engagement/Context**) Think of very customized offers; for example a shopper has checked an item in store but did not purchase it: the retailer can offer the shopper a discount via email or directly on the Mobile device the next time she enters the same store (or another store of the same chain). **Monitoring shoppers behaviour** Monitoring shoppers behaviour (store visits, walking-paths, etc.) is another possibility: for example the iBeacons system allows the retailer to know (in real-time) that the shopper has been standing in front of one specific display for more than three minutes; sensing second-by-second a shopper's (*inferred*) interest about a specific product, the system can supply additional information such as online reviews and – talking about fashion – other available styles or colours. As you go on shopping, a blue tie might (metaphorically) tell you: "I'm perfect with the gray suit you purchased here last week". You can even do real-time A/B testing (a method very dear to online marketers, that allow to directly compare the results of different marketing initiatives) with different displays in multiple stores: which one gets the most attention? **The online/offline integration (a.k.a. "Multi-channel integration")** The retailer can gather, for instance, if the shopper visited the same store or other stores of the same chain, which shelves/items she checked there, if she previously went online on the retailer's website to check out the same or different items, and so on. Come to think about it, iBeacon technology allows an effective integration of online and offline shopping, for example a customer may shop in a retailer's store and, while there, picks also up the items purchased the evening before on the retailer's ecommerce site.

That's what retail experts call "**Multi-channel integration**", the beneficial merging of the online and the offline shopping experience.
iBeacons make things like abandoned online shopping-cart follow-up a realistic opportunity for brick-and-mortar stores.

Furthermore, the integration of online and offline analytics allows, for instance, to evaluate conversion-rates that can help maximize ecommerce and in-store sales at the same time.

The big deal for retail is…
Acquiring a wealth of information on in-store shopping behaviour in real-time <u>prior to purchase</u> – that's the big deal.
Let me explain; shopping in brick-and-mortar stores hasn't evolved much during the past 100 years: shoppers enter a store, get hold of the items they need, pay them and then carry their purchases out of the store.
Traditionally, shoppers' behaviour can be realistically deducted only at the end of the shopping process, at payment time – when the loyalty-card and all the purchased items are scanned by the cashier.
So far real-time shoppers behaviour monitoring has been possible only online; but from now on – using iBeacons – this tremendous opportunity is available also in-store.

Shopper-engagement
Let's make an example of shopper-engagement: in a DIY-store the iBeacons system could allow a shopper to receive a notification regarding an upcoming workshop session he may wish to attend to – topics of interest can be automatically deducted considering his purchase history, surveyed hobbies, etc.

iBeacons in a small neighbourhood store
iBeacons potentially are ideal for big retailers with huge store chains, but could as well be conveniently employed in small stores, with very limited investments; a mom and pop store can easily iBeacon-enable the Mac (or iPad) already used for their POS system, so coupons automatically come up on shoppers' Mobile devices when close to the cashier's desk – cheap, simple, but effective.

Retail: a recap of what we learned so far
Remember the wise words of John Wanamaker? "Half the money I spend on advertising is wasted; the trouble is I don't know which half".
Retailers can now target the right shopper, in the right place, at the right time, interactively engaging her in new ways – while learning in real-time from her movement patterns and behaviour.

Could shopping with your Mobile device as a loyal assistant become a reality? Or are shoppers too "conservative"? Only time will tell, however consider that today a fast increasing number of consumers already use their smartphones during shopping to investigate and compare products – so let's consider this nascent habit already in place.

Some important considerations about iBeacon technology in Retail *New/updated content*	**"Colonization" of Mobile devices by Retailers** Location-based Marketing is about reaching consumers **in the right place and at the right time** with interactive content, media and services adapted to an individual's current physical location. More easily said than done: how do you *practically* and *effectively* do it? Mobile devices in general, and smartphones in particular, are instrumental for indoor positioning, shopper-behaviour monitoring, customer targeting and engagement – especially if iBeacon technology is employed. That said, we (consumers) have to be prepared for a proliferation of geo-localized, iBeacon-enabled Mobile Apps – "ideally" one for each store/shopping mall/chain of petrol stations/supermarket/… we frequent. Will our smartphones be colonized by Retailers? (*…actually, the right question is, will we allow it to happen?*) We (consumers) are going to differentiate between the retailers we truly feel like hearing from and those we'd rather not – therefore we'll decide which Apps to install, keep or remove. It's that simple! As somebody brilliantly told me, "…the success of any advertising [Location-based Marketing included] is grounded in trust – and trust is non-negotiable. If you don't trust the advertiser, you almost always refuse to interact with that company, much less buy their products. Bernie Madoff investment advice, anyone?". Dear Retailers, please, PLEASE, make every effort to be trustworthy – it's in your own best interest. Another point is: will these iBeacon-enabled Apps be all the same? I fear that I'm going to receive tons and tons of tedious notifications like "*Andy, if you buy product X now (it's on the shelf in front of you!), you'll get an additional 10% discount, just because it's you!*" and nothing more – what a bore! The exceptions – those few Apps able to separate themselves from the pack – will effectively improve my shopping-experience; the rule is: "…provide enough value, and (*probably*) they will come…" – if in doubt, dear Retailers, don't be afraid to ask. **Need of analytics solutions to extract timely and actionable information** In Retail there's no scarcity of data, companies "that sell" have been amassing it for decades – think of purchase-stats, loyalty-profiles, financials and so on. In recent years Ecommerce sites, above all, are data-hydrants that retailers have trouble to drink from: mouse-clicks, abandoned-carts, visited-pages, etc. have been challenging the capacity of even modern, performing Business Intelligence/Reporting/Big Data solutions.

Next analytics hurdle after Ecommerce?

iBeacons, of course.

Now, due to iBeacon tech, detailed, granular data about in-store walk-paths (and a lot of other shopper-actions) will congest even the most advanced "Big Data" analytics systems, making the work of Business-analysts – in simple words, **going from raw data to useful business insights** – very, very hard.

New, more effective (retail-focused?) analytics solutions are needed: tools able to easily, rapidly and intuitively interpret huge quantities of real-time data-points to **extract timely and actionable information**.

The goal is to make data more readily accessible not only to Business-analysts, but even to store personnel (those that interact with shoppers every day), enabling them to quickly and successfully work with data through a simple interface that removes the necessity to learning SQL or other complex Big Data querying methods.

At the same time, the integration with existing BI/Reporting/Big Data solutions could prove to be very beneficial, allowing all users to ingest, clean-up, search, refine and visualize data within a single (and possibly familiar) platform.

iBeacons ~~for retail~~ in other situations	
	Are iBeacons just for retail? iBeacons are not just for retail, there are a lot of other situations where applying the two key concepts of this technology (Micro-location and Interaction/Engagement/Context) can prove to be very valuable. **Museums and exhibitions** Visiting a museum or an exhibition will be a different experience thanks to iBeacon technology: micro-location and interactivity allow visitors to get information about the objects or products they are seeing and to be timely notified of pertinent events, sessions, workshops, etc. At the same time, it's possible to track which expositions attract the most foot traffic. **Mass transit** Think about the value of iBeacons in an airport or in a train station. Interested, for instance, about a train travel App that is aware of which train you are travelling on, and – as you board – automatically starts plotting your train's real-time progress? Fancy an airport interactive guide that shows you the shortest way from Check-in to your Gate? **Healthcare** There could be also very important healthcare applications; imagine a doctor visiting patients: his iBeacon-enabled tablet could precisely know about its location inside the hospital, and automatically fetch the information for a specific patient – saving time and avoiding dangerous mistakes. **Sport events** In a sport stadium your Mobile device could direct you to the fastest route from the parking-lot to your seat. **Parking** Don't remember where you parked your car? In a multi-floor parking garage your Mobile device could help to quickly find your exact parking space. **A final recap** iBeacons are quite flexible, aren't they? Innovative applications will come up every day, once critical mass will be reached; finally your Mobile device will have the chance to evolve from an high-priced time-killer (…an "angry birds machine"…) to a valuable time-saver.

iBeacons hardware and software support

Companies supporting iBeacons *New/updated content →* **Apple's iOS/OS X and Google's Android**	**iBeacon technology is cross-platform** The great news about iBeacon technology is that both Apple (with iOS and OS X) and Google (with Android) have committed to support for Bluetooth LE – this means very, very broad availability (literally millions of devices are already iBeacons-enabled) and no danger of launching services that only target a single OS. What about Microsoft? Microsoft appears to have recently added support for Bluetooth Low Energy in Windows 8 and Windows Phone 8; Nokia's recent Lumia WP8 phones are confirmed to include BLE hardware. By the way, it seems that recent Blackberries support iBeacon technology too. Let's get into details of hardware and software support for the two main players, Apple and Google. **Apple's iOS/OS X** The following iDevices – running at least iOS 7 – are supported: iPhone 4S or later, iPad 3 or later, any iPad mini, iPod touch 5th generation or later. Macs (equipped with at least OS X 10.9 Mavericks): mid-2011 MacBook Air, Mac mini, mid-2012 MacBook Pros. Earlier Macs can add Bluetooth 4.0 support through a third party USB dongle. **Google's Android** The first version of Android supporting iBeacons is 4.3 (Jelly Bean). Many Android devices already support Bluetooth Low Energy: Samsung Galaxy S3 or later, Samsung Galaxy Note II or later, HTC One or later, Nexus 7 2013 edition, Nexus 4 or later, HTC Butterfly, Droid DNA, etc.

iBeacons IDs

How does an iBeacon identify itself?	
	An iBeacon identifies itself using three customizable values: Proximity UUID (128-bit), Major and Minor (16-bit each).

Therefore you have three levels to identify a micro-location: only Proximity UUID, Proximity UUID and Major, Proximity UUID and Major and Minor.

For example, Proximity UUID identifies your entire retail company, Major identifies a specific store and Minor specifies individual shelves or different checkout tills inside each store.
Another example: Proximity UUID identifies your museum, Major identifies a specific gallery within the museum and Minor identifies an exhibit within that gallery.

Digression: **Proximity UUID in detail**
To generate a genuinely unique 128-bit Proximity UUID for any iBeacon, you can use the Mac OS X `uuidgen` command-line tool.
Since this procedure is not mandatory or enforced (you can choose your 128-bit Proximity UUID as you like), true uniqueness is not guaranteed. |

iBeacons location precision

iBeacons ranges/regions	
	iBeacons signals allow to calculate distances in quite an approximate and qualitative way – specifically your iBeacon-enabled can monitor three ranges/regions: - Immediate (less than 50 centimetres) - Near (approximately between 50 centimetres and 2/5 meters) - Far (more or less between 2/5 meters and 30/50 meters, depending on walls, the iBeacon output power and many other factors) Bear in mind that – especially indoors – radio signals jump around constantly: that's why ranges are not precise. For the same reason, delays are artificially introduced so that region changes can be conveniently minimized when the Mobile device moves back and forth on the boundaries; to be specific, while entering a region is sensed almost immediately, leaving it is usually notified with a delay of several seconds.

iBeacons security and privacy

Security	Since data broadcasted by an iBeacon is public, anyone could pick up the signal and use it within an "unofficial" Mobile App: retailers plausibly don't want third-party Mobile Apps to trigger actions on shoppers' Mobile devices once they are in their stores. Or – even worse – an hacker may clone an iBeacon for some fraudulent reason. How to prevent hackers from "hijacking" iBeacons and mess with your micro-location infrastructure? Companies who fears for the security of their iBeacons can use effective encryption techniques to prevent unauthorized manipulations.
Privacy	Can privacy become an issue with iBeacon technology? Yes it can, actually. Consumers may not be pleased about the fact of being monitored by retailers at every step in the store and have the right to know how their location information (and any other data) is used. Additionally, what happens if consumers are constantly fired on with unsolicited location-based offers as they walk through town? Game over, iBeacons-enabled Mobile Apps would be considered like a plague. **Some (common sense) advice for retailers** To be successful, iBeacons-based marketing needs to be respectful of the consumer and must improve the shopping experience – not kill it shamelessly. Retailers, be as transparent as possible and clearly explain how your iBeacons system works and how it interacts with your shoppers' Mobile devices; tell what data is specifically monitored and stored (and for how long). Finally, do your best to build a clear and smooth Opt-in/Opt-out process.

iBeacons & NFC

iBeacons vs. NFC? *New/updated content*	Sometimes **iBeacon technology** is described as a competitor of **NFC** (*Near Field Communication*). Tell you what: NFC and iBeacons are not enemies – each technology has a specific purpose, so they may reasonably complement each other very well, especially in the Retail environment. NFC, in the form of cheap passive RfId tags or labels, are used to individually identify single items (and store any logistics data and other pertinent info, if needed). Moreover, many credit cards (e.g. Visa) use NFC for contactless payments: just tap your NFC enabled card to the little box next to the POS and you are done (no PIN is required if you pay less than a specified amount, for example €20). NFC is also the chosen technology for millions of mass-transit contactless cards.
Is iBeacon technology replacing NFC? *New/updated content*	My answer is "*No, I don't think so.*" Currently you can't – at least cheaply – create an "iBeacon-card" to keep in your pocket, or an "iBeacon-label" to stick on consumer products; especially in Retail, merchandise-tracking is still a crucial area for NFC: when I select a shirt and carry it to a changing room, this interaction won't be visible to any iBeacon/App. Therefore, to offer shoppers an extensive experience including smart interactions with products beyond confined areas like merchandising stands and shelves, a mixed solution involving both NFC and iBeacons definitely is the way to go.

Digital wallets & iBeacons (in Retail)

Apple Passbook, Google Wallet, … *New/updated content*	Digital wallets such as **Apple Passbook** (for iPhones) and **Google Wallet** (for Android devices) are used to arrange and manage the digital versions of things you usually physically take with you when you go shopping, such as loyalty cards, discount coupons, gift cards, … …basically any card you keep in your leather wallet, typically with some kind of barcode on; Apple calls them "Passes", while Google prefers the word "Object" (I'll just call them "Passes"). What about payments (credit-cards, etc.)? Currently Passbook doesn't manage payments, while Google Wallet has the ambition to be also a full-fledged payment solution – but let's concentrate on improving customers' in-store shopping-experience and at the same time gather better, real-time information about shopper-behavior. By the way, and Microsoft? Rumor has it that **Windows Phone 8.1** will support Apple Passbook formatted digital wallet content and import it into **Microsoft Wallet**.
How do Passes work? *New/updated content*	In a few words, how do Passes work? Consumers essentially… 1) …receive Passes (e.g. discount-coupons) through email, SMS, a website, a printed QR-code, their preferred social network, [*...insert here any reasonable, past/present/future online and offline channel…*] 2) …"one-click" install Passes on their smartphones 3) …while shopping in-store, redeem Passes at the till, letting the cashier scan the barcode that pops-up on their smartphones display Apparently it is like using traditional coupons, isn't it? No, it's not because Passes have some very innovative and valuable features.
Location/Time awareness *New/updated content*	Passes are location-aware and time-aware, so they pop-up on the display of the customer's smartphone at the right time (for example before an offer is going to expire) and in the right place (just before entering the store or – even better – in-store, in front of the right product).

"On-the-air" updates	Location awareness is provided by "conventional" geo-location (GPS plus triangulation of 3G/4G towers, WiFi, etc.) or by iBeacons (**that's why we are talking about passes in the iBeacon Bible**). To be precise, **Google Wallet** doesn't use iBeacons yet, but rumors say Google is working on it (*…to tell the truth, hopefully Google is also working on making Google Wallet available worldwide…*).
New/updated content	Passes can be updated "on-the-air". Once a Pass is installed on a consumer's smartphone, the retailer that supplied it can easily, dynamically and selectively (for different segments of users) change its content sending pertinent updates, for example a new discount, the balance of a gift-card or the point-balance of a loyalty-card. "Segments of users"? Yes, you can group consumers taking into account info that you know about them, such as personal data, purchase history, product preferences, average order value, etc. Therefore Passes can be highly tailored with content specific to a single user – or they can be generic for any user. Retailers can even leverage "perpetual" coupons for ongoing promotions that run all over the year; once the Pass is installed it's possible to update any or all of the content and send notifications that a "fresh" offer, for example, is available.
Analytics	
New/updated content	A Retailer can monitor and analyze how each individual Pass is used by its recipient – for example, who has installed a Pass? When was it redeemed? Where? And so on… A note about digital redemption: unlike a traditional paper coupon, shoppers don't hand over a pass when it is scanned at the till, so retailers need to put in place appropriate procedures to manage things like duplicate scans, etc.
Some final considerations about Passes	
New/updated content	From the shopper's point of view, Passes are very easy to download/install (it's "one-click") and the user experience is delightful and very, very simple. For retailers, Passes are very easy to distribute and extremely cost-effective: this is a *channel* that undeniably has a low cost and big payback; Passes provide retailers with a direct, lasting connection to customers, sidestepping third parties and bypassing old-fashioned, traditional coupon distribution and local advertising. Moreover, the interactive, real-time nature of Passes facilitates unconventional marketing campaigns where incentives can change considering location, time of the day, number of redemptions and even inventory. In conclusion, digital wallets will definitely become a key tool for retail customer acquisition and promotion – **especially if employed in concert with iBeacons for indoors micro-location and interaction**.

"Passes" Quick Start Guide *New/updated content*	If you are interested in "Passes" (using Apple Passbook/Google Wallet/…), feel free to download my: **"Passes" Quick Start Guide for Marketers and Retailers – Understanding Apple Passbook, Google Wallet, Microsoft Wallet in 3 minutes** clicking on the following link: `http://meetingofideas.files.wordpress.com/2014/05/passes-quick-start-guide.pdf`

Conclusion

The end? **No, it's just the** **beginning…**	This is the final section of the iBeacons Bible, but it's not the end – there is still so much to do. iBeacon technology is very powerful and flexible, so we (engineers, marketers, creatives, etc.) have the opportunity to create new important applications to improve the life of people and to create business value for big and small companies. iBeacon technology will evolve, and this Bible will evolve too, so feel free to visit `http://www.gaia-matrix.com` to download the latest version of this document.
"iBeacon **Quick Start Guide"** *New/updated content*	By the way, if you are interested in iBeacon technology and you want to save time, feel free to download my: "**iBeacon Quick Start Guide for Marketers and Retailers – iBeacon Technology in 5 minutes through 9 Questions & Answers**" clicking on: `http://meetingofideas.files.wordpress.com/2014/02/ibeacon-quick-start-guide.pdf`

Links

Valuable links about iBeacon technology *New/updated content*	iBeacon for developers – Apple (https://developer.apple.com/ibeacon/) "iBeacon" on Wikipedia (https://en.wikipedia.org/wiki/Ibeacon) "Hyping the iBeacon" on labs@tmw (http://labs.tmw.co.uk/2014/01/hyping-the-ibeacon/)
Other iBeacon-related documents by Andy Cavallini *New/updated content*	"Passes" Quick Start Guide for Marketers and Retailers – Understanding Apple Passbook, Google Wallet, Microsoft Wallet in 3 minutes (http://meetingofideas.files.wordpress.com/2014/05/passes-quick-start-guide.pdf) "iBeacon Quick Start Guide for Marketers and Retailers – iBeacon Technology in 5 minutes through 9 Questions & Answers" (http://meetingofideas.files.wordpress.com/2014/02/ibeacon-quick-start-guide.pdf)