Beacon Technologies

The Hitchhiker’s Guide to the Beacosystem

Stephen Statler

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This book is dedicated to Tammie, Ben, and Sam Statler—my home team and source of support and encouragement.
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You have in your hands a brilliant and informative resource written by a true thought leader in our industry. Having had a prime seat at the table as an early navigator in the space, I’ve watched Stephen lead the way, and I’m deeply honored to be able to provide an introduction to what I hope will help propel you into the bright and promising future of the beacosystem.

It used to be the retailers themselves were changing the way retail was done—with deals and promotions, coupons, and e-mail blasts. Now, it’s the retail marketing and technology companies transforming how those retailers retail. Innovation, however, often comes in pockets, and you often have to throw a test against the wall to see what sticks. In the realm of location-based marketing, that can mean testing with beacons, sending targeted e-mail promotions, and engaging with customers both online and off.

Location-based marketing will be a $43.3 billion market by 2019, but the segment, which encompasses various channels to enable a brand to expand its reach, should not be confused with mobile advertising, which is only one part of a much larger marketing ecosystem that includes billboards, display advertising, and other channels.

So many retailers are bogged down with the bottom line and revenue that they forget about what drives the bottom line: customers and customer experience. Beacons are an important part of the wider location-based solution set available to aid in achieving these goals.

At the Location Based Marketing Association (LBMA), we believe that retailers need to invest in and develop a strategy for deploying these solutions. We call this strategy a three-layer location cake.

It’s important to recognize that location-based marketing is really about recognizing location as a data set that spans many technologies, devices, and media types.

We all want to get to that top layer, the one with the icing and whip cream, the one that ultimately leads to transactions and revenue, but we can’t get there unless we drive the right customers to the store and create an experience that is engaging and rewarding for them.

Layer One: Driving Location-Based Traffic
The first layer of the location cake is about getting customers into the store. This comprises a series of technologies that include social media, push messaging, geo-fencing, and more.

Geo-fencing and social location platforms are among the exciting new technologies available to digital marketers: it’s a location-based service that sends content, messaging and promotions to smartphone or mobile device users who enter a certain geographic area. When smartphone users enter a geo-fence, they can potentially receive targeted ads on web sites or apps they visit on their mobile device.

You’ll also see in this book how beacons are being deployed in stores and being used to track back to the e-commerce sites of those brands. Effectively bridging the bricks and clicks worlds together.

After all, a beacon sitting in a store by itself is useless if you don’t have anybody there to talk to.

Layer Two: Driving Location-Based In-Store Engagement
Once you get the traffic into the building, you need to turn your attention to engagement. The second layer of the location cake is about increasing dwell time, basket size, and customer experience. It’s at this layer that you should invest in technologies like Wi-Fi and beacons.
Beacons are about connecting the offline to online experience. Perhaps a customer walks by an item, looks at it, but doesn’t buy. The store can later send them an e-mail about their shopping trip and remind them of items they passed over. Beacons also “listen” in on customer behavior, similar to how search engines are used to track browsing history and provide targeted online ads.

Beacons give retailers the ability to collect data—something they are missing out on with their brick-and-mortar customers but are able to gather online. By engaging customers digitally in store, they can later use that data to re-engage them online—where more and more shoppers’ eyes and dollars are going these days.

It’s about being able to deliver that message in real-time, based on the context of where you are. It’s all about bringing that data into a single platform where you can act on it.

Beacons offer retailers a new way to connect with their customers, offering a more personalized, contextually based shopping experience. They not only deliver more value to the customers, but also empower your employees to consistently offer higher service levels.

Layer Three: Driving Location-Based Transactions

It’s been called a lot of things in retail: the “till,” the “cash box” or the “cash register.” In today’s digital age, the manual cash register has evolved into an electronic, scanning PoS (point-of-sale) system.

Whatever it’s called, the retail checkout system is based on the decades-old store design concept that consumers come to stores to choose their goods from shelves, and then pass through checkout to pay for what they purchased. Perhaps the greatest single disruption to the retail store is the fact that consumers have literally become the “point of sale.” They control where they shop, how they shop, how they pay, and where they receive their purchases. So, why do stores even need checkout lanes with “registers”?

The third layer of the location cake is focused on converting the great experience you’ve created with those customers into transactions and revenue. Here technologies like Apple Pay, near field communications (NFC), RFID, and loyalty platforms are key to winning the proximity-based transaction war.

Beacons play key role here too. Many of the early solutions work great as standalone mobile offer platforms, but without integration with the data you get from transactions and loyalty programs, those offers remain uninformed and often ineffective.

In The Hitchhikers Guide to the Beacosystem, you will hear all about each of these technologies, including who is developing them, where best to use them, and how they can be applied. Read on and you will find real-world examples of their application in scenarios from all three layers of “The Cake”.

Having Your Cake and Eating It Too

It’s about the integration of people, places, and media.

Retailers must move on from the one off pilots in location technology and instead embrace a full-fledged strategy that spans all three layers of the cake focused on driving traffic, creating engagement, and converting to revenue!

As a Canadian, I like to say we are still in the first half of the first period of the hockey game. There is much unexplored territory in the world of location-based marketing. This book goes a long way to helping the marketer, entrepreneur, and average consumer understand the value of location technology and data. The possibilities are endless and limited only by our imagination and ability to design and create.

—Asif Khan
Founder and President, The Location Based Marketing Association
Stephen Statler is a writer, public speaker, and consultant working in the beacon ecosystem. He trains and advises retailers, venue owners, VCs, and makers of beacon software and hardware, and he is a thought leader in the beacons community. Previously he was the senior director for strategy and solutions management at Qualcomm’s Retail Solutions division, helping to incubate Gimbal, one of the leading Bluetooth beacons in the market. He is also the CEO of Cause Based Solutions, creators of Give the Change, which is democratizing philanthropy and enabling non-profit supporters to donate the change from charity branded debit cards. They are also the developer of The Good Traveler program.

Stephen was born in the United States, grew up in England, and now lives with his wife, two sons, and a dog of uncertain origin in San Diego, California.
About the Contributors

Anke Audenaert is an adjunct professor at the Anderson School of Management at UCLA, where she teaches digital marketing and analytics. She is also CEO and co-founder of Favrit, a local bookmarking platform that will extend into a local native advertising. Previously Anke co-founded JumpTime, acquired in 2012 by OpenX, a global leader in digital and mobile ad technologies. Prior to that she worked at Yahoo!, building and leading its global market research and homepage network optimization teams.

John Coombs is the CEO and co-founder of Rover Labs. His company provides mobile app developers with a toolset to leverage beacon hardware with a UX that drops into apps to present relevant content.

Theresa Mary Gordon is a consultant in the corporate social, digital business, and RFID/NFC space for Near Field Connects. She is also a founding member of thinaire and tapGOconnect. Check out her presentations. tapGOconnect is a digital content management platform that connects people and “things” to communities, businesses, and events through real-time RFID/NFC m2m engagement.

Phil Hendrix is the founder and managing director of immr, where he splits his time as an industry analyst and consultant to leading companies and startups. As an advisor, Phil helps clients innovate and incorporate mobile, digital, and other disruptive technologies into their strategies. He has worked with clients in CPG, retail, consumer electronics, insurance, and numerous other verticals. Phil has prepared more than 20 analyst reports on mobile, location, proximity, data/analytics, and related topics. Before founding immr, Phil was a partner with leading consulting firms and a marketing professor at Emory University and the University of Michigan.

Kris Kolodziej is the founder and president of IndoorLBS, an advisory firm that published one of the first comprehensive reports on beacons. He was educated at MIT, was director of product management for cloud and location services at Verizon, VP of mobile at Aisle 411, and director of strategy at Toys-R-Us.

Patrick Leddy is the CEO and founder of Pulsate, an end-to-end marketing platform for real-world location. They provide a cloud platform and MicroBeacons™ that allow companies to turbocharge customer engagement. Previously, he founded Furious Tribe, a leader in mobile strategy, providing services to Citibank, Vodafone, RSA, O2, Danone, Nedbank, AXA, EMI, Investec, on their mobile strategies.

Ben Parker is a consultant working primarily with start-up and emerging growth companies with a focus on the mobile, wireless, and location services markets. He is currently advising several companies in the beacon. Previously he was a vice president at Procon (now Spireon) and was a senior manager at inCode Consulting, a business strategy and technology consulting firm specializing in the telecommunications and technology markets.

Mario Proietti is a co-founder and CEO of LocationSmart, the cross-carrier cloud platform for local, hyper-local, and context-aware application development, powering apps such as AAA’s Find Me service for AT&T. Mario serves on the editorial advisory board of GPS World Magazine and was founding chairman of the Wireless Network Issues Committee of the E9-1-1 Institute.

Ray Rotolo is SVP of Out-of-Home Assets for Gimbal Inc. and is tasked with revolutionizing how brands, retailers, advertisers, and municipality services interact with displays that incorporate location and proximity-based services. Ray has held leadership roles at several agencies that focus on OoH, including as
COO of Posterscope, SVP, and MD for Chrysalis—the Havas OoH unit he helped to create. Ray serves on boards and committees at Traffic Audit Bureau and Digital Place Based Advertising Association, Consumer Engagement Technology World, and xAd. He holds an MSc in Finance from St. John’s University in New York.

**Kjartan Slette** is the COO and co-founder of Unacast. Unacast powers the world’s largest proximity network, enabling brands and retailers to retarget their customers based on offline behavior. Prior to that, Kjartan has held a number of senior positions in the Norwegian tech and music business, and his last company WiMP/Tidal was just acquired by Jay-Z.

**Jarno Vanto** is a lawyer specializing in international data privacy law. He has authored a number of books on the subject and has been editor-in-chief and co-author of the *International Privacy Guide*. Most recently, Jarno authored *The Data Protection Act in Practice*. Jarno is an adjunct professor of law at Pace University School of Law and teaches a class on international business transactions. Jarno is also a member of the board of directors of AMCHAM Finland NYC, Inc and an advisory board member of Unacast, advising them on their privacy strategy as they build their network of beacon networks. He heads the New York office of Borenius.

**David Young** is the lead software engineer and technical manager at Radius Networks, where he has overseen numerous beacon deployments, the development of one of the first beacon registries, the definition of the AltBeacon standard, and design of beacons that support both iBeacon and Google’s Eddystone standard.
Waqar Malik worked at Apple helping developers write Cocoa applications for the Mac during the early days of OS X. Now he develops applications for various Apple OS platforms. He is a co-author of *Learn Objective-C on the Mac* and the author of *Learn Swift on the Mac*.
Acknowledgments

First, let’s acknowledge you, the reader. I’m more grateful than I can say that you are actually reading the acknowledgements (I bet you read the credits at the movies too, am I right?) We’ve been thinking of you throughout the writing process and hope you have found the subject as interesting as we have and that you have embraced the rather rambling style we have adopted for the guide. Hopefully this book has armed you with enough facts and folklore that you feel qualified to create something new yourselves and to grow this beacosystem into something even more interesting. So, if you have been, thanks for reading.

One of the things that has made this volume special is that we managed to convince so many leaders of companies that are helping to develop the beacosystem to contribute chapters and talk about their respective areas of expertise. It’s not like you all have a shortage of things to do, and goodness knows you aren’t doing it for the money. So—Asif Khan, David Young, Ben Parker, Jarno Vanto, John Coombs, Kjartan Slette, Anke Audenaert, Phil Hendrix, Ray Rotolo, Patrick Leddy, Theresa Gordon, Mario Proietti, and Kris Kolodziej—thank you.

What’s in a name? Quite a lot, really. It set the whole tone and premise for this book as a survival guide for people who want to dive into this proximity tech space. We hope The Hitchhiker’s Guide to the Beacosystem helps convey the magnitude of the subject and a sense of fun that is necessary for mental survival. Life is short, and you might as well enjoy learning. So thanks have to go to Douglas Adams, who first borrowed the Hitchhiker name from serious books about backpacking and provided hours of happy reading and listening to me as a kid. Thanks also to Sean O’Sullivan, who coined the “beacosystem” term, for letting us take it out for a spin and returning it with only a few bumps and scrapes, as well as for the pointers he has provided, both through his own writing and his suggestions on the book. Likewise, to Aisle Labs, who completely by coincidence adopted the Hitchhiker part of the name for their excellent report on beacons, which is available on their web site. Thanks for sharing.

This book originally started as a training course that we developed for our first-ever consulting client, Rick Belliotti, and his team at San Diego International Airport. SAN have gone on to create their own beacon-enabled app to help visitors navigate the terminals and track their baggage as they arrive at one of the world’s best airports. We look forward to writing about their app in the future. Don’t forget to buy a Good Traveler carbon offset as you are flying to or from San Diego. If it weren’t for Paul Manasjan, who gave me the consulting task of developing that non-profit program, we wouldn’t have been able to afford to pay the rent while taking the time to write this book.

Thanks to all of Statler Consulting’s clients. We learn through doing. It’s been a privilege to apply our knowledge to working on your challenges, be it talking with VCs and private equity firms about the best approach to investing in this space, working on business plans and patents for new ideas, or providing training to ramp up a team that is building new proximity services.

The experience that convinced me that there was an audience for our book was reprising the course that our friends at SAN airport had “piloted” and seeing it blossom up in Silicon Valley with beacon vendors, chip vendors, software experts, as well as venues in the audience. Thanks to Mario Tapia for the collaboration with Mobile Monday University to put that course on.

We learned a lot of the things that are in this book while working on wireless and retail technology issues at Qualcomm. Thanks to everyone there who was part of that journey. Thanks to Irwin and Paul Jacobs for creating a unique environment that valued creativity and engineering, to Brian Dunphy who hired me at QCOM, to Rocco Fabiano, who put me in a position to explore the intersection of wireless,
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up and publishing my blog articles.

Staying in touch with the industry can be tough when you are working out of a home office. Fairbanks is
a great therapy dog when a walk is called for to think things through, but he's really coasting when it comes
to keeping up with the "phigital" news. Conversations at the water cooler tend to be about household chores
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bar for writing about all things beacon.

Before Apress agreed to be our publisher, Katy Loffman’s Rights Solutions helped give us a kick in the
“right” direction and Kenny Waldron’s input provided a model of how a smart solution designer might
respond to The Guide.

Being born dyslexic (is that how you spell it?) may not be the best qualification for producing a tome
like this. It’s only thanks to Jocelyn Statler, my Mum, and Derrick Crowe that the text is as intelligible as it are.
Jo is a role model and has a level of patience and dedication that I can only aspire to. Derrick has gone way
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the right order.

One of the best things about writing The Hitchhiker’s Guide to the Beacosystem was talking to
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Thank you to those of you who bought this book as a trophy for your book shelf but didn’t read it. We
appreciate the money, the shelf space, and don’t consider you any the less for your lack of concentration or
spare time. Chances are, dear non-reader, you bought our book because of the promotional video, which
was created by our dear friend Don Rayner, whose rates are very reasonable, but are generally a lot more
than what we paid in beer and hamburgers.

—Steve Statler

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Computers are bursting out of the metal boxes and machine rooms where they were born and are becoming embedded throughout the world in which we live. The communication technologies that enable what is called the Internet of Things extends their reach to appliances in our homes and the meters and valves that regulate the flow in our heating, power, and water systems. The outputs have evolved way beyond the original paper printouts we used. Now these machines engage us through the voice of Siri, virtual reality headsets, and massive digital displays. The inputs are just as diverse, from finger-sensing layers on tablets, cameras that can guess our mood, and a wide variety of technologies that are designed to track the location of people and things. These are described variously as “presence,” “proximity,” and “real-time location systems”. The ability for computer systems to know where objects are located is key to what is being described as “digital to physical convergence”. This is where computers and the real world become melded together.

The Bluetooth beacon has taken center stage in this location technology revolution. These devices, which can be the size of a guitar pick, are being sprinkled around buildings, hidden away out of sight. They allow mobile phones to understand their location indoors, something that was very hard to do previously. They enable proximity triggers that can cause apps on our phones to start to interact with the world around us in new ways.

At one level they are very simple devices, but rather like the transistor, which helped to fuel another technology revolution, the possibilities are endless. Their successful use requires the understanding of a large array of related subjects.

Who This Book Is For

A lot of articles have been written about these Bluetooth beacons, but they tend to focus on fragments of the picture. This book is intended to be comprehensive. It’s been written for anyone who wants to understand both the big picture and the details of what’s required to create new products and services.

Hundreds of new companies are springing up to take advantage of the opportunities that beacons and other related technologies are creating. This book is written as a “survival guide” for anyone who has joined such a company or is thinking of starting one themselves.

Even for those of us who have spent a number of years working in this area, this guide to the beacosystem is proving to be useful. In the course of my consulting work for clients, I have found myself referring back to details of how the standards work and who some of the companies are in this space. In helping my clients get up to speed on beacon-enabled ad networks, it’s been helpful to refer them to a chapter that explains this new area.

It’s a big topic to understand thoroughly. In order to get the most out of the time you spend mastering this domain, we believe it’s important to have fun, and to share and explore some of the stories behind the development of the technology. We can’t promise as many laughs as Douglas Adams’ masterpiece The Hitchhiker’s Guide to the Galaxy, but if you are fond of understanding some of the events and people behind the technology, if you enjoy getting to know some of the details that make you feel like an insider, this book is for you.
What You’ll Learn

We have divided the book into four sections. As computer scientists, we have adopted an approach of hierarchical decomposition (starting at the top and breaking the problem into smaller manageable chunks). The first one, Big Picture (Chapters 1-3), helps give readers a sense of the significance of the technologies and how they are being used. The second and largest section, Components (Chapters 4-15), breaks down into layers the products and technology in a beacon solution stack. This, along with the many real-world examples, will provide an understanding of how the pieces can work together. In the third chunk, Technologies that Complement Beacons (Chapters 16-19) and What They Do, we look at a large number of competing and complementary technologies, so that solution designers can figure out the right tool for the job. Lastly, in Section 4, Using the Building Blocks (Chapters 20-22), we review the applications of beacon technology and where it’s making a difference. We drill down into payments in particular, because that’s such a strategic area, and lastly we look at some of the issues and opportunities that face the industry in the area of the future of the standards for Bluetooth beacons.