



Smart Beacon Management with BlueRange

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This article describes the need for Smart Beacon Management, demonstrates innovative ways to manage and control it efficiently, and shows how this can be achieved with BlueRange.

© 2017 M-Way Solutions GmbH, Stresemannstr. 79, 70191 Stuttgart, Deutschland
Tel: 0711/25254-60

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Related Links

BlueRange website:
<https://bluerange.io>

Website version of this guide:
<https://www.bluerange.io/guide/>

Beacon Management with BlueRange

1 General Information

1.1 Digitalization of physical surfaces

SmartBeacon management is an application that digitizes areas. It evolved from the requirements of organizations that gain significant parts of their value creation from large locations. Among the different technologies for digitizing surfaces, M-Way Solutions' BlueRange is based on BLE because it provides companies with the most relevant use cases, the most sophisticated solution, and the best cost-benefit ratio.

The necessary BLE hardware has been on the market for several years and has most often been used in the context of proximity marketing and B2C in a simplified form: the beacons. Bluetooth beacons are offered by different manufacturers with different function and performance promises, but generally they have the same basic principles and functions: they send a signal, a message, via BLE to all eligible receivers within range. The strength of the signal can then be used to determine the distance between the receiver and the transmitter. This signaling, depending on the distance to the beacon, is called Location Based Service. The evolution of this technology and the differentiation factor are now the so-called Smart Beacons. SmartBeacons provided by BlueRange stand out from the mass of "normal" beacons due to their bidirectional communication capabilities. Bidirectional communication forms the basis of a distinctive feature: the construction and provision of a beacon mesh that in which beacons are able to communicate with each other and with the MeshGateway, via the mesh protocol. The MeshGateway provides the beacon mesh with a single point of access to the cloud or a corresponding management console.

1.2 Challenges of beacon solutions

After initial euphoria in the marketing segment, beacons had a bumpy start and did not always leave positive memories and results. In proximity marketing, they have been able to increase their relevance in selective applications and use cases. These include price information, vouchers, and sales promotions that can only be used by a predefined range of recipients. Unlike proximity marketing, which uses mostly "normal" beacons and often in smaller numbers, the SmartBeacon logic provides a range of possibilities beyond proximity marketing, thanks to its dense mesh. This means that a complete system can be used to illustrate a whole range of B2B and B2C applications.

As a central cornerstone, the tracking and messaging functions can be modeled and implemented in many variations.

In the previous proximity cases, mostly beacons that had a temporary functions were used, which in many cases were also maintenance-intensive.

There would be the replacement of batteries on every single device on site, the search for the right device, but especially the software update, which only works on a per-device basis.

This makes the extensive use on large or even many surfaces barely possible or even uneconomical.

The BlueRange approach with the SmartBeacon system simplifies all these processes by centrally controlling all the beacons and actively monitoring and managing all the elements needed to run a mesh in large areas.

1.3 Identify your specific use cases

The use case is the core and central element of any beacon application. Therefore, BlueRange has made the identification, plausibility, and implementation of use cases the basis of the successful use of SmartBeacon Management. Each project focuses on specific use cases that provide clear added value for the owner or operator. To increase the efficiency of the area and for an improved ROI, different use cases can be combined. First and foremost, it's about making the area more productive, which means boosting efficiencies, generating data, making better use of assets on the floor, creating savings, or ensuring better space management. BlueRange's primary mission is not to apply technology, but to solve problems for customers through the combination of digital technology.

The three most important criteria for determining a use case are always: Target-specific, industry-specific, requirement-specific.

Here are some examples of these criteria from practice:

Industry: Healthcare, retail, production, logistics, lighting, etc.

Requirement: Cost reduction, increase in sales, data generation, Interaction and information management

Target groups: Customer, user, employee, administrator, site IT, project manager, service

Here is an example of specified use cases in the healthcare field:

Industry: Healthcare

Requirement: Cost reduction through increased efficiency

Target groups: Patients, nurses and doctors

Use Cases: Tracking and inventory management of medical devices, patients, and associated information management. Equipping a hospital with a BlueRange mesh, attaching asset beacons to devices, equipping patients with wearable

asset beacons, providing platform access and an application, whitelabeling.

BlueRange's end-to-end offer can be used in a variety of standard cases, but any project or assignment can be tailored to the specific situation and needs, based on the requirements of the area and target group.

In order to identify the optimal use cases for each customer, goals and requirements should be identified and clearly defined. Use cases usually arise from the optimization of regular processes that can be rethought or redesigned through the use of digital technology. In some cases, inefficiencies that have been experienced for years can be remedied through the use of digital infrastructure. The possibilities of digitized spaces are versatile and the combination of use cases means that the investment in this digital infrastructure usually pays off quickly. Property owners and operators who want to act strategically and adapt to digital change quickly realize that functions such as asset tracking, indoor localization, inventory management and access management have great potential for optimizing existing processes, or even extending their offerings.

Specific examples of use cases are listed on our website: www.bluerange.io/

Don't know the strategic direction yet?

BlueRange offers interested parties, customers, and partners access to the relevant information via workshops and consulting. This can be done at the customer's site or at BlueRange in Stuttgart, where the SmartBeacon platform can be experienced in action. Together we can develop use cases.

If interested, contact us: www.bluerange.io/contact

1.4 Components needed to take full advantage of BlueRange Beacon Management

The BlueRange Beacon Management System provides the following components:

- Access to the BlueRange platform, as SaaS, or as individual self-hosting, as an on-premise solution
- One MeshGateway per site, as an access point to the individual mesh
- SmartBeacons, with BlueRange firmware containing our unique protocol. They form the mesh infrastructure
- Optional: Asset Beacons from BlueRange or other manufacturers. They are attached to devices or objects and can be located and tracked within the mesh.

1.5 Beacons or SmartBeacons

There are basically two types of beacons:

Beacons / Asset Beacons - Bluetooth devices that send BLE signals, so-called messages. These signals can be uniquely assigned and identify the device. These devices can only output defined signals.

SmartBeacons - Bluetooth devices that enable bidirectional communication via BLE. The BlueRange firmware, available as FruityMesh open source software, enables this communication for all Nordic based beacons on the nRF51 / nRF52 chipset. This bidirectional communication is a prerequisite for networking to form the mesh.

1.6 BlueRange - Device management for beacons and the Internet of things

BlueRange is aimed at companies that want to digitize their existing office, warehouse, production, service, or retail space. BlueRange makes it easy to manage and monitor Bluetooth-enabled IoT devices while adhering to conventional security standards. The multi-tenant functionality of the platform makes it easy to operate multiple sites per building and branch offices from a single server. The intuitive operation of the platform allows the Beacon inventory to be managed, updated and configured without much training.

BlueRange is developed and operated in Germany and the platform can be booked either as a cloud solution (SaaS) or as an on-premise installation.

2 A guide to setting up your own beacon management solution

2.1 Method

The following sections provide detailed step-by-step instructions for setting up a BlueRange mesh. The focus is on the use and enrollment of the MeshBeacons and the MeshGateways, as well as the use and functionality of the platform. Of course, as a partner or customer, you will receive a detailed and personal introduction, especially to the applications you use.

Notification:

Please note that uploading a correct floor plan and the correct dimensions are necessary, especially for asset tracking applications.

In addition, BlueRange supports the consideration of a WallMap. This increases the accuracy a lot. The SmartBeacons must necessarily be positioned exactly on the floor plan.

2.2 Enrollment of the MeshGateway

The enrollment process inventories the device and places it under the control of the BlueRange system.

- Connect the [MeshGateway](#) with the power supply and the ethernet cable
- Supply power to the [SmartBeacons](#) and place them in range of the MeshGateway
- Open iot.relution.io and log in with the account details that have been provided to you
- Go to → Sites and “[Add a new Site](#)”.
Give a meaningful name, upload a floor plan and give its length in meters
- Under your site, got to MeshGateways and click the “[Enroll](#)” button
- Select your user and name the device → finally save it
- You will be redirected to a site where you should now [copy the enrollment code](#) of the enrollment that you just created
- Now, in another tab, open the [url of your MeshGateway](#) (e.g. meshgw-12345.local).
- Follow the wizard that will guide you through the final steps

The device is listed on the platform in your device overview and classified as a MeshGateway. Registration will connect the device to the BlueRange server and all necessary device data will be available through your platform.

Once registered, your MeshGateway device can identify SmartBeacon devices within its reach. The device is now under the control of the administrator who can manage the device through the web platform.

2.3 Enrollment of SmartBeacons / Beacons

When you enroll SmartBeacons, you can connect them to the mesh and list them on the platform. This networking procedure works automatically for all beacons in the mesh area.

- Back at iot.relution.io, you should now [see the enrolled device](#) showing up as one beacon and one MeshGateway under your site
- Under IoT → Sites → “Your Site” → Information, the “[Manage Devices](#)” button will take you to another page
- Now you can click on the „[Enroll SmartBeacons](#)“ button
 - a) All SmartBeacons should be [detected after a while](#) and will show up in a list
 - b) After all SmartBeacons have been found, you should select “[Stop to Enroll Beacons](#)” before continuing
 - c) You can now select all the beacons, add them to the map and place them via drag and drop
- You can watch their status under IoT → Sites → “Your Site” → [Device Overview](#) where you can see their connections, status and device information

By manually placing the beacons in the right place on the map, a high level of accuracy in the display of the exact positions and network structures is ensured.

2.4 Enrollment of Asset Beacons / Assets

If you are enrolling asset beacons, you can connect them to the mesh and list them on the platform. Assets are entered and ordered manually.

- Under IoT → Sites → “Your Site” → Information, the “[Manage Devices](#)” button will take you to another page
- There you can click on the „[Enroll Asset](#)“ button
- In the "Platform" section, select the platform of the asset you want to enroll, either a smart device, see the top line, or a beacon platform, see the bottom line
- Under "Users", select the users of this asset and who this asset should be available for

Next, the [choice of platform](#) is crucial:

- For [Smart Devices](#) (top line):
 - a) Select a user and enter the data of the smart device
 - b) Under "Device" you name the smart device and set the ownership to "business" or "private"
 - c) Then, policies can be set
 - d) Finally, you select the type of enrollment notification and an expiration date of the enrollment opportunity. If you do not specify a date, the device can be registered at any time
- For [Asset Beacons](#) (bottom line):
 - a) Select a user and specify the location of the beacon
 - b) Enter the device name and serial number
 - c) Finally, save the asset

You can track the status under IoT → Locations → “Your location name” → [Device Overview](#) and find the location in the “Map” view

2.5 More information and campaigns

If you select one of the devices (MeshGateway / SmartBeacon), you will find more information. SmartBeacons search for Android / iOS devices after powering up. A short time after you start the SDK application, you should create a heatmap.

Campaigns are found under IoT → Campaigns, they consist of triggers (currently only SmartBeacons with configured iBeacon messages are supported) and actions (notification, content, ...). You should first configure one or more beacons with an iBeacon message. (Found in IoT → Locations → "Your Location Name" → Device Overview → "Beacon Name" → Beacon Messages). Before you configure a Relation Tag message, you first need to create some tags, which can be found under Settings → Tags.

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3 Operation of BlueRange

When all SmartBeacons are registered and configured, BlueRange monitors the devices independently and automatically notifies the administrator of any automatically occurring changes or battery problems. As a result, maintenance is kept very low and intervention is necessary only in case of changes. Due to its self-healing ability, the BlueRange network automatically reconnects when a single connection is lost and replaces the lost connection with another one.

3.1 Views

Campaigns View

The "[Campaigns](#)" view lists all created campaigns, across all locations. With just one click, you can view more details or manage a chosen campaign.

Locations View

All set locations are listed in the "[Locations](#)" view. Here you can select a specific location to get details about devices and operations on site.

"Information"

Once a location is selected, the corresponding details of the location are shown in the "[Information](#)" view, including, if set, the address of the location on a map, the number of broadcast messages, and the number of devices in the mesh, sorted by type of device.

"Device Overview"

The "[Device Overview](#)" tab, as the name implies, provides a general overview of the devices linked to the mesh in list form and a map of the location of each device. Information such as device names, serial numbers, status, beacon messages and the time of the last connection can be displayed here. When you click on a particular device, its details view appears, showing all the details of the device. When devices have been registered, the device list is divided into the "Devices on the map" and "Assets" tabs by default.

"Map"

The "[Map](#)" shows all devices within the mesh. With the corresponding button, you can switch between manual time setting and "[real time](#)" which enables you to track the assets in real time. If desired, other displays may be switched, e.g. "[Heatmap](#)", "[Tracking Data](#)" and the movement patterns on the map, the "[connections](#)" between the SmartBeacons, the names of and information about each device, the "[Range](#)" of the SmartBeacons and also "[Help](#)" for using the map.

3.2 Organizational structure

BlueRange is based on a so-called organizational model which ensures the multi-client capability of the system. There is a superordinate level (Super Orga) that administers the management of the Orgas. It has global control over all locations and devices. Users will only see the features that are shared with your organization and its assigned user role.

There are one or more "General Admins" per organization / company. They are responsible for setting up new locations / sites, which in turn are managed by a site admin responsible for setting up use cases and new devices.

General Roles in BlueRange

“General Admin”

The “General Admin” is responsible for the overall IT and software management of BlueRange on a global level for all locations of the organization / company. The creation of new sites is especially their task.

“Site Admin”

The “Site Admin” is responsible for BlueRange's on-site administration, especially for setting up new use cases and new devices, and assigning roles to employees, patients or customers.

“Project management”

This role is mainly interested in the data generated and the resulting information from BlueRange and its use cases on site.

“User”

This general role is determined by the function of the user and their tasks. Specific roles in this category are split between internal and external.

Examples of **internal roles** are:

Healthcare	Retail	Production
Doctor	Retailer	Process mechanic
Nurse	Salesperson	Production manager
Caretaker	Warehouse worker	Warehouse worker

Examples of **external roles** are:

Healthcare	Retail	Production
Patient	Customer	Supplier
Visitor	Supplier	Shipping partner

Roles are used to identify and assign access and editing rights to the various views and functions of the BlueRange platform.

Assigning and managing specific roles ensures easy and straightforward rights management that is comfortably handled by the platform. Thus, with appropriate pre-planning, a functional structure can be created with clearly defined roles and rights.

4 FAQ

How many locations / site can I establish?

The BlueRange platform allows unlimited site setups. Based on our multi-tenant platform, you can set up tens of thousands of sites and control and monitor every single beacon in a mesh.

What is an average mesh?

A normal sized mesh includes up to 100 SmartBeacons per location / site and MeshGateway. Additional beacons can be added.

How many beacons can I control per MeshGateway?

We recommend working with about 100 beacons per MeshGateway. The functionality depends on environmental factors. However, a MeshGateway can technically control more than 100 beacons.

Is the protocol suitable for real-time use cases?

Our protocol supports real-time use cases with high accuracy. We are constantly working to eliminate factors that can cause delays.

How complex is the installation of beacons at a site?

Our SmartBeacons can easily be placed on the floor, on walls, on pillars, on the ceiling or on shelves when operated with batteries. If the connection is available to the mains, SmartBeacons can be connected to an electrical outlet. We also offer integration into existing infrastructures, such as lighting systems, which not only make them very efficient, but also provide sufficient power and function much like a WiFi network. We are more than happy to evaluate the best approach for implementing SmartBeacons in your organization.