



Device Management Guide

Understanding the importance, benefits and capabilities of device management tools.



TABLE OF CONTENTS

Introduction	3
Beacon Fleet Deployment and Management Challenges	7
Options for Managing your Beacon Infrastructure	10
◦ Kontakt.io Device Management	10
◦ SDK to Create a Custom Solution	10
◦ No Device Management	10
Device Management Use Cases	12
About Kontakt.io Device Management	13
◦ Kontakt.io Infrastructure Features	15
◦ Kontakt.io Device Management Benefits	15



INTRODUCTION

Infrastructure Management (IM), sometimes referred to as device management, is a tool used to remotely monitor, control and update the hardware components of location-based solutions. It allows for the more efficient and effective operation of solutions based on location data by making it faster and easier to keep all the deployed devices in good working order, properly connected to the network and updated with the most current programming for all security and data needs. As location-based IoT solutions become more integrated into new industries and their functionalities grow in number and sophistication, Infrastructure Management will play a key role in ensuring the success of the project, its ability to meet key performance indicators and achieve ROI.

Infrastructure Management becomes an issue as RTLS reach a certain size or level of complexity. It's easy to manage without IM on deployments that are small in scale or limited in functionality, but beyond a certain point, maintaining a healthy fleet of IoT devices without the use of IM capabilities becomes a difficult, expensive and risky proposition. The risk factor comes from the possibility of, for example, dead batteries resulting in even a small part of your deployment going offline and not being aware of it until—or unless—you somehow discover it. In fact, depending on the size, purpose and business context, ensuring the effective performance of some deployment location data infrastructures is de facto impossible without fleet management tools.

This is why Device Management is evolving from a nice-to-have extra to a must-have necessity for any solution based on beacons. Relying on manual management simply isn't realistic or cost-effective for a growing number of RTLS projects. By offering the ability to configure and monitor IoT devices at scale after they are deployed, Infrastructure Management is essential to maintaining the health and performance of fleet hardware while protecting the devices from security threats.

Before we dive deeper into the business value of Device Management, here are just some of the top-level benefits that it delivers:

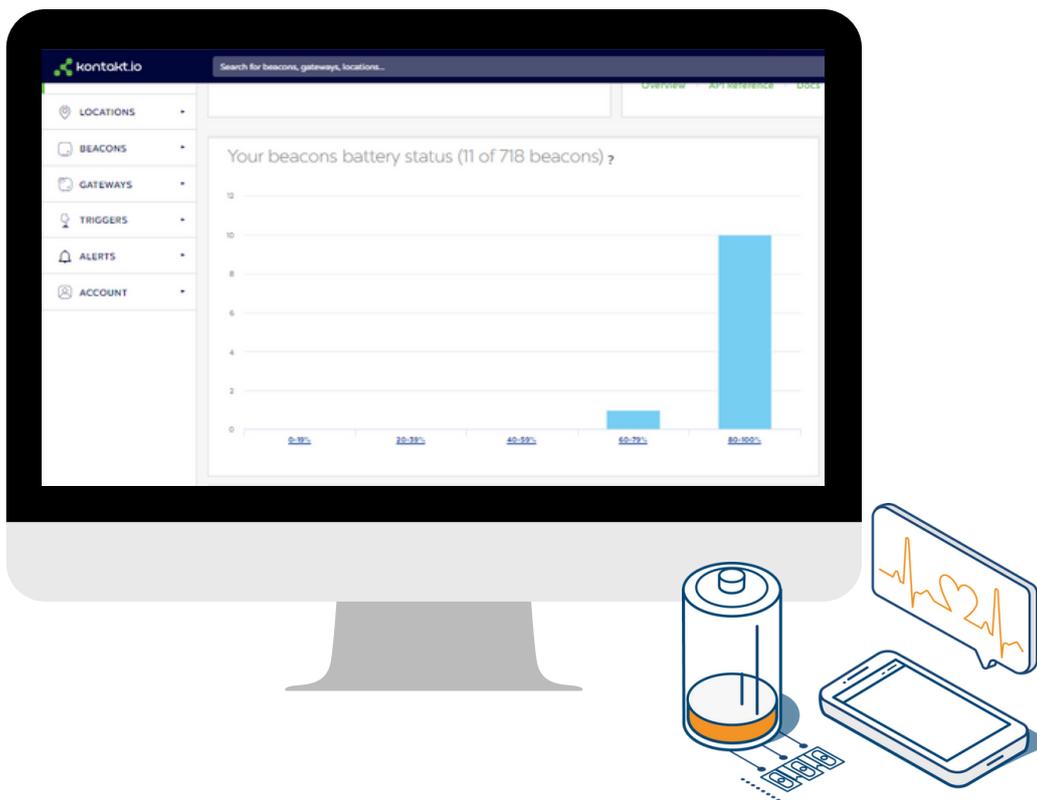


Batteries

To state the obvious, beacons and other IoT devices need battery power to function. Checking battery statuses in your deployment is among the most basic and crucial of monitoring and diagnostic capabilities provided by Device Management. Getting an early warning about power-related issues is fundamental to maintaining the smooth operation of any deployment that relies on beacons.

Most modern Bluetooth LE beacon and tags can function for years but the end will come eventually and when it does, the solution that relies on that beacon can be interrupted or, at a minimum, compromised to the point where it cannot function properly. A wayfinding application, for example, will suddenly have dead zones and appear to be totally broken to users who may or may not give it another chance. In an asset tracking solution, potentially valuable items might disappear from view or be lost from inventory. Beacons with environmental sensors would stop being able to monitor temperature or humidity conditions, resulting in ruined inventory, undeliverable goods and customer claims.

With Device Management tools, you can monitor the battery levels of all beacons, tags and sensors in your deployment and more easily arrange for preventative maintenance.



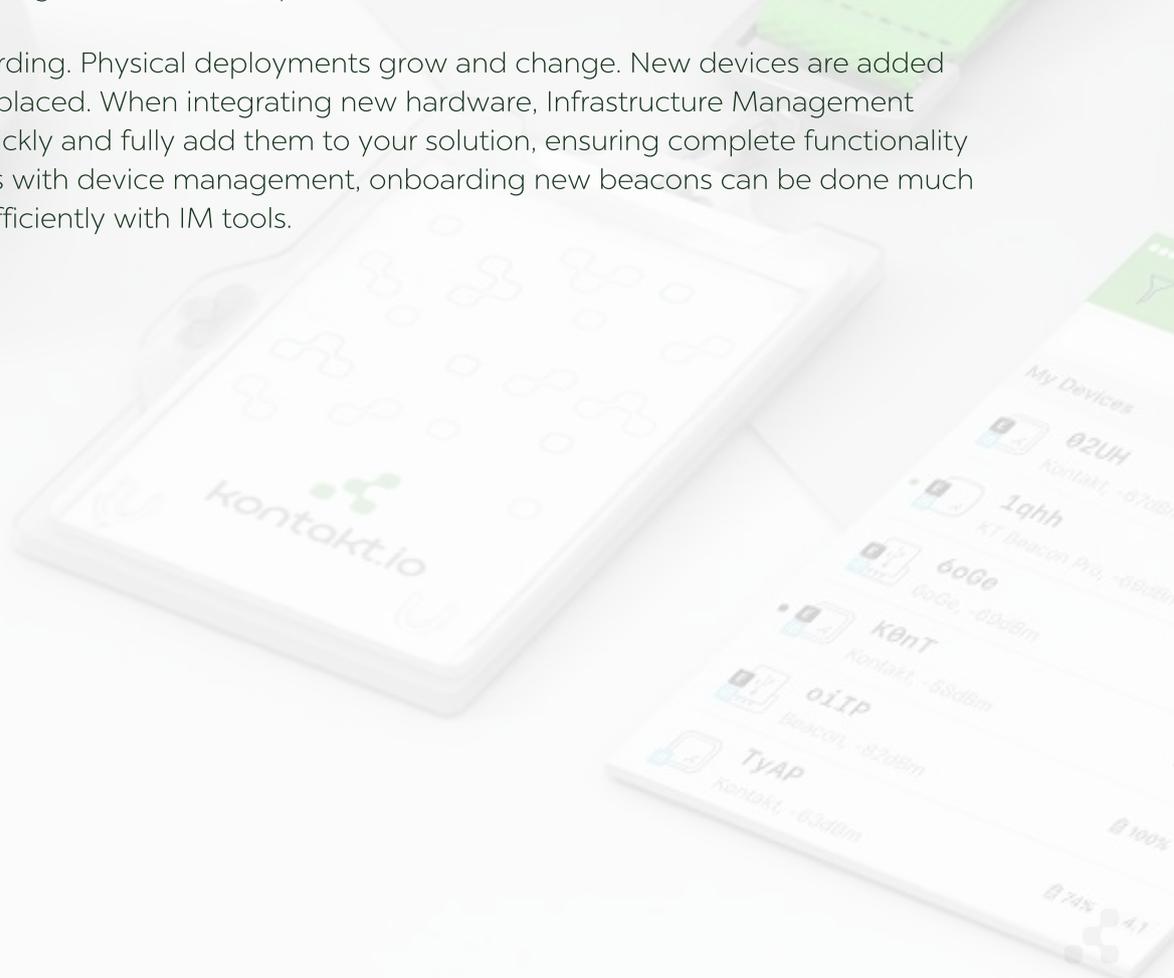
Device Management and Onboarding

Once your beacons are up and running in an active deployment, there are any number of reasons why you would want to not only check their status, but adjust their performance parameters. There are configurable device settings that can be changed to accommodate the changing needs of the application, other variables related to connectivity or signal strength and frequency or security measures.

Let's say, for example, you want to change the configuration of the signal broadcast by certain beacons in a particular area within a larger space. It could be an asset tracking application in an industrial setting or a wayfinding application in an airport. Increasing the frequency of the signal of these beacons will give you more accurate, granular location data on items in a production line or passengers moving through space. But let's also say that you only need this increase for a limited time or only at certain times of the day. Achieving this would be de facto impossible without IM because taking the time and staff resources to constantly manually make these changes would quickly become a financial and logistical drain on general operations. In these situations, stakeholders would be aware of the capabilities of the infrastructure and the insights they could gain with this additional data, but would be effectively prohibited from taking advantage of them due to the lack of Device Management tools.

It's also likely that, at some point during a deployment, you will need to update either the device software or the firmware. If a very significant number of beacons is involved and they're spread out over a large area, completing the updates without IM becomes an extremely difficult and perhaps impossible task. As with other aspects of device management, over-the-air (OTA) updates for selected devices or the entire fleet, done with just a few clicks, adds another dimension to the functionality of any RTLS while contributing to operational efficiency and reducing cost of ownership.

Then there's onboarding. Physical deployments grow and change. New devices are added and old ones are replaced. When integrating new hardware, Infrastructure Management makes it easy to quickly and fully add them to your solution, ensuring complete functionality and security. Just as with device management, onboarding new beacons can be done much more quickly and efficiently with IM tools.



Alerts

Device Management makes it possible to detect and often remotely deal with issues before they become problems but there's another feature that make you aware of these issues even when you're not looking for them. You can use IM to set up automated alerts when various performance indicators exceed or fall below limits that you set. By creating these rules, you can get an early warning about developments that may require your attention well before they grow into something with the potential to cause interruptions in the service of your RTLS.

Alerts can be sent via email or web-app notifications to the relevant stakeholders about, for example, any battery in the fleet that is reaching a certain level. "Last seen" status alerts can be sent to different teams responsible for or active in different areas of the deployment. The history of all alerts can also be archived for each device in the fleet along with handling status and intervention and maintenance reports.

As simple and straightforward as the alert functionality may be, it offers tremendous value in terms of peace of mind and the ability to deal with issues before they result in significant losses, whether financial, material or in terms of customer experience. With so many active parts in large solutions based on location data, the chances of encountering something that needs attention increase dramatically. Infrastructure Management adds a layer of insurance against unwelcome surprises by keeping a virtual eye on networks of devices that would otherwise be impossible to monitor effectively.



BEACON FLEET DEPLOYMENT AND MANAGEMENT CHALLENGES

A lot of thought and effort go into a beacon deployment long before you flip the switch when it goes live. You have to research the beacon hardware to see what fits for your use case, design the deployment and execute the set up. The work required is proportional to the size and complexity of the project and can add up to significant investments of time, manpower and money.

All of this can be wasted without the right tools to keep the infrastructure robust and operating as designed over the long term. Infrastructure Management is a necessary measure for ensuring that the components of the deployment remain in good operational health and equipping managers with the power to control and update their fleet efficiently.



Thinking of beacon deployments as being completed when they go live is the wrong approach. They are just getting started at that point and will require ongoing support for as long as you want to have a fully operational, reliable solution based on location data. In particular,

Infrastructure Management makes it easy to implement the inevitable updates and optimized programming that is effectively otherwise impossible for many deployments. These include:

- **Power settings**

Data gathered over time will reveal opportunities for optimization. A common development in many deployments is the realization that initial power settings were too high and can be adjusted downward to reflect the actual needs of particular beacons in specific parts of the network, thus saving on power and extending battery lives. Conversely, should circumstances require it for whatever reason, changing power settings to respond to increased performance demands is also easily executed with Infrastructure Management.

- **Signal strength and interval**

This is another performance metric that is often reconfigured to reflect adaptations to changing circumstances in particular areas of a beacon deployment. The strength and interval (the frequency with which a beacon's signal is broadcast), can and should be adjusted to meet the needs of the use case involved. Wayfinding, asset tracking, condition monitoring and other applications each have different signal strength and frequency requirements. If the settings of the beacon do not match the use case, performance will suffer or power will be wasted, since excess signal strength and frequency drain the battery without delivering additional performance. For example, tracking the position of items on warehouse shelves, which are stationary most of the time, do not require the same frequent signal burst of a wayfinding application that tracks users at a high level of accuracy in real time. Adapting signal and strength and frequency to fit the needs of the use case is fundamental to optimizing performance and doing so remotely and at scale is only possible through Infrastructure Management.

- **Security settings**

Security is a vitally important subject for beacon deployments. Piggybacking, cloning, hijacking and cracking are real threats to the secure transmission of data through any IoT network. With Infrastructure Management, you can ensure that every available countermeasure to these attacks is fully activated, from hardware through connectivity and into the cloud. These include shuffling, end-to-end encryption and software locks that make it impossible to access data stored on a beacon's chip. Infrastructure Management tools ensure that a beacon fleet is properly updated with the latest security measures and can be reconfigured en masse should the need arise at any time.

- **Beacon firmware**

We're all familiar with the idea of software updates when it comes to our phones or computers and beacons operate on the same principle. Features get added and improved, bugs are eliminated and the overall user experience gets refined over time. Like any connected device, beacons can and should be updated as these improvements become available to support their full functionality, smooth operation and reliability. Again, Infrastructure Management makes it simple to deliver these frequent and necessary updates to your entire fleet.

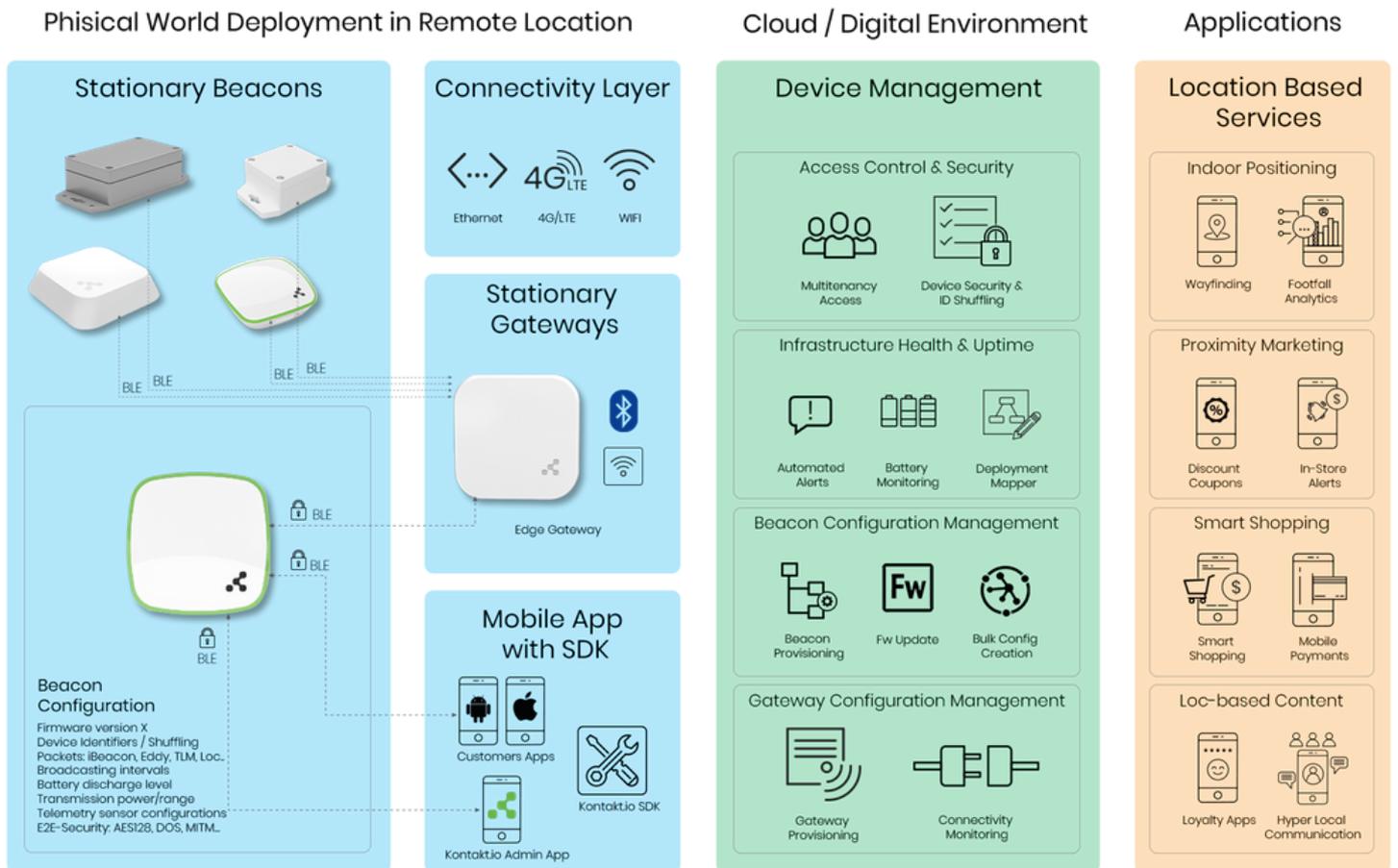
The need to make these changes and updates shouldn't be seen as an inconvenience or burden. The context and details of your deployment will not remain static for the entirety of its operation. Goals and circumstances will change. New functionalities will become available. Updates will deliver better, more efficient performance and the ability to quickly implement all of these at scale is fundamental to the success of the project. From the technical perspective, beacon deployments are fluid and dynamic, not stuck in time. Infrastructure Management gives you easy access to these enhancements, adding improved content and performance, greater efficiency and expanded capabilities.



The components of device management

To monitor and control your devices with Infrastructure Management, you need to first establish a connectivity layer, either through a Gateway infrastructure or through SDK's. This interface is your connection to all monitoring, configuration management and applications.

Kontakt.io Beacon Infrastructure Management



OPTIONS FOR MANAGING YOUR BEACON INFRASTRUCTURE

As mentioned earlier, the activation of a beacon-based solution is just the beginning of another phase of its operation. The focus shifts from its design, setup and activation to managing and monitoring its proper functioning through an awareness of the health and status of its components. Here are the options for the approaches you can take for this important transition:

Kontakt.io Device Management

Using the services provided through Kontakt.io Device Management means having full, integrated control over your beacon fleet and the ability to manage and monitor everything remotely. All the benefits we've listed so far are easily supplied with just a few clicks and you have total visibility into the status and performance of your fleet. Importantly, you get an early warning into issues when there is still time to address them instead of being surprised by urgent and often critical failures.

SDK to Create a Custom Solution

It's also possible to build your own management application using Kontakt.io SDK. Remember, though, that building such a tool is a large and likely costly option. Building your own software starting at zero requires you to include a full operating system (OS) and measures to ensure that all updates are successful. Unless there are highly specific, detailed reasons you would need to build your own IM software to cover functionalities not covered by existing solutions, this option is limited to all but the largest beacon deployments.

No Device Management

Then, of course, you can choose to move forward without any device management software. In this case, all we can do is warn you again about the inherent risk involved and remind you about the benefits you're missing.

It's important to understand that the scale of many, perhaps most, contemporary solutions based on location data are too large and sophisticated for manual management and monitoring. Also, even if you're convinced that you can do it, you have to consider if you should. We're confident that, upon examination of the time and commitment involved, you'll find that it is simply not cost-effective to attempt to manage a beacon fleet with strictly human effort. Automation is a must. Digital insights and full-time awareness of device statuses are critical. The best of intentions and the most capable staff are simply no match for the complexity of all but the smallest and simplest beacon deployments.



Device Management cannot be compared to the offer of an extended warranty on a new television or extra insurance on a rental car. It's not a rarely-used extra or simply an opportunity for an up-sell you probably don't need. Strictly speaking, Infrastructure Management is optional but only in the same sense that eating a healthy diet is optional—you don't have to do it, but doing so brings many benefits, avoids a lot of problems and, in the long run, costs much less than the alternative.

Before deciding to move forward with your beacon deployment without the use of Device Management, take a moment to consider if you're willing to jeopardize your investment while getting sub-optimal performance and wondering when the inevitable problems will arise. What then?



DEVICE MANAGEMENT USE CASES

Device Management makes it possible to optimize any beacon-based deployment through updates, fine-tuning and agile adaptation to the needs of any use case.

Let's say you've set up a location-based deployment to deliver information to visitors in a certain area—perhaps a museum or exhibit of some kind. When visitors approach a certain point, they can receive contextual content based on what they're looking at or whatever is featured in that particular area. By adjusting the beacon settings for signal strength, you can set the virtual “boundaries” of the availability of that content, which can be made available from, say, two meters away or six, depending on your preferences, the dimensions of the room, the size of the crowd and more. Controlling signal strength also limits overlap and noise between different beacon broadcasts.

Now, what happens when the exhibit changes? What do you do when the context is completely different and the beacons in that space need to broadcast their signals at different strengths to “fit” the requirements of the new setup? Spending time manually calibrating each beacon, especially in an environment with multiple signals, while technically possible, is massively time-consuming since it will definitely require a processes of trial-and-error until the right combination is found. Meanwhile, with the remote access and insights of Infrastructure Management, the same process is completed quickly and easily.

The same applies to indoor positioning services, like wayfinding applications and asset tracking. In this context, in addition to the signal strength, the signal frequency becomes a factor. The frequency with which a signal communicates with a device is reflected in the accuracy of the application. The more frequent the signal, the more frequently the location of the device is updated.

With IM, it's easy to make the necessary changes in frequency signal to fit the needs of the application. In a warehouse setting, for example, items that typically stay on shelves for an extended time may not need to be located as often as fast-moving goods. When turnover changes the assortment of goods present in the warehouse, signal frequencies can be adjusted to fit current needs, improving performance in terms of tracking data or battery life depending on the specifics involved.



WHY KONTAKT.IO DEVICE MANAGEMENT SOFTWARE IS THE IDEAL SOLUTION FOR YOUR BLUETOOTH IOT INFRASTRUCTURE MANAGEMENT.

IoT solutions are not complete without a device management strategy. The full potential of beacon-based deployments cannot be leveraged without the ability to manage and configure devices at scale. Implementing Kontakt.io Device Management significantly expands the functionalities available and Kontakt.io, as an industry leader in Bluetooth tech, provides an excellent infrastructure management solution. Kontakt.io Device Management guarantees the stability and scalability of your solution.

Lifecycle Management

This is focused on the most essential functionalities covered by the management of beacon-based devices. Infrastructure Management has to address basic needs like facilitating asset provisioning and onboarding new software and devices. Then it must turn to ongoing tasks like asset configuration and required maintenance-related functionalities like monitoring, generating alerts and providing real-time diagnostics. Infrastructure Management is essential to the proper and efficient operation of physical assets in any beacon solution. Kontakt.io Device Management provides the following functionalities:

- software and firmware management
- monitoring, alerting, and dashboards
- bulk device management
- beacon health monitoring, and data logging at the Gateway level
- remote configuration

Architecture and Security

Secure operating procedures are at the heart of the effective operation of all Infrastructure Management, from initial rollout, to device enrollment and going forward over the long term of the deployment. Overlooking the role and importance of security and the IM architecture that supports it can be a costly mistake. Along with productization, scalability of the platform and flexibility in terms of account permits, security is one of the four criteria for evaluating any IM design.



Integration

Ensuring simple integration with existing assets while providing a clear path for future deployments is a significant challenge when selecting Infrastructure Management services. Effective IM should include resources not only for integration, but for the sharing and exportation of sensor data. The five most important aspects of Kontakt.io Device Management integration are platform API capability and extensibility, device SDK and API integration, connectivity management, device data egress capability and developer usability.

Currently, Kontakt.io supports leading gateway and access points from major BLE and WiFi vendors*: Cassia Networks, Cisco, Cisco Meraki, Juniper Networks, Rigado, and Ruckus Networks. These partnerships allow our customers to leverage their existing infrastructure and speed up time to market.



Business and Strategy

Kontakt.io is well positioned to provide industry-leading Device Management capabilities. As a leader in the BLE device field and with a strong market presence and customer base, we have a comprehensive understanding of both the business needs and technical knowledge involved in beacon fleet management. Our market strategy allows us to use standards and protocols that operate with non-Kontakt.io devices as well and we allow third party hardware vendors to develop using our FDK (firmware development kit), making it possible to easily integrate their hardware with Kontakt.io BLE device management software. Additionally, with our open stack approach toward networks we enable our customers to leverage their existing network infrastructure and use the full potential of Kontakt.io Device Management.

*Please note that the level of integration depends on the vendor. Find out more on <https://support.kontakt.io/hc/en-gb>.



Kontakt.io Infrastructure Features

Device Management

Web Panel,
Mobile Phone,
RestAPI,
SDK

Device Onboarding

Automatically onboard pre-configured device from Kontakt.io Order-ID (one-to-many) to the Kontakt.io Panel or via API

Device Provisioning

Two-way communication between the device and Kontakt.io Cloud, activation and de-activation of broadcasted packets including iBeacon, Eddystone, Kontakt.io Location Frame, Kontakt.io Telemetry Frame, configuration of settings including TX-power and transmission interval

Device Management

Device grouping, OTA Firmware updates, Battery and Power Management including creation of custom rules, alerts and notifications for different users (lost and low-power devices), sharing of device ownership and administration rights, last seen timestamps

Device Security

Firmware-to-Cloud Encryption, encrypted telemetry and Kontakt.io admin packets, AES128, Secure Shuffling of device identifiers (major/minor/Mac)

User Management

Creation of master accounts with sub accounts, granting specific access and edit rights to specific subset of devices

Location Management and Deployment

Creation of locations, uploading floor-plans assignment of devices and gateways to location and, alerts for loss of Gateway connectivity

iOS and Android Admin App including SDKs

Enabling all Device Provisioning and Management Features through the Apps and SDK

Kontakt.io Device Management Benefits

Fast device onboarding

Deployments grow, new beacons are added and existing ones are replaced. With Kontakt.io Device Management, authenticating, provisioning and integrating new devices into your network is fast and easy. Get beacons out of their boxes, onto walls and ceilings and helping to drive your solution in no time!

Locate connected devices quickly

Refer to Kontakt.io Panel for quick access to the real-time location of any beacon or tag in your network. No need to spend time searching for people or assets when you can find them at a glance.

Simple IoT device organization

Organize large fleets of devices into segments with common characteristics or roles with Kontakt.io Device Management. Create defined rules and accesses for different groups of devices or even individuals.

Easy remote device management

Get instant visibility into device health and status and deliver updates remotely at scale to keep your fleet running on the most current version of all software and security measures.



About Kontakt.io

Kontakt.io Inc. is an industry leader in indoor location services and BLE beacons. Our mission is to help businesses tap into the value of indoor location and sensor data. We better connect people, locations and things to increase customer satisfaction, save costs, and improve productivity and safety.

We empower vertical business applications, with open standard APIs and AI-driven event streams to help enterprises accelerate through digital transformation. To our location-aware technology partners, we offer fleet management software, location and condition services, beacons and gateways to help them focus on core innovation, reducing time to market and costs.

Today, we serve over 2,000 customers across diverse sizes and industries, from transportation and logistics to manufacturing, healthcare, airports, governments, and public spaces. We strive to delight people and make a real difference in the world wherever possible by providing an enterprise-tailored software solution scaled to the internet.

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