Active Monitoring with Beacons in the Healthcare Industry
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Healthcare represents a huge industry that sees millions of emergency visits and stays annually. In fact, healthcare expenditures in the US were estimated at $3.24 trillion in 2015. Much of this will go toward costly equipment. These assets, however, are often misplaced. One recent investigation uncovered that a major medical center took a huge financial hit simply because they were “unable to locate” 383 assets. The study’s findings paint a grim image of asset tracking in healthcare:

“More than $11 million in taxpayer money was used to purchase hospital equipment that has since gone missing from a Bay Area medical center.”

This is due largely to poor processes. While making institutional changes in the industry will take time, the Internet of Things is becoming an increasingly popular solution to healthcare problems. Connected technology offers providers the chance to automate time-consuming services and increase efficiency.

Real-Time Location Systems and asset tracking solutions help administrators ensure security and regulation compliance as well as enable employees to work more efficiently on a daily basis. For hospitals, asset tracking offers the chance to increase equipment utilization rates, reduce the loss of expensive assets, and bring new possibilities to patients and visitors.

Existing solutions and the cost of Active RFID

There are several technologies used in asset tracking. In the past, GPS disrupted a number of industries and is now being used by companies and individuals alike. However, the limitations of GPS and the high cost of existing systems means managers are often left blind when conducting operations indoors. Similarly, WiFi and active RFID-based systems can offer dividends, but they come with a huge price tag. Bluetooth, on the other hand, has high penetration rates, and beacon tags are far cheaper than their active RFID counterparts.

Active RFID can be costly and impractical as well as useless in large-scale operations.

The total first year costs, including software and hardware, for a 1000 unit active RFID solution can easily reach up to $39,100. The cost of implementing that same system with Bluetooth beacons hovers around $10,890.

That is a total savings of up to 73% by using Bluetooth beacons.
Bluetooth beacon tags

The functionality of beacon tags is relatively simple. Beacons are small Bluetooth devices that broadcast a near-constant radio signal to smart devices in the area. This signal indicates the Bluetooth user’s proximity to that beacon and, subsequently, a specific location. Additional beacons can be installed to accurately identify an individual’s position down to meter level. The technology can be easily integrated with other systems and everyday devices due to existing widespread adaptation of the Bluetooth standard.

More importantly, beacons offer a diverse array of opportunities for healthcare professionals including better physical and digital security, decreased wait times, and higher equipment utilization rates.
Hospitals are information-intensive organizations. By increasing the amount of data captured and improving communication, RTLS can help improve the overall quality of care while simultaneously decreasing costs. This helps hospitals ensure that the right person and equipment are always in the right place at the right time.

There are two common ways to deploy beacons in healthcare: first, the more common method in RTLS, fixed readers and moving beacon tags. For Bluetooth, this is accomplished with tools like Location Engine and Gateway. The Gateway acts as the reader, collecting beacon data and sending it to the Location Engine for analysis. Common use cases include asset tracking and real-time patient monitoring.

The second method, which is commonly associated with beacons, involves fixed beacons and moving readers. Here, the beacons are attached to assets or points-of-interest and then paired with a mobile app. These methods are great for sending specialized messages to app users at the right time. For patients, this could be information about their appointment or prescriptions. For healthcare professionals, this could be patient data or updated scheduling information.

I. Use Cases
Common beacon uses in healthcare:

- Asset tracking
- Automated check-in
- Automated entry and access
- Compliance tracking and recording
- Data generation
- Enhanced building security
- Enhanced patient security
- Equipment utilization
- Indoor positioning
- Optimized patient flow
- Post-visit care
- Wayfinding
Better Asset Tracking and Equipment Utilization

Hospital assets can be costly. In fact, the cost per bed has risen 90% in the past 15 years to $3,144. Each hospital bed includes expensive equipment, and keeping track of this equipment is often a huge task. Hospitals are big and densely populated. Staff often work in several different areas and have different objectives. The result is precious and costly assets being regularly misplaced or left in disuse. Estimates indicate that hospitals will purchase 10% to 20% more equipment than actually required for operational needs.3

By implementing beacons, staff will be able to always know where assets are located. Even when a tool is misplaced, a beacon infrastructure can help locate it.

- Less misplaced assets
- Less over-purchasing of equipment
- Shorter wait times for patients

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2. “Out of Control: How clinical asset proliferation and low utilization are draining healthcare budgets.” Pg 3, GE Healthcare.
Increase Efficiency and Visitor Satisfaction

Hospital visits are not easy. For patients, doctors, and administrators, the entire process can be tiring and confusing. Reduced wait times both in the waiting rooms and the doctor’s office could lead not only to better experiences but less wasted money. With regularly changing schedules, beacons can expedite the entire process by digitally granting access to information or supporting staff through indoor navigation capabilities.

A recent study surveyed 9,945 unique patients to better understand how hospital wait time impacted their experience. The study found that shorter wait times meant much more than just higher satisfaction. It resulted in higher confidence in the provider.

“We are led to believe that wait times are not just a component of patient satisfaction, but an important component of quality care. In a new healthcare economy, minimizing wait times must be taken seriously in order to compete, manage costs, and retain clientele.”

Add security

Beacons can authenticate physical access such as entrances to wings or offices, which means a leg-up on liability problems. They are easily added to IDs to create real-time keys. Managers can grant or restrict access on an individual basis. While traditional badges rely heavily on human interaction and staff, connected badges allow for the automatic granting or revocation of access as necessary. This protects visitors, patients, and the integrity of the system.

Beacons and wearables can be used in conjunction with one another to create a powerful duo. It can be difficult to keep medicated or confused patients safe. Beacons, however can instantly notify a healthcare provider where lost patients have gone. This means providers or physicians can locate and verify the locations of patients as necessary. Plus, Beacons can be configured to alert staff if a patient wanders out of pre-defined areas. Such solutions keep patients safe, reduce threats, and cut down on liability problems.

- Quicker access to patient information
- Easier hospital navigation
- Location data of other staff members
Real-World Success: Affordable Attendance Tracking

Elite-ID Electronic System uses beacons for automated, wireless logging and monitoring of staff attendance. Due to the low cost of beacon technology, they are now able to offer their solution to hospitals for 50% less. This means businesses who would not have been previously able to afford these systems finally can.

Reliable verifications systems help hospitals better manage staff and simplify proof of work, liability monitoring, and inspection records.

Real-World Success: THINaër’s Asset Locating System

THINaër’s hugely successful deployments were recently described in RFID Journal:
Beacon tags are zip-tied to such assets as wheelchairs, beds, or patient care equipment while corresponding receivers are installed in patient rooms and some hallways. The receivers capture tags’ regular signals and forward the data to a cloud-based server. The software is able to link each tag’s corresponding asset with their physical location.

This provides real-time and historical equipment information. It can also detail how the assets are being used and, in some scenarios, by whom. This could also be leveraged to track cleaning and maintenance.

“The return on investment is in the predictive analytics this provides,” THINaër CEO Bryan Merckling explains. “It allows companies, for the first time, to understand the true cost of care.”

Real-World Success: Indoor Navigation

Navigation ID recently beaconized the Westfriesgasthuis hospital in the Netherlands to give users indoor navigation capabilities. The easy-to-use app is offering a better and more efficient experience through simplified wayfinding. This program can help users: find their way; locate a specific office, entrance, or other defined POI or connect to the nearest representative.
The importance of any RTLS rests in the data they transfer or collect. The most basic system (like those based on NFC or passive RFID) simply registers when an asset passes through a location. This rudimentary data can help managers track asset locations, optimize usage, decrease waste, and even find insight into the overall flow of an operation. That, however, is just the beginning.

Recent developments are enabling real-time data and active asset tracking. Moreover, thanks to the affordability of Bluetooth-based infrastructures, these active RTLS systems are now available to a wide array of healthcare providers.
Beacons are able to generate active and even real-time data that can be easily leveraged for analysis and visualization. Now, beacon technology has one more important tool: Location Engine. The Location Engine API passes data through a beacon Gateway directly to the cloud, allowing users to check data like beacon location and telemetry. The Location Engine API also allows for “triggers,” real-time reactions to specified events or changes in the space.

Location Engine enables easy data generation and quick integration of data into solution provider apps and platforms. This means a solution provider can create a program that indicates dwell times in different areas, visualization tools, heatmapping interfaces, and more. The software allows solution providers to create platforms for asset tracking and the optimization of operations through powerful data.

Location Engine and Gateway were released last year and are being rapidly used and integrated. Nearly **400 businesses across 40 countries** are testing the technology.
The Technology

The Gateway is a device that scans for beacons in its range and sends data about their location, movement, and health to the cloud. The Gateway comes in two versions:
- Hardware Gateway
- Software Gateway

Location Engine is the tool that offers users access to data transmitted by the Gateway. It can show where specific beacons are located, how much time they have spent in range of a given Gateway, at what time they entered or left an area, and further information.

Location Engine can be accessed in two ways:
- Through the Panel, where Gateway information is presented in clean diagrams, maps, and tables
- Through the API, which provides raw data to be plugged into other platforms and used as defined by the solution provider
Zonal Tracking

For beacons, bigger and stronger is not always better, and the number of tags required for a deployment will always depend on the use case. While some companies need highly targeted tracking of less than one meter, most use cases do not receive an increased benefit from extreme accuracy.

Zonal Tracking focuses on larger areas and can pinpoint the relative location of an asset. It is highly useful as it also removes unnecessary data and technology. In use cases where extreme accuracy does not bring sufficient added value, the cost of highly accurate tags and receivers as well as excessive data processing would only add to the overall price tag—not to the overall benefit.
Defining good business cases for Bluetooth-based asset tracking

The value brought by a Bluetooth-based system should be fully examined before moving forward. Systems that work for one company may not work for another. This is because each deployment and use case is different. The following can help managers better evaluate the value Bluetooth can bring a specific asset tracking system or business.

ROI = Benefit / Investment

**Benefit:**
There are two major ways beacons benefit a system: increased utilization and process improvement. Beacons can immediately enable a company to increase the utilization rates of assets by making them more accessible and visible. They can also expedite and clean up processes by eliminating bottlenecks and risks.

**Investment:**
Beacons are more than just a hardware cost; they include three different stages of cost. The upfront hardware cost includes infrastructure and installation. There is also the daily cost of operations, and, finally, the long-term costs and updates. Most importantly, the more complex the system, the higher these costs will be. This is why bigger and stronger is not always better for tracking infrastructures. Extreme accuracy and complexity will cost in the short and long term.
Hard to track assets?

Inefficiencies in your staff and management?

Get in touch to learn about Bluetooth infrastructures and how the technology can work in your business.