



# Encompass

## Simple, fast, flexible, cost-efficient: A new paradigm in real-time location systems

*Bluetooth® low energy wireless technology leveraging hospitals' existing Wi-Fi® opens doors to wider adoption of RTLS and better management of mobile assets.*

Real-time location systems (RTLS) have helped hospitals significantly improve management of mobile clinical assets, right-size inventories, and save hundreds of thousands to millions of dollars in capital and maintenance costs.<sup>1</sup>

RTLS technology has been deployed in healthcare for the past 15 years, and yet, despite its substantial benefits, its market penetration remains at just 15 to 20 percent.<sup>2</sup> That is mainly because traditional RTLS required large capital expenditures and long deployment programs before the hospitals could realize the benefits.

Now with the Encompass platform, an elegant new wireless solution is poised to make the benefits of RTLS accessible and affordable to a much broader range of care providers. This approach, built upon open standards and commercial Bluetooth low energy and Wi-Fi technologies, eliminates the classic objections to proprietary hard-wired locating systems. Through the marriage of Bluetooth low energy with the existing hospital Wi-Fi infrastructure, it can be installed in a matter of days instead of months and with no need to open ceilings or drill into walls to run cable. The basic technology is already proven in industries such as retail and transportation/logistics.

As a cloud-based application, the location system is accessible to any authorized staff member and from any computer or mobile device with internet access. This means staff members can find equipment from wherever they are, instead of having to first find a computer loaded with custom locating system software.

The capital and installation cost is up to 60 percent lower than for cabled RTLS. There is no on-site server for the hospital to maintain and no dedicated software to update. The system readily scales to accommodate growth and can be easily reconfigured if hospital layouts are redesigned or repurposed. Encompass provides proximity-based device location data using the same basic geo-referencing as smart phone navigation apps. It is built on a system of battery-powered Bluetooth low energy beacons and mobile and fixed receivers. The receivers transmit location data via Wi-Fi to the cloud by way of a site gateway installed on a server provided by the hospital.

### At a glance

Wireless real-time location systems based on Bluetooth low energy and existing hospital Wi-Fi make the technology and its benefits more accessible.

- Fast and disruption-free installation at a fraction of the capital cost of wired RTLS
- Less time wasted searching for mobile equipment
- Helps patient care be more timely and effective, improving patient and staff satisfaction
- Tight control of mobile asset inventories
- Immediate savings and strong long-term return on investment<sup>3</sup>

# Listening to healthcare providers

RTLS for healthcare helps reduce the time caregivers spend searching for mobile devices such as infusion pumps, monitors and wheelchairs. In surveys, nurses report that delays in finding equipment can compromise patient care and safety and are a source of patient and staff dissatisfaction.

Encompass combines the experience of GE Healthcare in hospital management and RTLS with the expertise of Zebra Technologies in enterprise asset intelligence and wireless communication. The open-standards approach to RTLS aligns closely with hospital leaders' desire to avoid proprietary technologies that tend to be costly, inflexible and difficult to update and service. It also lets hospitals leverage their investment in Wi-Fi networks instead of building new single-purpose infrastructures.

The wireless RTLS has appeal because it eliminates complicated installation processes that can conflict with ever-stricter infection-control policies and force temporary closure of sections of floors or removal of patients from their rooms while cabling and other physical infrastructure is installed. Its simple and fast installation enables hospitals to quickly use the system, thereby helping to create the potential for an accelerated return on investment, instead of waiting for several months after a contract is signed. Furthermore, in certain circumstances, the technology can be provided as a subscription service— with a smaller/limited initial capital investment required.

Bluetooth low energy and Wi-Fi help enhance RTLS consistency and reliability: the signals pass through walls and, with multi-path propagation, function in the presence of staff members or other obstructions, such as equipment carts. At the same time, the short-range and very low transmit power of the Bluetooth beacons limits impact on the hospital's radio-frequency environment and reduces the risk of interference with other wireless communications and medical equipment. The Bluetooth asset tags are inexpensive, and their operation has been optimized for healthcare RTLS with batteries that can last two to five years.

## Simple infrastructure

In the simplest sense, Encompass technology is analogous to a ship navigating with assistance from a lighthouse. The lighthouse (beacon)

emits a signal; the ship captain (receiver) uses the signal to identify the lighthouse location and steer an appropriate course.

The Encompass application is based in the cloud and is maintained and updated by the vendor, so that users can immediately enjoy the benefits of new features and enhancements. All data analysis and generation of maps showing device locations occurs in the cloud. The RTLS physical infrastructure consists of four types of Bluetooth low energy devices, designed specifically for healthcare environments and to withstand frequent cleaning with common disinfectants.

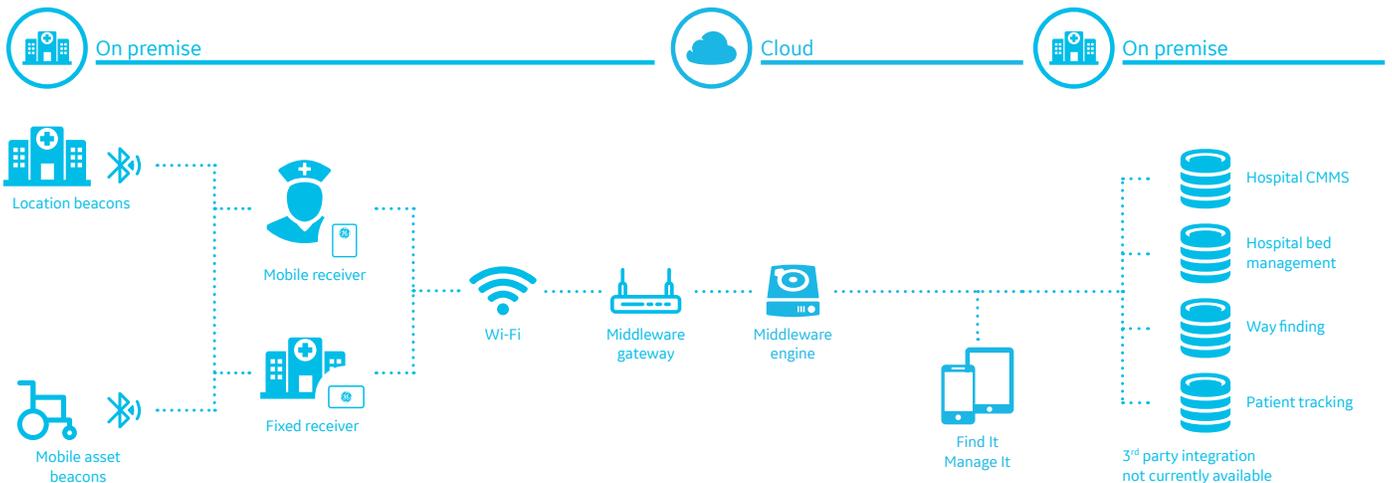
**Location beacons** are attached with adhesive to walls in rooms and in other areas where equipment needs to be detected. Their locations are geo-referenced. Their replaceable AA batteries last two years or more.

**Asset beacons (tags)** are affixed to the mobile devices and equipment. They carry coin-style batteries and broadcast at intervals that can be adjusted to achieve a balance between location precision and desired battery life (two to five years).

**Mobile receivers** are small pager-like devices that staff members wear, creating in essence a crowd-sourced communication infrastructure. As people move around the floors, the receivers "hear" the location and asset beacons and transmit the location data over Wi-Fi. The cloud-based application then synthesizes the data to map asset locations. In the interest of privacy, the mobile receivers are not linked to the wearers' identities. Staff members do not register with the badge; they simply pick it up and carry it while they work. The batteries can operate for 18 hours before recharging.

**Fixed receivers** are AC-powered and are placed in areas where staff members go infrequently but where mobile equipment is kept, such as soiled rooms and storage locations. These devices send Wi-Fi signals when they "hear" asset beacons, helping managers monitor equipment stocking and PAR levels. Receivers at exits can help detect theft of tagged equipment. These receivers are attached with adhesive to walls and plugged into standard AC power sockets.

Both types of receivers contain auto-configuration, over-the-air update features (there is no need to find or touch the devices) and filtering algorithms and logic so that they send only the necessary information and thus preserve the bandwidth of the Wi-Fi network. The site gateway collects the Wi-Fi data from all the receivers, packages it and sends it to the cloud-based software application.



## Performance in practice

Encompass, the GE wireless RTLS, is much simpler than wired systems to design and install. While all hospitals are different, they also have much in common, and the technology is flexible and tolerant enough so that installers can follow a deployment playbook containing a few fundamental principles: for example, location beacons placed every 25 feet in corridors, and placed in patient rooms at the head of the bed on the equipment side. If issues develop with the initial layout, Bluetooth devices can be easily relocated or added as necessary.

Once the system is installed, staff members can access it on a desktop or laptop computer and on Apple® or Android® laptops, tablets or smartphones. When they search for a type of device, the display shows those items in close proximity to the person's location with accuracy sufficient to enable quick retrieval. The location system can be accessed remotely so that, for example, a manager in one hospital in a care network could help a colleague in another hospital locate a mobile device—and even do so from home or while traveling.

The ultimate benefits of a cost-effective RTLS deployment are clear:

- **Patient care:** Helps ensure mobile assets are delivered when patients need them. Helps caregivers provide prompt diagnosis and treatment. Nurses can spend more time on patient care, rather than looking for devices.
- **Operation efficiency:** Staff members easily and quickly locate equipment; time spent searching is greatly reduced. Biomedical staff can locate equipment to perform timely and compliant planned maintenance.
- **Financial performance:** Mobile device inventory is right-sized and capital, maintenance and labor costs reduced. Loss, theft, and rental of mobile assets like IV pumps and telemetry boxes may be minimized.

Furthermore, the cloud-based RTLS application has flexibility for upgrades that increase its power and utility. For example, in the near future, the system may show a searcher the one device closest by and the potentially shortest path to reach it. With the addition of a new application, staff members' smart phones could function as the RTLS mobile receivers: smart phones are fully enabled by Bluetooth.

Technology based on Bluetooth and existing hospital Wi-Fi is the wave of the future in RTLS. By driving down cost, speeding installation and simplifying usage, it removes barriers to broad adoption. Now, hospitals of almost any size can deploy RTLS to help ensure timely and effective patient care, control their mobile asset inventories, and generate long-term savings that can justify the initial technology investment.

## An outcome-based solution

Encompass is a cost-effective solution that helps hospitals manage mobile asset inventory, reduce total cost of ownership, and achieve better capital allocation. It enables healthcare professionals to manage all critical mobile assets in real-time with accuracy and ease so that they spend less time searching for equipment and concentrate on providing quality patient care.

Encompass helps the hospital and the healthcare professionals to enhance patient care, improve operational efficiency, and increase financial performance.



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Imagination at work

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