Making the right decisions on an RFID/RTLS system may seem daunting. In an effort to unravel the complexity, this introduction answers some of the basic questions and concerns.

**What is RFID/RTLS?**

Radio Frequency Identification (RFID) and Real Time Location Systems (RTLS) are automated identification solutions that allow a user to track assets or processes in real time (RTLS) or last scanned location (RFID).

RFID/RTLS solutions go beyond a barcode solution allowing the end user to automate system processes and workflow, as well as provide business intelligence.

RFID/RTLS solutions automate identification, location and actionable data by attaching either a passive, battery assisted passive (BAP) or active tag to an asset. The tag communicates through a reader, sensor or access point to a server which visually displays the asset's information via user interface software.

User interfacing software allows for cumulative information from which reports and business intelligence can be analyzed.

**Visibility to assets and processes**

RFID/RTLS provides visibility to a wide range of assets and processes including:

- Wheelchair, IV pump, mobile assets
- Medication control/tracking
- Temperature compliancy
- Hand hygiene compliancy
- Inventory control
- Surgical instrument tracking
- Surgery/ED Suite Workflow patient and staff location

Because of the wide range of applications, an extensive Primary Needs and Impact Analysis is always a good course of action when discussing and selecting a solution that will deliver the desired results.

**Why RFID/RTLS?**

Hospitals everywhere are looking for ways to become more efficient, to improve profitability and patient care. Manufacturer processes like lean and Six Sigma are becoming accepted and expected practices to help address the complex challenges in healthcare.

RFID/RTLS are instinctive tools for achieving efficiency goals. On average, in a typical 200 bed hospital, staff spends 12% of their time looking for assets from endoscopes to wheelchairs. This translates into an annual cost of between $6,000.00 and $9,000.00 per staff member. (Source: IDTechEX January 2007)

**Without RFID/RTLS**

When staff can’t find the assets and supplies to take care of their patients, they tend to hoard, purchase or rent more equipment. Delays in service or patients leaving without treatment (LWOT) negatively impact the patient experience and are detrimental to the bottom line.

An RFID/RTLS system is a tool to help improve patient care and the bottom line.

"The market for RFID tags and systems in healthcare will rise rapidly from $94.6 million in 2009 to $1.43 billion in 2019. Primarily, this will be because of item level tagging of drugs and other medical disposables and Real Time Location Systems (RTLS) for staff, patients and assets to improve efficiency, safety and availability and to reduce losses "

What makes up an RFID System?

One of the best descriptions of a system comes from the AORN Journal:

“An RFID system consists of sensing chips and non contact RFID tags, which may be active or passive, and RFID readers. The sensing chips and RFID tags send and receive information by wireless radio-frequency messages, so the RFID tag need not connect directly with the RFID reader to exchange information. The RFID tags have active and passive forms. A passive tag consists of a chip and an antenna to send messages to the RFID reader and is similar to a bar code on a wristband (e.g., a wristband similar to a watch) consists of a built in battery to send messages over distance and a sensor to record temperature or position data.”¹

Below are three typical tags for different purposes:

- **Passive Tag**
  Can be attached to most any asset from specimen vials to instrument sets.

- **Staff Tag**
  Can be used for location tracking, HCAP review, hand hygiene reports and staff duress.

- **Temperature Tag**
  Used where constant temperature levels need to be maintained from refrigerators and freezers, to blanket warmers.

Choosing the tag technology is part of the overall decision and is often based on eleven criteria:

- Value
- Use Case
- Battery life
- Easy to order
- Expiration date
- Level of Perishable Risk
- Frequency of movement
- Cost of Asset
- Priority of responsibility in medical treatment
- Highest responsibility of medical staff
- Cost

What are the basic technology options available?

In terms of the overall technology platforms, there are five that have shown effective outcomes based on desired results:

- **Gen2IR** – Infrared signal read by tags and data transmitted over 900 MHz or proprietary Wi-Fi networks.
- **Ultrasound** – Tags transmit a unique identification signal using ultrasound waves. Receivers that use a patented Digital Signal Processing (DSP) algorithm pick up the signal and transmit it via an existing LAN/Wi-Fi.
- **Passive** – Uses tags of varying sizes usually very thin with printed or embedded antenna. Works with portal or hand held readers to provide location details. Product data is generally stored on the tag and can be enhanced with battery assist.
- **Zigbee** – A mesh sensor network that is low power, self healing and self calibrating using an 802.15.4 frequency.
- **Wi-Fi PLUS** – Tags communicate over existing 802.11 networks. Often a low cost solution if a Wi-Fi network is already in place and if the coverage is robust.

¹ AORN Journal August 2011 Vol 94 No2
Where is RFID/RTLS utilized in a medical environment?

A  OR Workflow:
Utilizing RTLS technology, the Operating Room has the opportunity to automate workflow, drive process improvement resulting in efficiency and revenue gains. Communicating patient location status to family members and staff is also a valued benefit.

B  Pharmacy:
RTLS Temperature and inventory monitoring provides the ability to ensure the safe handling, reporting, auditing and location or inventory control of pharmaceuticals. RTLS can also help reduce reorders of misplaced chemo therapy medications.

C  CSSD:
RTLS and Passive RFID technologies provide the real-time or ‘last known’ locations of tagged instruments, instrument trays or mobile devices alerting the department or designated staff about any adverse events.

D  ED Workflow:
RTLS technology offers the Emergency Department an opportunity to automate throughput and drive process improvements that result in efficiency and revenue gains. Reduce LWOT instances through bottleneck visibility and manage assets and inventories critical to delivering patient care.
Which technology is the best?  …“It Depends”

No two hospitals are the same. All have differing needs, different visibility goals, different ROI aspirations, different existing infrastructures and different budgets, so a needs analysis process must be executed if the correct solutions are to be implemented.

As a first step, below is a guide from the whitepaper, “RTLS-based Ubiquitous Healthcare Management System Design and Implementation” which provides some baseline levels of technology evaluation.

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<th>Passive RFID</th>
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How do we make sense of all this?

At Skytron we developed Skytron Discovery™, a step-by-step process to help clients identify their needs and assist in the development of the best solution.

E-mail info@skytron.us if you would like to learn more about our process.