

## T E C H N O L O G Y

# RFID: It's About More Than Asset Tracking

*Rick Krohn, MA, MAS*

Radio frequency identification, or RFID, has been receiving a lot of attention in the healthcare industry lately because it addresses a vexing problem of healthcare operations—locating people and things. With RFID you can track any physical object—equipment, medications, people—but more importantly, information about what's being tracked can be stored, transmitted, updated, and integrated with other information, all without direct human intervention.

RFID describes a wireless identification technology that communicates data by radio waves. Data is encoded in a chip, which is integrated with an antenna and packaged into a finished label or tag. RFID tags may be passive, requiring close proximity to a reader, which is usually used in tracking supplies, or active, in which the RFID tag contains a small battery to enable continuous monitoring at greater distances; this is used mostly to track equipment.

## Passive and Active

There's a significant difference in cost between passive and active RFID. Passive tags have no power source and are quite inexpensive, and passive readers, both tethered and

portable, generally cost from \$500 to \$1,000. Active tags are significantly more costly, and the wraparound wireless infrastructure must be added to the cost of active RFID tag readers. RFID technologies offer different rewritability options, memory sizes, and tag forms and can be read from anywhere within range of the RFID reader.<sup>1</sup>

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Frost and Sullivan estimates that the market for RFID-based tracking systems in healthcare will increase from \$300 million this year to \$658 million by 2007.<sup>2</sup> That growth is likely to be sparked by both clinical and business applications of the technology.

“We've been working since 1996 to develop RFID solutions with technology innovators like Wal-mart, but it's only recently and mostly in the

supply chain that we've seen RFID obtain a solid footing in the healthcare industry,” says Debbie Murphy, global practice leader for life sciences at Zebra Technologies. “We're still in the early adoption phase of RFID in healthcare. Pharmaceutical tracking is a growth area, and there are emerging opportunities taking shape for both passive and active RFID in the areas of high-end asset management, patient tracking, blood bag tracking, and newer clinical applications.”

But because the price points of the technology have not reached the tipping point of wide adoption, RFID in healthcare has been restricted primarily to asset management and supply chain applications. There's a lot to keep track of—in 2003, Jackson Memorial Hospital in Miami discovered that it could not account for \$4 million worth of equipment and quickly decided to implement an RFID tracking solution.

## Healthcare Applications

Faced with the same issue, early in 2004, Bon Secours Health System, Richmond, VA, installed an RFID equipment tracking system to monitor 12,000 pieces of equipment at its three facilities. In less than a year,

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Bon Secours has documented benefits that include capital avoidance, by being able to locate and use otherwise idle equipment, and utilization efficiencies, by better distributing equipment at its facilities. Additionally, the nursing staff has gained approximately 30 minutes per nurse per shift in time saved as a result of not having to hunt down equipment.

Bon Secours estimates that it has gained a \$200,000 benefit per year over and above the cost of the RFID system installation and maintenance costs, not including staff productivity gains. An interesting side benefit for Bon Secours has been the ability to piggyback a WIFI network onto the RFID project because both systems use the same architectures and hardware.

But RFID asset management deployments must include more than just location tracking, says Fran Dirksmeier, CEO of Agility Healthcare Solutions. "RFID-enabled solutions must include the management and automatic measurement of asset utilization to be effective," he said. "With tracking, managing, and automatic utilization measurements, RFID solutions can drive improvements in business process, workflow, and decision support that translate into a sustainable ROI."

Beyond asset management, there are intriguing applications of RFID in the patient sphere. For instance, RFID tags can be used in long-term care to track elderly and disoriented patients and in the maternity ward to track mothers and babies. Surgical patients can be tagged to ensure that the right procedure is being performed on the right person at the right time.

One of the more innovative uses of RFID today involves tracking and monitoring surgical equipment. At St. Vincent's Hospital, Birmingham, AL,

surgical instruments are monitored to determine their location, last sterilization, maintenance record, and the like. St. Vincent's also has deployed RFID to track patient flow through its radiology and cath labs.

Todd Stewart, vice president of AMT Systems, sees opportunities for RFID imbedded in smart labels as a patient safety tool in the operating room. "We're using RFID tags in the OR to establish positive patient identification and prevent the 3 Ws—wrong patient, wrong site, wrong surgeries."

*"The pharmaceutical industry now is testing RFID technologies to track and trace products."*

Other patient care applications of RFID technology that are on the launch pad or are in development include:

- An implantable RFID device the size of a grain of sand that acts as a portable medical record (Verichip).
- A "smart" patient wristband that, when scanned by an RFID reader, reveals a patient's name, date of birth, admitting orders, insurance information, surgical site, allergic reactions, medication requirements, and blood type (Georgetown University Hospital).
- Staff bracelets to locate physicians, nurses, and patients anywhere in the hospital (Beth Israel Hospital, NY).
- Patient wristbands to track and facilitate patient flow through the perioperative process. (Massachusetts General Hospital's Operating Room of the Future).
- An RFID indoor positioning system to locate equipment, devices, and

accessories needed to perform specific surgical procedures. (The University of Pennsylvania).

- A skin-sensing RFID wristband that triggers an alert if an attempt is made to tamper with or remove the wristband (EXI Wireless).

### Obstacles to Adoption

Nevertheless, there are obstacles to deploying RFID in hospitals, including interference with other devices, such as cell phones and telemetry; user acceptance; privacy concerns (the American Civil Liberties Union and consumer groups have taken positions opposing RFID); and disputes over intellectual property rights related to RFID standards.

Radianse, a startup RFID company, estimates that it will cost from \$500 to \$2,000 per bed to install its RFID systems in a hospital.<sup>3</sup> Gartner doesn't expect RFID to take hold until 2010 and recommends that IT managers try RFID in supply chain and ERP deployments as springboards from tactical to more global applications of the technology.<sup>4</sup>

The pharmaceutical industry now is testing RFID technologies to track and trace products. The FDA Anti-Counterfeiting Task Force has strongly suggested the use of RFID as a tactic against pharmaceutical counterfeiting, and according to the META Group, RFID adoption in pharma may surpass retail adoption within the next 18 months.<sup>5</sup> Tracking pharmaceutical products is a vital safeguard measure because estimates suggest that as much as 10 percent of pharmaceuticals distributed worldwide are fraudulent.

In one trial deployment, medicine bottles are being fitted with RFID tags to detect fake drugs moving through the supply chain. Other pharmaceutical deployments include recall management and return management

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(the FDA Office of Compliance reported 1,230 drug recalls between 1997 and 2002, or an average of 3.9 recalls per week), inventory management, product authentication, pedigree management, and sample management.

### Calculating the ROI

The benefits of RFID cannot be fully captured in a traditional ROI analysis—the measurements are too restrictive. Some applications, such as asset tracking, offer more immediate and tangible returns than a workflow improvement application.

When viewed in terms of both hard and soft returns, however, RFID presents a far more attractive economic proposition. RFID can yield increased revenue (fewer equipment purchases and leases, accurate charge capture, and less shrinkage) as well as cost avoidance (better utilization, better equipment maintenance, supply chain, and inventory control). It also can yield soft returns, such as labor savings through improved workflow, patient safety, and employee and patient satisfaction stemming from staff efficiency and streamlined patient care.

Regardless of the application, RFID project planners face tough decisions on system architecture. Many RFID technologies operate on single-purpose networks that include proprietary servers, readers, cabling, and tags. Although costly, these networks operate well outside the frequencies used by other medical or communications telemetry systems typically found in healthcare facilities and aren't subject to the limitations of bandwidth and granularity that are symptomatic of WIFI networks.

Another option is to run the RFID network on standard 802.11 wireless infrastructures that, in many cases, are

already in place as the backbone of facilities' wireless local area networks.

"Proprietary RFID infrastructure adds an additional and unnecessary layer of cost, process, and disruption to facility operations," says Michael McGuinness, CEO of PanGo Networks. "Active RFID can be piggybacked on top of a WIFI network infrastructure based on a standard 802.11 wireless frequency protocol. With the conver-

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gence of voice and data communications via wireless systems, upfront costs of \$250,000 to \$500,000 can be eliminated, implementation periods can be compressed, and resource utilization can be optimized."

But those savings may be illusory, says Agility's Dirksmeier. "For tracking purposes, WIFI networks must deploy far more access points to achieve the resolution necessary to identify the precise location of individual items. Even then, each access point can only handle a small amount of active tags as 'clients.' The tags are expensive, the battery life is limited, and as a security device (for inventory, equipment, and patients), this system architecture simply doesn't work."

### Future Potential

The market for healthcare RFID solutions is ripe with opportunity, not

only in terms of asset tracking and supply chain, but also in patient safety, workflow optimization, and business process applications. Integrated medication management, auto ID, asset management, and inventory control are just a few industry opportunities that are poised for growth.

To the extent that hospitals can receive a "second bounce" from their investment in RFID (for instance, RFID architecture that coincidentally provides the backbone of a WIFI network), these technologies will become increasingly attractive. But like other technologies, the RFID buying decision will rest largely upon the return on investment, the total cost of ownership, interoperability and integration, and ease of adoption considerations.

It's uncertain whether RFID ultimately will surpass bar coding as the primary auto-ID and point-of-care patient safety technology in healthcare. It's more likely that bar coding and RFID will complement each other, based on relative functionality, cost, and ease of use.

"It's a process," says Zebra's Murphy. "The healthcare industry doesn't embrace new and unfamiliar technologies, and we're still years away from widespread RFID adoption. The industry must first get its arms around bar coding as an auto-ID technology and then leverage investments in scanning devices, networking, and wireless infrastructure to introduce RFID applications. As the business and clinical value of bar coding becomes more widely felt in healthcare, RFID will attract greater interest as a complimentary—not replacement—technology."

RFID will continue to make inroads into healthcare via track-and-trace solutions, first as asset and inventory

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management tools, then gravitating toward personnel, patient, and clinical monitoring devices. High-end asset tracking, location tracking, and anti-counterfeiting are the near-term winners for active RFID, but as volume consumption drives down

unit costs, workflow and process efficiency will become main drivers of RFID adoption.

**About the Author**

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