

Moving target

Tracking mobile assets through a sprawling, chaotic environment is a complex problem. Wendy M. Grossman discovers the possibilities in existing Wi-Fi networks

Studies say that the average US hospital has 300 beds and 4,000 pieces of mobile equipment. In a hospital all needs are urgent and staff need to know that all equipment has been correctly maintained and updated; they must be able to distinguish among apparently identical items. Finally, hospitals sprawl. Similar problems are common to military bases and manufacturing facilities.



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Human psychology makes this problem expensive, as staff hoard and hide equipment whose availability is uncertain, forcing extra purchases. Asset-tagging using RFID is an obvious solution. But systems using passive tags that work in simple environments like data centres or building entrances and exits don't fit the chaos of hospitals: imagine having to negotiate RFID readers in every doorway while rushing to a patient's bedside with an IV pump. Especially since some RFID readers and chokepoints may interfere with medical equipment, according to studies published in the *Journal of the American Medical Association*. If you're going to use RFID tags they must be active tags with batteries that extend the range at which they can be read accurately. And you need a pervasive wireless infrastructure.

Unwiring

Manufacturers devising real-time location systems (RTLS) have tried many different types of wireless. GPS doesn't work reliably underground, indoors, or even outdoors within an enterprise campus. Other possibilities, such as infrared, Zigbee, or ultra-wideband, rely expensively on proprietary infrastructure. A UWB base station, for example, can cost \$2,000 to \$5,000; for a three-building campus that could mean \$1 million for infrastructure only. GSM is often banned in critical care areas.

Ekahau, a spin-off from the University of Helsinki's complex systems computation group, was formed in 2000 to exploit discoveries the group had made in using probabilistic maths and statistical modelling algorithms to pinpoint mobile locations in any wireless data network. In 2002, the fledgling company had what seems now an obvious insight: enterprises already have wireless networks. Why not leverage their Wi-Fi? "It is a disruptive innovation," says Antti Korhonen, president and CEO of Ekahau, "because whatever you're trying to use for indoor tracking, we have taken the infrastructure cost away from the equation. If you have Wi-Fi already you only buy software and tags."

The company has gained competitors since, he says, but, "We started with innovation from the university – patented algorithms and pretty hard science. The signals from Wi-Fi base stations are jumping up and down all the time.



The London Clinic

The 76-year-old London Clinic, one of the UK's leading independent hospitals, is housed in a 1930s Harley Street building full of nooks and crannies. Setting up its Wi-Fi network, intended to enable the smooth flow of information around the hospital was accordingly challenging. Solving that problem, however, has enabled the network to become the backbone that supports Internet access and VOIP capabilities, and, most recently, Ekahau's RTLS to track the hospital's high-value medical equipment, particularly items that have a high turnover such as syringe pumps and blood gas monitors. The pilot began in December 2006 with 100 tags.

By making it possible to easily locate equipment when it's urgently needed or due for preventive maintenance the system has improved safety and patient care, while enabling staff to make better use of the equipment. The hospital is expanding the system to include locating patients and coordinating the movement of duty porters. As the hospital adds further premises in the Harley Street area, the system will play a key role in ensuring control over resources and people. Potential future applications also include taking advantage of the two-way communications capability and LCD built into Ekahau T301B personnel badges to equip staff with "panic" alarms and also to implement wireless paging.

It's really difficult to be accurate and if you don't do it right you can get the location on the wrong floor. We would claim that we have the most cost-effective and most accurate solution and that's the reason we're selected by so many worldwide partners like Siemens, and McKesson, the gorilla of US health care."

Installation, he says, requires a site survey that entails walking around the site with a laptop and clicking your location on a map approximately every 10 metres to record a fingerprint composed

of the addresses identifying the base stations detectable in that location and their various signal strengths. Identifying an asset's location means matching it to a fingerprint in the database.

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