

October 2004

Frontline Solutions

Managing Supply Chain Strategies with Technology

Active RFID Will Redefine Wireless Infrastructures

Active RFID tags, mesh networking, and wireless sensors add up to a new wireless infrastructure that eliminates concerns about cost and power consumption and enhances asset management.

BY TOM KEVAN

By layering active RFID tags, mesh networking, and wireless sensors, vendors are redefining supply chain management wireless infrastructures. Together, the technologies deliver greater value and functionality than any one alone could offer. These new infrastructures will change the economics of automatic data collection, enhance visibility at the edge of the supply chain, and redefine asset management.

“We are at a point where you can actually build economical systems using active tags, where they themselves are, in a sense, the readers,” says Robert Poor, chief technology officer of Ember Corp.

Active tags provide information on demand or volunteer information periodically. “The point is they can be part of a network in a way that a passive tag cannot,” says Poor.

Stretching the Limits

Active tags give options and flexibility that passive tags cannot. Active tags have their own internal power supply, which continuously powers the tag’s communications circuitry and lets it convey information without power from a

reader. These tags can transmit their signals over greater ranges than passive tags (100 meters or more) and commonly have 1 million bits of dynamically searchable data storage. With these capabilities, a single reader, or gateway, can communicate with many tags.

Continuous power enables active tags to monitor status and environmental conditions with built-in sensor capabilities. They’re thus well suited for cold-chain management and cargo security applications.

“With inexpensive radio chips and the appropriate software stack



on the radio chips, you can make a sensing device," says Poor. "It could identify a particular product or report the current temperature or the temperature history of a trailer or rail car. It can indicate that the object has been subject to a large amount of shock. Any kind of thing that you wish to sense is easily captured and recorded. An active tag is really a wireless sensor."

"What you add to the tag is not only the ability to identify the item but also to sense environmental conditions," says Rupert Schmidtberg, chief technology officer at Sensitech Inc.

Mesh networking is a natural architecture for active tag and sensor networks because of its flexibility, economy, low-power consumption, and reliability. A mesh network is a local area network in which each node is connected directly to each of the other nodes. This architecture is reliable because of the redundancy of paths by which information can be passed. If one node fails, all the other nodes can still communicate with each other, directly or through one or more intermediate nodes.

Traditional star networks have one access point or network controller. In this configuration, the controller must be able to reach out to all of the constituent nodes. But more importantly, all of the nodes have to be able to reach back to the controller, and that takes power.

Company Information

Ember Corp.
Boston, Mass.
617-951-0200
www.ember.com

Savi Technology
Sunnyvale, Calif.
408-743-8000
www.savi.com

Sensitech Inc.
Beverly, Mass.
978-927-7033
www.sensitech.com

Wireless Data Research
San Mateo, Calif.
650-522-8211
www.wdrg.com

www.frontlinetoday.com

In a mesh network, a node needs to communicate with its nearest neighbor. The neighbor will relay the data to its next neighbor, and so on until the data gets back to the controller or collection point.

"This reduces the cost of deployment because you don't need as many readers, and the cost to deploy reader infrastructure is lower because you don't have to hang cable," says Schmidtberg.

And because of the reduced transmission distance, these radios can be orders of magnitude less powerful and still get the message across reliably.

Proof of Concept

Two companies are already in position to deliver on the promise of the new wireless infrastructures. Sensitech Inc., a provider of cold-chain management systems, has implemented the technologies and architecture in its product line, and Savi Technology, a provider of supply chain security and asset management systems, has moved from the planning stage to a prototype.

Sensitech has developed a product called TempTale RF. This radio frequency-enabled temperature monitor contains a temperature sensor, radio chip, antenna, and networking capability (see "Theft and Terror Threats Push Sensors into Supply Chain" in the September 2004 issue of Frontline Solutions).

"The radio chip falls into the gen-

eral category of what standards group EPCglobal envisions as Class 4 RFID tags," says Schmidtberg. "These tags are more intelligent because they have battery power and a microprocessor, and they use mesh networking."

The paradigm for these higher classes of RFID tags is a bit different from that for the passive tags. Whereas a passive tag has a relatively short read range, these battery-powered tags transmit over much longer distances. This capability lets companies know the condition of their products before they unload the containers. The TempTale RF can record the condition, time, and location of products in near real time.

Sensitech's TempTale RF is currently in pilot test but will be commercially available by the end of the year.

Savi's cargo container security system, called the Sentinel, includes sensors and active RFID tags. The Sentinel's integrated environmental sensor module monitors pressure, temperature, humidity, and shock. The system's active RFID tag captures historical information, such as time stamps and location, as well as sensor data, which can be captured by readers at port facilities (see "High-Tech Container Security" in the July 2004 issue of Frontline Solutions).

The system currently links all of its components with a sensor bus. But Savi is "planning to replace the bus with a mesh network," says Lani Fritts, vice president of business development for Savi Technology. The upgraded product is now in the prototype stage. FS

© Reprinted from FRONTLINE SOLUTIONS, October 2004 AN ADVANSTAR PUBLICATION Printed in U.S.A.

Copyright Notice Copyright by Advanstar Communications Inc. Advanstar Communications Inc. retains all rights to this article. This article may only be viewed or printed (1) for personal use. User may not actively save any text or graphics/photos to local hard drives or duplicate this article in whole or in part, in any medium. Advanstar Communications Inc. home page is located at <http://www.advanstar.com>.



For more information about Sensitech products and services, contact 978.927.7033 or www.sensitech.com