

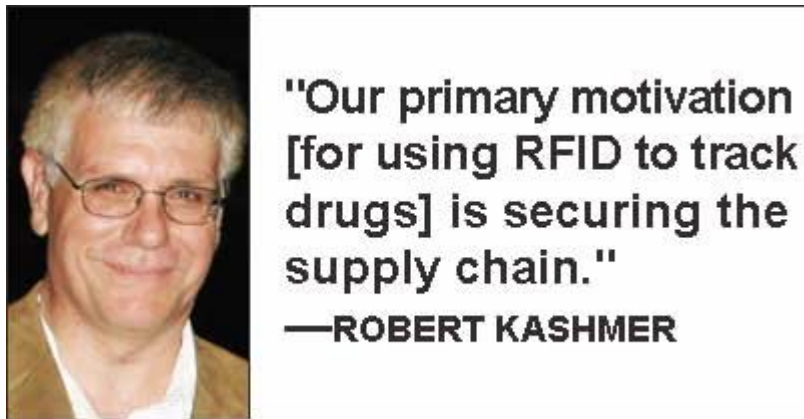
THE Network Effect

EPCglobal standards for sharing RFID data securely over the Internet are now set. Several companies have tested them in real-world pilots, but most companies are just starting to realize their value.

By John Edwards

Worldwide, scores of companies and organizations are committing themselves to pilots that use EPCglobal network and data-sharing standards, kicking the infrastructure's virtual tires and assessing its practicality for use in a variety of real-world situations. "Networks are open and ready for business," says Jeff Barnett, intelligent supply-chain services manager for [VeriSign](#), the Mountain View, Calif., company responsible for much of the networks' connective infrastructure. "They are there for companies to use now."

Under development for nearly a decade, the Internet of Things—which combines RFID technology, the Internet and [EPCglobal](#) standards—allows businesses to track goods through virtually every aspect of the global supply chain. Companies and organizations engaged in EPC pilot projects are pioneers in what promises to become the universal identification standard for a wide range of industries.



"EPCglobal standards are an important component of RFID standards, because they have the potential to be the most widely used form of RFID," says Raghu Das, CEO of [IDTechEx](#), an RFID and smart-packaging consulting firm located in Cambridge, England. "While niche standards have appeared before for applications such as animal tracking, EPCglobal is creating global standards to help ID everything in the world."

The ultimate goal in the adoption of EPCglobal standards is to take RFID beyond the confines of a single organization and create value for the entire supply chain, says Gay Whitney, standards director for EPCglobal, the Brussels-based nonprofit organization leading the commercialization of EPC technology. "The EPCglobal standards development organization," she says, "provides a collaborative platform for focusing resources, cooperative progress and collective decision-making."

Playing a pivotal role in the initial formation of EPCglobal was [GS1](#), headquartered in Brussels. The organization is responsible for the development of the GS1 System, a series of standards designed to improve supply-chain management. EPCglobal is a strategic RFID initiative for GS1, a venture it runs jointly with its U.S. affiliate, GS1 U.S. "We have been engaging RFID for about 10 years," says Henri Barthel, GS1's director of global partnerships and projects.

With the support of GS1 and GS1 U.S., EPCglobal has made significant strides over the past couple of years toward

organizing and codifying the EPC technology specifications. Key EPCglobal standards such as Application Level Events (ALE), Object Name Service (ONS) and EPC Information Service (EPCIS) are already ratified. With these and other standards for underlying hardware and software, vendors are at last able to build systems that allow businesses to share data about EPC-tagged items as they move along the supply chain.

"We now have 11 ratified standards available," says Whitney. "Everything from the tag to the reader to the collecting of data to the exchanging of data—we have that full suite of standards."

Still, even with network standards falling into place and results from full-fledged trials pouring in, the adoption of EPC technology faces challenges that threaten to impede its progress. One potential hindrance is the development of Discovery Services, which will allow companies to find and share data securely (see box on opposite page).

"Although the EPCglobal network has come a long way in the last two years, there are still many issues that have to be tackled before it can become widespread," says Das. "It becomes very complex when you have thousands of retail stores talking to thousands of distribution centers."

An EPCglobal Prescription

Although EPCglobal network and data sharing standards are barely out of the starting gate, [H. D. Smith](#), the fourth largest national wholesale drug company, headquartered in Springfield, Ill., is looking forward to the day when the technology will help it ensure the authenticity and quality of the products it ships. The company, which delivers pharmaceuticals to health-care providers nationwide, is particularly interested in EPCglobal's Drug Pedigree Messaging Standard. The specification, ratified in January, will help pharmaceutical manufacturers, wholesalers and retailers track the "genealogy" of drugs as they travel through the supply chain. Drug shipments can be automatically scanned and validated, and their pedigrees can be made instantly available to all interested parties.

The Drug Pedigree Messaging Standard promises to prevent counterfeit drugs from being introduced into the supply chain, saving lives and sparing trading partners from financially devastating lawsuits. "It allows us to ensure accuracy and trust with our partners," says Robert Kashmer, vice president of information technology for H.D. Smith.



"Standards are essential to ensure pedigree interoperability across the value network of trading partners."

—LUCY DEUS

Besides being a good idea, pedigrees are also becoming a legal requirement. Starting in 2009, California will require electronic pedigree tracking for all drugs sold in the state. Similar measures are on the books in Florida, Nevada and several other states. On the federal level, the [U.S. Food and Drug Administration's](#) pedigree-tracking program, introduced in 1987, has been repeatedly postponed. The agency was set to begin enforcement in December 2006, but was blocked by a court injunction. The program remains in limbo.

The Drug Pedigree Messaging Standard was developed and ratified in just over a year, thanks to the collaboration of industry colleagues and other participants from across the supply chain. That's considered lightning speed for any open industry standard, says Lucy Deus, vice president of product development for [SupplyScape](#), a supply-chain software and services provider located in Woburn, Mass., that contributed its proprietary electronic pedigree intellectual property to the specification. "Standards are essential to ensure pedigree interoperability across the value network of trading partners," says Deus, who served as the specification's editor.

H. D. Smith began its involvement with RFID-based pedigree technology in the days before the Drug Pedigree Messaging Standard was ratified. In 2005, the company launched a pedigree pilot project with [Purdue Pharma](#), a Stamford, Conn., pharmaceutical manufacturer. "It was designed as a proof of concept, with a limited project life," says Kashmer. But as a result of the success of this pilot, the company licensed SupplyScape's software for use as its e-pedigree solution. "Our primary motivation is securing the supply chain," Kashmer says. "At this point, we're looking for more than just a return on investment, although we are also planning to take advantage of the system's efficiencies."

Kashmer expects that the EPCglobal standards will play a significant role in establishing pharmaceutical product pedigrees. Although the company has not yet switched its operations over to the new standard, it is working toward that goal. "We've designed every RFID or pedigree pilot with the assumption that we would eventually proceed to implementation," he says. "We've worked hard to develop a flexible IT architecture that will accommodate the differences in regulations and manufacturers' implementations."

Getting the Goods

The world's leading consumer goods manufacturer, London-based [Unilever](#), is one of EPCglobal's most enthusiastic supporters. The company plans to use the technology to query RFID data provided by its suppliers and retailers. Unilever began an EPCIS trial in 2006, using IBM's implementation of EPCIS—a network infrastructure that allows companies to store data associated with EPCs in secure Web databases—to collect and access information from within its own manufacturing environment, as well as from its suppliers and retailers. "The main goal is to facilitate the transfer of EPC-based information over a common platform that any retailer or vendor could use," says Zach Thom, a customer supply-chain analyst for Unilever's Australia region division.

The company is also using reports and analysis solutions from [T3Ci](#), an RFID software vendor based in Sunnyvale, Calif., for a variety of support tasks, including promotion management, supply-chain visibility and metrics, as well as RFID readability. "Due to the vast amount of information provided by EPC technologies," Thom says, "this platform is based on a pull model to retrieve only the information you need to answer a specific question."



Unilever is still working hard to convince its suppliers that the EPCglobal network is a win-win technology for partners across the supply chain. "It comes down to using the technology proactively with our retail partners to reduce supply-chain complexities," Thom says, "and we are happy with the way our retail partners are using the technology so far." He also hopes that raw material suppliers will be inspired to participate in the EPCglobal network as they see and understand the technology's benefits.

Thom believes that a trial-and-error approach is the best way to test the EPC technology capabilities, and he claims that it doesn't take a huge investment to run a few retail trials and test variables in a controlled manner. "Whether those variables are as simple as different item types and tag placements, or complex decisions such as analytic vendors and back-end solutions," he says, "you have to see what works best for your business and how that relates to your company's overall objectives."

Out to Sea With EPC

One of the largest, and therefore perhaps most important, EPCIS trials took place late last year and earlier this year on the high seas. The test, phase one of a project dubbed the EPCglobal Transport and Logistics RFID Pilot, tracked in real time the location of cargo containers being shipped from Hong Kong to Japan. The real-time information was generated from active, battery-powered Gen 2 UHF tags on sea containers.

One of the communication interfaces between the active tags and the EPCIS server and repository was created through the integration of [Oracle](#) Sensor Edge Server (a component of Oracle Fusion Middleware), Savi Site Manager operating software, and active RFID tag and data collection systems. "The communication of EPC data between trading partners requires close collaboration between a number of technologies," says R. Fraser Jennings, [Savi Technology](#)'s vice president of standards and regulatory activities. "It's taken a while to achieve the necessary balance, but we've finally reached that point."

The next phase of the two-stage trial, scheduled for completion in February 2008, will enable information to be exchanged between potential end users, such as customs administrations for automatic customs clearance. "One of its key characteristics will be the EPCIS communication between multiple trading partners, rather than just two," Whitney says. The trade lane to be used in the next phase—Shanghai to Long Beach, Calif.—will be far longer and more geographically and chronologically challenging than the relatively short hop used during the initial stage.

The next phase's pilot participants will involve several hardware and software companies, including BEA Systems, IBM, Oracle and Savi. A variety of government bodies and global supply-chain providers, such as Maersk Logistics, Schneider National, DHL and NYK Logistics, are also set to participate.

Piloting Down Under

In Australia, businesses are getting serious about using the EPCglobal standards to improve supply-chain productivity and efficiency. The National EPC Network Demonstrator Project (NDP) Extension, which wrapped up in June, had dual objectives: to demonstrate how existing Gen 2 technologies and EPCglobal standards could be used to facilitate electronic proof of delivery (ePOD) and paperless delivery, and how returnable assets—pallets—could be tracked and managed using RFID.

"We wanted to look, at a very high level, at the types of business processes that one could implement with the EPCglobal network," says Kevin Larnach, convergent solutions principal for [Telstra](#), which participated in the project as a service provider.



The NDP Extension pilot proved that EPC adopters are able to benefit from the visibility of assets along the entire supply chain.

The pilot's other objectives included investigating data management and integration requirements when introducing EPC technology, developing commercial pathways for EPC service provision and promoting the interoperability of EPC solutions through the use of global standards. Consortium members included pallet supplier CHEP and some of its customers—ACCO Australia, Capilano Honey, MasterFoods and Procter & Gamble. The project was supported by the Australian government through its Department of Communications' Information Technology and the Arts program. It built on the findings of a previous NDP pilot that tracked the exchange of data between trading partners and the movement of products from manufacturer to retailer.

For the extension pilot, fixed interrogators at CHEP and customer sites read the pallet tags during loading and unloading. The interrogators reported the RFID reads to the Telstra Adaptive Asset Manager Web site, which incorporated EPCIS support. Truck drivers employed by CHEP, as well as the service center staff, were supplied with ruggedized PDAs containing a custom application developed by Retriever Communications. The PDA software communicated with the Telstra Web site and allowed monitoring of every step in the pallet use cycle, from provisioning to delivery and return. Larnach says that the project achieved its goal of a 100 percent read rate.

The project's participants learned that EPC is far from a "plug-and-play technology," says Maria Palazzolo, CEO of GS1 Australia. But they also discovered that adopters are indeed able to benefit from the guaranteed visibility of assets along the entire supply chain, as well as ePOD, paperless delivery and improved inventory management. While the NDP Extension focused on pallets, GS1 Australia believes that EPCglobal standards can also be applied to the RFID-enabled management of other supply-chain assets.

GS1 Australia says it plans to continue to provide support and training to enterprises looking to pilot or implement RFID technologies. The organization also says it will continue to work with the Australian government to help source funding for additional projects.

Moving Forward

With EPCglobal network projects deploying worldwide, the next step will likely be—yet more projects. GS1's Barthel notes that trials conducted under real-world conditions are the only way to judge how the EPC technology will behave in the real world. "The testing and piloting phase," he says, "are critically important to support the massive deployment of the technology that will happen over the next few years."

The organizers of Australia's NDP Extension, for example, could have relied on results from EPC trials conducted in other parts of the world. But the participants believed that it was important for Australian trading partners to work with criteria that accurately reflected local conditions, including business practices, transportation networks and products.

IDTechEx's Das notes that Gen 2 UHF technology, incorporated into most recent pilot projects, promises to solve the low read rates and other tag-to-interrogator problems that dogged early EPC trials. Yet he believes that much work remains to be done on the network side. "While standards have been ratified, it's going to take some time to work them into the back-end infrastructure," he says. "Initially, a lot of companies will be using the EPCglobal network standards in parallel with their existing RFID technology, until they feel confident that they can turn off their old system."

Although real-world deployments are steadily gaining momentum, Unilever's Thom says it will still take some time for EPC to achieve the "critical mass" it needs to become a truly mainstream technology. "It will take a few years to get a broader acceptance of RFID/EPC technology across multiple retailers and many more vendors," he says. "In the meantime, it is our responsibility as an industry to work together to educate consumers about the technology, develop common standards and challenge each other on the correct and most beneficial use of the technology."

Seek and Ye Shall Find

While EPCglobal has many of its network and data-sharing standards in place, additional standards currently under development will aim to help make them even more useful and powerful. The Cambridge Auto-ID Lab, for example, is developing a design and prototype for Discovery Services—a specialized search engine designed expressly for EPCglobal network users.

"Discovery Services will enable an organization to find other providers of information for an object," says Mark

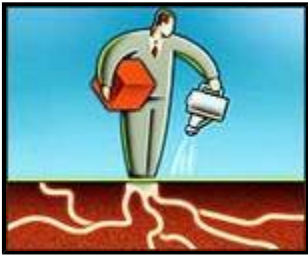
Harrison, director of the Cambridge Auto-ID Lab. "It also has the potential to enable information exchange between organizations that do not yet have an existing business relationship."

The Cambridge Auto-ID Lab has been working on Discovery Services for the past year. "We began with a user survey and interviews with end users and technology vendors," Harrison says. "We then considered various models of how Discovery Services could be architected and have developed a design document for the record format and interfaces for publishing and query."

Discovery Services has lagged behind other key EPCglobal network standards mostly because of its sheer complexity, including the need for an extremely scalable database that might hold up to trillions of records yet can still respond quickly to queries. "A further challenge is the protection of the confidentiality of those records," Harrison says, "so that access control policies set by publishers are enforced and information is shared only with those organizations that are entitled to see it."

Recently, EPCglobal launched a work group for the creation of a Discovery Services standard. "The joint requirements group," says Harrison, "will gather end-user requirements and feed into the development of a technical standard."

Harrison expects that Discovery Services will initially be adopted by food producers, pharmaceutical firms, aircraft parts manufacturers and other businesses for which "traceability and the ability to do rapid product tracking and recalls is particularly important."



| [Back to normal page view](#) | [Send this article to a friend](#) |

Copyright © 2002 - 2007 RFID Journal, Inc. All Rights Reserved