



WHITE PAPER

## CISCO SYSTEMS AND RFID TECHNOLOGY

**As companies transition their business processes to take advantage of the promise of radio frequency identification (RFID) technology, successful deployments will reap the benefits of an intelligent networking infrastructure.**

### BACKGROUND

Offering end-to-end product visibility, RFID technology is poised to revolutionize the supply-chain industry, significantly reducing costs and helping to enable differentiation. With support from such major industry figures as IBM, Wal-Mart, and Procter & Gamble, the momentum is clearly behind this technology. While the pressure is on, however, RFID technology solutions are still maturing. Most deployments are in the pilot phase now, with companies learning about and preparing to use this technology and planning to face the funding issues and business process changes that it will bring.

RFID is a means of identifying a person or an object using radio transmissions. This is accomplished by using two primary components: the transponder—an RFID tag located on the object to be identified, which contains a microchip and miniature antenna; and the reader—also known as a detector or interrogator, which communicates with the tag and passes its information on to a controlling system or middleware host. RFID technology offers the following significant advantages over traditional barcode data collection, although RFID will probably never replace barcodes completely:

- *Provides a per-item identifier*—Barcodes only identify groups of products.
- *Non line-of-sight*—Barcodes have to be properly oriented, often by hand, for laser scanning.
- *Resistant to harsh environments*—Barcode life is limited by how long the printed symbols remain readable.
- *Can be reprogrammed and reused*—New data cannot be written to barcodes.
- *Can be read in groups*—Barcodes must be read individually, whereas an RFID reader can scan multiple items simultaneously.
- *Secures data*—Tag memory can be programmed, optionally permanently locked, and can also be erased to protect privacy.

RFID already has myriad commercial applications, such as preventing automobile theft, collecting drive-through tolls, managing traffic, gaining entrance to buildings, automating parking, dispensing goods, and tracking library books. As RFID technology solutions mature, companies everywhere will also experience unprecedented supply-chain visibility and information exchange.

Currently, EPCglobal, Inc., based on a joint venture between the Uniform Code Council and EAN International, is responsible for developing a single industry standard worldwide to further enable adoption of RFID based on the Electronic Product Code (EPC). The EPC is the favored specification of both Wal-Mart and the U.S. Department of Defense (DoD). This positions EPC as the leader for large supply-chain implementations.

## **RFID IS NETWORK-CENTRIC**

Scenarios suggest that in seven to 10 years widespread item-level tagging will present significant challenges to any technology platform. The density of readers, the volume of data that is created and transmitted, and the potential uses of the information will be staggering. At this point, the role of the network will become much more critical. Networks will need to filter a tremendous amount of non-essential RFID data as close to the source as possible so that it is invisible to applications and will not overwhelm the system. The transition from today's deployments to networks capable of handling this increased load will require a solution that is scalable as the deployment grows.

RFID traffic is not unlike other network applications or data types like voice and video. Pilots or simple deployments can perform well with standard IP networks without complete upgrades. However, network features can be used to optimize RFID deployments. Functionality such as network availability and scalability, simplified network provisioning, network security, and network quality of service are enhancements that advanced deployments will require. Choosing the correct network infrastructure now will help to ensure the investment protection of RFID networks.

As RFID deployments transition from serial to IP and proprietary, closed networks to standards-based open networks, interoperability with equipment made by multiple device manufacturers is required. Customers can minimize their total cost of ownership by choosing networks that provide this interoperability in a converged network that supports voice, video, and data as well as RFID traffic. Interoperability is just the start as RFID networks become increasingly sophisticated. Rather than operating as separate entities, RFID devices should be fully supported by core network services in an integrated, end-to-end system that only an intelligent network can provide.

## **CISCO IN THE RFID MARKET**

Cisco Systems® intends to be among the global leaders in intelligent networking for integrated, standards-based RFID deployments.

Cisco® uses its existing networking expertise to make RFID networks over IP scalable, resilient, manageable, and highly secure for customers. Cisco will provide an infrastructure of routers and switches that have been optimized to run RFID applications through testing, device integration, and standards development. Cisco is not building RFID tag or reader products at this time—instead, Cisco intends to work with RFID technology providers to help enable interoperable, end-to-end solutions.

Cisco is taking a leadership role in the industry by becoming a member of EPCglobal and actively working with this standards body to shape future RFID standards. Mohsen Moazami, vice president of the Internet Business Solutions Group at Cisco Systems, was selected to serve on the Board of Governors for EPCglobal; in addition, Cisco has employees participating in various EPCglobal Hardware and Software Action Groups (HAG, SAG).

Cisco is also currently exploring areas of benefit that could be achieved from an internal deployment of RFID-based technology.

## THE WAY FORWARD

The following predictions clarify the implementation timeframe that Cisco envisions as well as the related effect on infrastructure:

- *Over the next one to three years*—Companies will investigate and invest in network-level capabilities to manage readers and filter RFID data. Persistent, high-speed WAN connections will be necessary to achieve the full value of tagging initiatives, but in the short term, bandwidth will be driven by other business needs such as video and IP telephony.
- *Over the next one to five years*—Companies will investigate and invest in network appliances, network tools, and network operating system improvements that will perform RFID information services in the store or truck. Network technology partners will be required to support RFID devices and middleware functionality in the network.
- *Over the next five to 10 years*—Companies will investigate the impact of item-level tagging on their extended supply chain. They will invest, when and where appropriate, in quality of service, increased bandwidth, storage, content, and wireless capabilities that support RFID functionality in an increasingly consumer-facing role.

Obviously, these guidelines do not apply to all industries or to specific, high-value opportunities. Companies that are able to take advantage of early opportunities to drive value with RFID will be in a good position to influence technologies and create the skill sets—both business and technical—to compete at the highest level.

For all companies, the right solution will integrate RFID technology with robust network services. It will require the formation of new business models and possibly even new alliances. The reward, however, will be unprecedented efficiency and increased profitability, and those who fail to make the transformation in the time allotted may ultimately lose their competitive advantage.



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