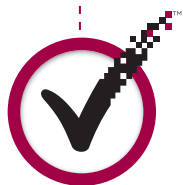




WHITE PAPER

The EPCglobal Network

Maximizing the Business Benefits of RFID





WHITE PAPER



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Where it all comes together.™

Understanding the EPCglobal Network

The EPCglobal Network employs Electronic Product Code (EPC) and Radio Frequency Identification (RFID) technologies to deliver increased efficiency and accuracy through business automation. The network improves tracking, security, and collaboration by providing a standard framework for supply chain event information exchange. Because individual product units can be tracked precisely through the entire supply chain, the EPCglobal Network offers unprecedented opportunities for supply chain event management. The EPCglobal Network manages RFID information in three key phases: Discovery, Storage, and Secure Access. VeriSign, Inc., is a leader in providing services that respond to the needs of each phase.

Discovery—The Object Naming Service (ONS) directs general requests for specific product information within the network. EPC Discovery Services manage partner-specific EPC data, creating the ability to track and trace.

Storage—EPC Information Services control the storage and retrieval of detailed product information on each unit as it travels through the supply chain.

Secure Access—EPC Trust Services authenticate user identities, controlling access, and ensuring sensitive information is delivered only to approved entities.

+ Expanding the Value of Supply Chain Management

From the advent and implementation of the Universal Product Code (UPC), to modern data applications that streamline production and inventory requirements, supply chain management has saved businesses billions of dollars. As businesses have recognized the ability of supply chain management to deliver significant savings, they continue to search for new ways to achieve cost savings through the supply chain. While these current systems continue to evolve in order to provide additional sales value, they do face some limitations that may be better resolved by new technologies.

Today, parallel efforts are underway to develop new technologies that will allow businesses to succeed in an increasingly competitive environment. These dramatic new ideas are being embraced in order to realize new efficiencies in supply chain event management and to extend the capabilities of existing solutions.

Radio Frequency Identification (RFID) tags, in conjunction with Electronic Product Codes (EPC), is one such technology, offering a practical way of generating detailed supply chain event information. While RFID represents a significant shift from previous approaches, it is merely the next logical step in a long tradition of reducing costs through improvements to supply chain management.

Although many companies have begun to invest in RFID systems, many have yet to understand the benefits that arise when RFID technology is paired with the EPCglobal Network. By providing real-time access to information about each event in the manufacture and movement of products, the EPCglobal Network offers the opportunity to significantly improve business efficiencies and savings. This white paper will explore the requirements, challenges, and opportunities associated with RFID technology and the EPCglobal Network.

+ The Current State of Data Management

There are two types of data commonly shared between trading partners for business planning and transaction management. RFID will ultimately create a new category of information to help drive further improvements to the supply chain. In order to understand how RFID and the EPCglobal Network will influence the future of supply chain management, it is important to discuss the two categories of data that are shared today: master data and transaction-based documents.

Master data is the static information that physically defines a product or location. This includes information such as the size and weight of a product. Manufacturers require this information to manage packaging, shipping, and a host of other issues involved in getting products to market. Retailers use the information to determine storage needs and shelving requirements. Additionally, master data can include the address of a required location and its functional role in the supply chain.

To ensure the accuracy of master data, the Global Data Synchronization Network (GDSN) was developed. This system leverages EAN.UCC standards to allow data pools to communicate consistently with one another. By leveraging the GDSN, trading partners can be sure that their master data is accurately propagated throughout the supply chain.

Building on the Business Benefits of RFID

Many companies are already implementing internal, closed-loop RFID systems. Internal implementations can achieve efficiency benefits whether or not they involve outside trading partners. However, the greatest benefits of RFID technology are realized when products are tracked through the entire supply chain. This is where the EPCglobal Network becomes an invaluable part of the new supply chain event management. Businesses get real-time views of all products throughout the supply chain, generating efficiency in inventory control, reduced product loss, and delivery management.

The second category of data exchanged between supply chain systems is transaction-based information. This includes the transfer of necessary business documents including purchase orders, shipping notices, and invoices. Companies have relied heavily on Electronic Data Interchange (EDI) solutions to handle document exchange requirements. EDI was designed to support push-based document exchange and continues to be a highly effective mechanism for supporting relationships with many trading partners.

The next level of data sharing requires a new method of exchange—a method that can be achieved through RFID technology and the EPCglobal Network. These new opportunities for data management will dramatically affect the future of supply chain management.

+ Supply Chain Event Management—A New Era in Working with Trading Partners

The goal of RFID technology and the EPCglobal Network is to create an environment where every object can be “seen” from the time it leaves the factory, through shipping and warehousing, and into the retail environment. This means each and every event in the supply chain can be tracked and recorded. The result is information that will truly enable the vision of supply chain event management.

A few important components of RFID technology allow for significant changes to the way supply chain events can be recorded and traced. For example, RFID tags are scanned using radio waves, eliminating the current need for “line of sight” scanning. How does this improve the ability to track products through the supply chain? Line of sight scanning demands significant human interaction. The time and manpower needed for such solutions quickly reach a cost-prohibitive plateau. With the ability to view products via radio frequency technology, products can be cost effectively tracked through every step of the supply chain and errors are virtually eliminated.

RFID technology also offers significant advances in the ability to associate an individual object or product with detailed product data. Under the current system, a UPC is attached to a product in the form of a bar code. This code is not specific to each individual unit. In other words, one UPC is used for all units of a product produced by a single supplier. EPC allows product data to be tracked down to the level of each individual product. Each RFID tag includes an EPC that is unique to a single unit. Because RFID tags are limited in the amount of information they can store, they only carry the EPC. Specific product data is not stored directly on the tag. However, product manufacturers can easily associate the EPC with corresponding product information held within the company’s databases. Additionally, all trading partners can associate information about the product’s movement through the supply chain with information held in their databases. As all of these databases are connected through an open network, the information becomes instantly available to all authorized parties.

But how will these changes benefit business planning and strategy? In the past, supply chain improvements have focused on fine-tuning procedures through planning. By implementing detailed plans for managing the supply chain and executing against those plans, companies hoped to create greater efficiencies. However, even the best plans frequently fall victim to human error or to unexpected deviations that occur within real-world settings.

An important supply chain contribution of RFID, as previously mentioned, is visibility into the actual events taking place across the extended supply chain. RFID delivers

visibility to product movement at each and every point along the supply chain. With this knowledge, companies can quickly determine when execution fails to follow the plan. Actions can then be taken to resolve these exceptions.

Currently, many companies use bulk point-of-sale (POS) data to measure events at an aggregate level and to assist in business planning. This level of information is not practical as a proactive mechanism for identifying exceptions or deviations from supply chain plans. Additionally, this type of data exchange is frequently slow and laborious, as the reality of transferring data between trading partners becomes apparent. The new visibility produced by sharing information about events via the EPCglobal Network means companies can proactively and more accurately identify problems or concerns in the supply chain and address them faster. Exchanging data over this open network allows everyone to access the information needed and to make decisions accordingly. No longer are important decisions about responding to supply chain exceptions made in the dark or left to trends and outdated information.

This new ability for improved information sharing and decision-making is the result of two fundamental capabilities that RFID brings to advanced supply chain management: “track” and “trace.”

Track allows companies to know where a product is at any given moment within the supply chain. Manufacturers have the ability to know when a product has been delivered to trading partners. Retailers can better manage inventories and reduce the costs of maintaining large quantities of warehoused merchandise. All trading partners can reduce lost revenues from out-of-stocks.

Trace allows companies to see exactly where a product has been throughout the entire supply chain process. Manufacturers get a big-picture view of how their products move through the supply chain, allowing them to determine where costly delays are taking place or where shrinkage may be occurring within the delivery process.

The fundamental information provided by track and trace regarding product location and movement will likely be applied to a wide array of business scenarios. Many leading supply chain companies are beginning their exploration of the possibilities created by this new level of visibility into the supply chain. The result is that businesses are identifying a variety of real-world scenarios that can be addressed by the EPCglobal Network. These include:

- **Proof of receipt:** The ability to track a product’s location enables a receiving company to establish proof of receipt as goods are scanned upon entering the building.
- **Inventory accuracy:** All trading partners can know exactly how much inventory they have at any given moment, streamlining the order process, decreasing safety stock requirements, and reducing the number of times a product is not on the shelf when a customer wants to buy it.
- **Chain of custody:** By identifying which trading partners were in possession of a shipment on its normal path, companies can identify where losses are taking place, guiding important decisions on shipping and partner selection.
- **Product conditions:** Managing expired products and making product recalls become much easier and less costly as the exact products involved can be quickly identified and located. Additionally, physical conditions that impact product integrity, such as temperature, can be tracked and associated with individual products to ensure shipments are enjoying optimal conditions throughout the supply chain process.

The EPCglobal Network: an Essential Component for Supply Chain Event Management

The value of RFID technology is significantly increased with the EPCglobal Network. In order to keep the costs of RFID tags as low as possible, they are designed as a minimal processing chip with an antenna. This limited computing power means most RFID tags store only an individual EPC.

But product data associated with each EPC can be stored on databases across an entire supply chain network. The EPCglobal Network uses a distributed network architecture to handle the large quantities of data and to make that data accessible to all interested parties.

+ Avoiding Information Overload

The impact of implementing RFID across the supply chain for management of data presents some daunting challenges. As RFID achieves the ubiquity currently enjoyed by UPCs, the result will be a networked physical world that will include all traded objects. Such a system will quickly scale to enormous proportions to become one of the largest man-made systems ever, with an expected capacity to handle more than one trillion new unique objects annually.¹ If not managed properly, the vast amount of information generated from such a system has the potential to overwhelm the required computer systems.

Fortunately, not all companies will want or need every piece of information. To help avoid information overload, only the data that are needed will be moved at any given moment. The EPCglobal Network delivers only the necessary information that is requested by a company to enable a specific business process. A requirement for successfully accomplishing this open system of information exchange is a distributed network architecture.

Distributed network architectures not only facilitate the easy exchange of information, they also help avoid the problems of information overload. This type of architecture reduces the information processing demands by sharing the workload over many computing processors instead of requiring a single computer to do all the work. Rather than depositing all the required data into a single, centralized system, the information resides on millions of computers throughout the network.

Under this system, the manufacturer, as well as all trading partners, create and store their own serialized information about each and every product. The manufacturer will manage and host a database that stores information about the generation of the product. While trading partners manage and host similar databases storing information about the product's movement through the supply chain. Each involved partner will make that information available to all authorized parties over the Internet.

Not only does this architecture allow for the management of huge amounts of data, it also delivers other important benefits. Availability of data increases. Consider the current state of the Internet. Large quantities of data are stored on millions of servers around the world and are easily accessed through Web browsers with the assistance of the Domain Name Service (DNS). Similarly, the EPCglobal Network utilizes an Object Naming Service (ONS). The ONS points to an address on the EPCglobal Network where information about the product in question is stored. This allows for instantaneous availability of information.

The ONS also provides another important benefit—the EPCglobal Network is loosely coupled to the systems that provide and utilize event information, allowing for added flexibility and scalability. Consider another Internet analogy. Companies that depend on email correspondence to keep business associates connected do not have to worry about physically alerting important constituents when email servers have been moved or updated. That is because the unique identifier for each individual in the company (i.e., the email address) is not hard coded to the IP address of the email server. When email servers are moved, replaced, or updated, the DNS entry is adjusted and all emails are automatically directed to the right location.

Similarly, the ONS can be adjusted or updated to take into consideration changes in the network. As trading partners move locations, change service providers, or bring new servers online, the revised ONS data will automatically send the appropriate data where it needs to go. As long as an EPC is valid, real-time data exchanges can always be made.

¹Auto-ID Center White Paper, "The Networked Physical World," January 1, 2001.

Standardization and the EPCglobal Network

In order for any universal, global system to succeed, standards are essential. The standards process for the EPCglobal Network is ongoing. As catalysts of this process, collaborative pilot programs help companies develop a clear vision of the long-term value RFID offers businesses.

Businesses should look for low-risk opportunities to implement pilot programs that require low levels of effort. These types of pilots provide important, practical learning as standards continue to emerge.

The distributed network architecture of the EPCglobal Network also provides improved performance. With many machines carrying the workload, traffic bottlenecks are avoided. Data are transferred more efficiently allowing real-time to become a reality.

+ Early Exploration Delivers Practical Learning

Leading retailers and manufacturers throughout the world have already begun implementation of RFID and EPC technologies. These institutions are discovering the benefits that early involvement can provide. Early involvement gives companies an opportunity to identify the most valuable use cases for their business and to ensure technological developments respond to individual needs.

Implementing pilot programs is a conservative approach to understanding the technology and ensuring that final, enterprise-wide deployments deliver the greatest benefit possible.

The true value of the EPCglobal Network requires that internal RFID and EPC technologies are in place and tested. This is the logical starting point in the development of new supply chain event management systems and many companies have already taken this step. Internal efficiencies become almost immediately evident, allowing for the identification and development of business process improvements.

Once internal programs are running successfully, the real value of RFID technology can be realized through inter-enterprise piloting. Extending pilot programs across supply chain networks enables companies to better understand the opportunities for optimizing the extended supply chain.

+ VeriSign Can Help You Get Started

The ROI realized from RFID technologies will be based on a different set of variables for each business. The first to explore the network will be the first to identify and quantify the real business opportunities. That's why VeriSign is a leading participant in the development of the EPCglobal Network—it's our commitment to helping business get the greatest value from the network in the fastest time possible. We can help you develop and implement pilot programs right now. The VeriSign® EPC Starter Service™ provides a piloting environment that ensures data integrity and continuity. This allows for information sharing in multi-partner and multi-site pilots to help you learn firsthand, in a low-risk/low-cost way, about the EPCglobal Network. And VeriSign is a proven, experienced partner you can trust with this important initiative.

If you'd like to know more, we offer a variety of opportunities to better understand the process for deploying pilot programs into your business systems. Several Webinars are available to help you navigate the requirements for taking advantage of the EPCglobal Network and RFID technologies.

For additional information on EPCglobal Network pilot programs contact a VeriSign representative at 1-866-372-7343 or visit www.verisign.com/epc.