The EPCglobal Network™ Demonstration
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1 Introduction

In an increasingly global market, the EPCglobal Network presents unprecedented opportunities for product suppliers to overcome supply-chain challenges that have accompanied the growth of inter-regional and global trade. Manufacturers, suppliers, End Users, shipping companies and solution providers have spent decades inventing ways to understand where products are as they move through the supply chain. The goals have been to maximize availability -- and create a greater selling opportunity -- while maintaining the lowest amount of product in stock.

Billions of dollars have been invested into many supply chain management solutions, and many companies have purchased, developed or licensed supply chain solutions for their own environment. These solutions, however, are fragmented, have poor or moderate return on technology investments, and left a landscape where companies have become wary of new solutions that address optimizing their supply chain. Finally, world leaders in commerce and technology agree that the EPCglobal Network is the foundation for the kind of connectivity that will increase visibility throughout global supply chains and help trace shipments, combat the introduction of counterfeit products and prevent retailer out-of-stocks.

2 Purpose of This Document

This paper seeks to offer insight into two use cases that were demonstrated live at the EPCglobal US Conference in September 2004. The information is designed to serve as a high-level guide for organizations that wish to understand and take advantage of the EPCglobal Network to gain more control of the supply chain and achieve the greatest return on their trading partner relationships.
3 The EPCglobal Network

The EPCglobal Network is a secure means to connect servers containing information related to items identified by EPC numbers. The servers, called EPC Information Services or EPCIS, are linked via a set of network services.

Each participant in the EPCglobal Network will store relevant information related to specific EPC numbers in their own EPCIS servers. In many situations, local databases will provide the information that is required. If not, this operation will trigger entries in electronic registries indicating that a specific EPCIS server has information about a particular EPC number. When a user submits a query to the EPCglobal Network, it will send the query to the registries, which will return the address of the various EPCIS containing the requested information.

The EPC number is strictly an identifier or license plate. It does not carry any information indicating what the tagged item is, where it has been, where it is going, what is its shelf life, etc.

MIDWARE manages read data real-time on your internal network, sorting, filtering, and batching information, passing on only relevant info. It adds the location and event info enabling the EPCIS and internal systems to act on the data.

EPC Information Services (EPCIS) connect your EPC data with information such as business events. Event-based rules trigger 'intelligent networking' and true automation is achieved. The greatest benefit is when EPC Information Services are shared among trading partners.
4 Use Case #1: Product Authentication

The first use case, Product Authentication, demonstrates how an EPCglobal Subscriber can positively establish the identity of an EPC tagged product through the EPCglobal Network. Trading partners collaborate and communicate to ensure that authentic product from a supplier arrives at the correct retailer destination.

4.1 Product Authentication Overview

Venus Blades, women’s razor blades manufactured by The Gillette Company, are typically shipped in mixed pallets to multiple locations via a freight carrier. Shipping in this manner carries the risk of product misplacement or theft, yet it would be too expensive to ship Venus Blades only by the full truckload. In the following use case, Gillette (along with solution providers Sun Microsystems and VeriSign, and trading partner Wal*Mart) demonstrates how a missing or mis-delivered Venus Case can be identified and re-associated with its order.

In the Product Authentication scenario, Venus Blades EPC tagged pallets were read by EPC readers and tracked as it traveled throughout Gillette’s supply chain. The tracking information and the EPC data are stored in Gillette’s business systems together with business content data. When another party – in this case the retailer Wal*Mart – gets possession of the product and the appropriate security requirements are met, the EPC data can be used to obtain additional information about the product.

During the live demonstration, Wal*Mart received a pallet on stage that it could not identify. In order to obtain additional information on the pallet, Wal*Mart needed to query the EPCglobal Network. In this example of the EPCglobal Network, Gillette’s RFID network (which connected RFID readers deployed at its Devons, Mass., and Romeoville, Ill., distribution centers) linked to a reader on stage at Baltimore Convention Center.

The query initially requires that the information from the EPC tag get scanned into a computer system (here called a Discovery Station), which then sends a query to the root ONS service, a component in the EPCglobal Network, using the EPC as a key. Based on the manufacturer code and product code in the tag data, ONS returns the Internet address for the manufacturer’s EPC IS that contains information about the particular product.

Now that Wal*Mart’s has the Internet address, it sends a query requesting additional information needed to find shipping data related to the product. The query uses a secure channel that establishes the identity of the querying system. When Gillette’s information service receives the request, it verifies the identity of the querying system and, according to the access control rules, creates a response. The response (including the unique EPC of the tagged pallet associated with that case, as well as the case’s purchase order number and other shipping details) is returned via the established secure channel and displayed on Wal*Mart’s discovery station’s screen. (See Figure 2 on page 6.)
Figure 2: Gillette’s EPC IS Service returns information to Wal*Mart indicating that a scanned product has been disassociated with its order. It then recommends the appropriate action.
### 4.2 Product Authentication Process Flow

The following diagram shows the process flow for this application explaining what happens at the manufacturer and retailer levels:

**Manufacturer: Gillette**

- As cases and pallets are created and stored, and as orders are assembled, related EPC information is collected.
- The manufacturer determines the identity of the querying party ("Requestor"). If the Requestor is authorized to send the authentication query, it proceeds with the following steps. Otherwise, the query is dropped or handled in accordance with different internal policy as an unauthorized query.
- The manufacturer looks up the corresponding EPC information in internal business systems, and based on the defined business policies, takes one of the following actions:
  - If the EPC number has not been properly recorded in the manufacturer’s EPC repository, the response suggests that the pallet may be counterfeit or stolen.
  - If the requestor is the customer that the pallet is intended for, and the specified location corresponds to a ship-to location recorded in the manufacturer’s business system, the response indicates that certain information regarding the pallet that might be helpful to re-associate the pallet with a specific purchase order. The manufacturer can also return additional case attributes that can be useful for lifecycle management—such as an expiration date—and other business processes.
  - If the location specified in the query does not correspond to a product distribution area linked to the ship-to location in the manufacturer’s business system, the responding system generates a “gray market” condition and takes the action defined by the business process.
  - If the requestor is not the customer that the product is intended for, the query returns information suggesting the appropriate action— to return the product, for example. The response might contain additional useful information, such as name, contact information and account number of the appropriate transportation company.

**Retailer: Wal*Mart**

- An EPC tagged pallet arrives at the retailer.
- The retailer’s EPC reader reads the EPC information on the tag.
- The retailer’s EPCIS query’s the EPCglobal Network ONS service to locate the manufacturer’s EPC IS.
- The EPCglobal ONS service sends the retailer’s EPC IS the manufacturer’s EPC IS.
- Retailer’s EPC IS receives response from manufacturer’s EPC IS.
- Both retailer and manufacturer take appropriate actions defined by business processes, existing contracts, legislation, etc.
5 Use Case #2: New Product Visibility

The second case, New Product Visibility, shows how trading partners can find out exactly how much product is located in a store’s backroom and on the selling floor in a critical product launch scenario. This enables trading partners to collaborate and alert each other as to where product may be needed and accurately determine where to send product for a new product launch.

5.1 New Product Visibility Overview

Today’s supply chain is does not have real-time information or visibility to allow manufacturers and retailers to manage product outages. Product visibility today is handled using Point of Sale (POS) technology that does not offer real-time understanding of which products are on the shelf or in the backroom. Using a new product introduction of Pantene Smooth and Sleek Shampoo and Daily Moisture Renewal Conditioner as the second demonstration case, manufacturer Procter & Gamble (P&G), solution providers TIBCO, IBM, VeriSign, and retailer Wal*Mart show how suppliers and retailers can utilize the EPCglobal Network to gain visibility into the store sales floor and backroom.

In the New Product Visibility scenario, Pantene Smooth and Sleek Shampoo and Daily Moisture Renewal Conditioner EPC tagged pallets were read by EPC readers and tracked as they traveled throughout P&G’s supply chain. The tracking information and the EPC data are stored in P&G’s business systems together with business content data. In addition, the tracking information and EPC data is collected when the product reaches the Wal*Mart stores, as the cases enter the backroom, when the cases are moved to the selling floor, and optionally when the cases go to the compactor. Combined with the knowledge of how many selling units are in each case, the EPC data can be used to obtain item-level inventory on the sales floor and the backroom. This knowledge enables the trading partners to collaborate about product levels and accurately determine where product needs to ship for a new product launch.

During the second live demonstration at the EPCglobal US Conference 2004, P&G wanted to check its new Pantene products stock levels at Wal*Mart locations in north Texas. P&G sent a query to the Object Name Service (ONS), which pointed P&G to an IP address where the data related to its query was stored. (The presentation used real inventory data taken from Wal*Mart’s north Texas distribution center and stores several weeks prior to the demonstration.) Then P&G and Wal*Mart were able to exchange data over the EPCglobal Network through each of their EPC IS to show current stock levels of the new Pantene products were in their stores. If P&G thinks the inventory levels are too low, a feature of the software can e-mail an alert to Wal*Mart advising the retailer of the situation. It can also verify that P&G is ready to send additional shipments of the product.

Both TIBCO and IBM have engineered separate Inventory Management applications for P&G for this live demonstration. These applications can be used to query a retailer’s EPC IS for New Product Visibility through the supply chain. In addition, the applications integrate information in the manufacturer’s applications and retailer and partner EPC IS across the EPCglobal Network. Both applications have a built-in interface to interact with ONS and access registered EPC IS fors. The solutions utilize Web-services-based EPC IS interfaces, digital certificates and encryption for trusted trading partner interactions.
The TIBCO application compares the near real-time accurate inventory at granular levels with the inventory build-up plan in the supply network. The application identifies the gap and raises threshold alert, highlights the gap in a different color, and displays the location on a geographic map with additional details below. (Figure 3) The application lets P&G create an email and collaborate with the retailer to take corrective action and build the inventory according to plan in order to ensure successful product introduction and zero out-of-stock.

Running the query reveals the screen in Figure 3, where a report displays each product and highlights in bold red each location and inventory level where inventory is below the specified target. The report also offers a button enabling P&G to send an email to the Wal*Mart. In this case, P&G would request that Wal*Mart immediately move certain cases of product around to ensure that target levels are met for a particular date at pertinent locations to meet requirements for a promotion.

The IBM application makes use of the EPCglobal Network and the Wal-Mart Stores’ EPC IS to enable P&G to locate product and identify product quantity in the pertinent areas of the supply chain. P&G will only be required to open the Retail Inventory Query Screen within the Manufacturer Supply Chain Inventory Reporting Application, selecting from the appropriate menus and inputting a few parameters. A list of retailers will be shown, and after selecting “Wal*Mart Stores,” the P&G will be offered a series of locations, a list of products and SKUs, and specify “Inventory Targets,” enabling them to
activate a part of the application that will create an alert if there are any locations that do not meet the target quantities.

The application will show P&G the selected GTINs, including their pictures (Figure 4). Upon performing pre-established security checks and running the query, the Application will create a Retailer Inventory Report Screen that answers P&G's query. In this case, the screen displays the inventory levels of Pantene, both the shampoo and conditioning products in the backroom and on the sales floor of specified Wal-Mart stores. Locations with inventory below target levels are highlighted.

Figure 4: The Management of Inventory Targets screen, designed by IBM, shows the selected GTIN and its picture.

Similar business applications can be built by the manufacturer to perform a variety of functions and return a wide range of information in real time. The common thread is that it is easy to build valuable applications that leverage various players' EPC IS available throughout the EPCglobal Network's ONS component. The Network's principal function is to enable a querying application to locate the available s for a specified EPC.
5.2 New Product Visibility Process Flow

The following diagram shows the process flow for this application at the user level, in this case P&G:

Such applications can be tailored by the manufacturer’s solutions provider to perform a variety of functions and return a wide range of information in real-time. The common thread is neither the application nor the various players’ EPC IS – it is the Network. This network includes ONS, EPC IS, the trading partners’ repositories of EPC observations, and the applications that use them. The Network’s principal function is to enable a querying application to locate the appropriate EPC IS and satisfy subsequent queries against it.

Indeed, behind the scenes, the application is making use of the EPCglobal Network to direct it towards whichever resource is required at any given time. The EPCglobal
Network itself is responsible for knowing where to point an application looking for information based on a particular EPC or class of EPCs. Similar to the Internet, the EPCglobal Network is continuously updated, and it will know within 60 seconds when EPC tagged products have arrived and been read at various locations, whether these are manufacturers, retailers or distribution centers.

6 Conclusion

The Product Authentication and New Product Visibility examples are only two use cases out of hundreds that will be accessible utilizing the EPCglobal Network. Once the EPCglobal Network is in use, the applications are virtually limitless. An increasing number of companies, organizations and institutions are adopting EPCglobal standards and tagging their products with EPC tags or requiring their suppliers to do so. Those who make early use of the EPCglobal Network will see increasing opportunities for efficiencies and competitive advantages in tandem with the global consolidation of supply-chain technologies and the growth of the EPCglobal Network. These innovative applications from Wal*Mart, Procter & Gamble, Gillette, IBM, Sun Microsystems, TIBCO and VeriSign offer early return on investment. They can easily be expanded to have wide-ranging impacts on production, backlog, tracking defects and tampering, minimizing recall consequences, managing expiration dates and promotion logistics and more.

Whether you're a manufacturer, a retailer, or another partner within the supply chain – whether your business is small, medium or large – there is no better time to begin taking advantage of the EPCglobal Network. A wide array of private, public, for-profit and not-for-profit companies and institutions have cleared the path towards global standards that will meet universal business objectives. The result of this work and the dedication of companies such as the ones listed in these pages will be extraordinary progress in supply-chain visibility and management, ultimately leading to increased profitability and better customer experiences.