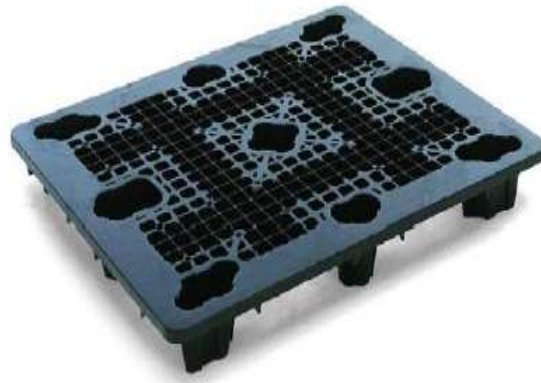# RADIO FREQUENCY IDENTIFICATION (RFID) FOR PALLET TRACKING

Many companies lease pallets and other logistics containers in order to offload the cost of maintaining their own pallet fleet.

THE PROBLEM

Managing the return of these items has often proven challenging for pallet providers. Although many companies currently use cheaper wood pallets, demand for reusable plastic pallets has increased in recent years because of fears about cross-contamination from meat and other food products shipped on wooden pallets (which are often scrapped afterward).

Plastic pallets also last longer and are lighter than their wood counterparts, which can save on freight costs.

Think you have pallet-tracking problems?

CASE STUDY

Svenska Retursystem (SRS) distributes more than one million plastic pallets throughout Sweden. Keeping track of each pallet is a formidable, but essential, task. Deposits are required to cover costs should pallets be damaged or lost, and SRS was constantly running into problems with pallets being returned later than expected, or not at all. The outdated inventory system wasn't adequately keeping track of where pallets were being lost or damaged, resulting in SRS incurring the costs.

A system for tracking the pallets while they were in circulation was desperately needed. Bar code technology was proposed, but determined to be insufficient for the application for two reasons. First, because these pallets are for carrying fresh produce, each pallet re-entering the facility is treated with a variety of cleaning chemicals and high-pressure washing. Bar codes simply could not endure these conditions. Also, the life of any pallet inevitably involves a significant amount of bumping and bruising, and even a small scratch can render a barcode useless.

THE SOLUTION

The radio-frequency identification (RFID) tags applied to opposite sides of the pallet, to provide real-time visibility of pallets in circulation, each pallet was outfitted with a ruggedized tag that would remain with it for its entire lifetime. Instead of mounting these tags to the exterior of the pallet (as is necessary with bar codes due to the line-of-sight requirement), engineers at pallet manufacturer Arca System, Perstorp, Sweden, embedded the tags in the interior structure of the two-piece pallet. Two tags are embedded inside opposite corners of the pallets to ensure that regardless of orientation on the conveyer, one tag will be picked up. Once installed, the tags can be written to with information and read by the antenna. When the pallets complete a cycle, the tags are cleared and rewritten. Two plate antennas at the entrance to the pallet-cleaning machine read the tags. Pallet history is downloaded for each pallet, and if damage is evident, the proper customer is charged. Likewise, the pallets whose origin is unknown can be identified by reading the tags.

PALLETS ON THE ROAD

In this application, pallets leave SRS and arrive at the warehousing hub of a major supermarket. Supermarket operators use a portable handheld scanner to read and write time and date stamp, as well as handling instructions, to the tag. The pallets are then loaded with perishable goods, and the tags are written to with information such as product expiration date and storage instructions. The full pallets are then delivered to the neighborhood grocery store, where grocery workers scan them as they arrive to ensure freshness and quality. Empty pallets are loaded into the trucks and returned to SRS where they are again read. After relevant charges are processed, pallet information is then cleared, and the tag is written to with date/time information for its next voyage out into the world. Results of the RFID system are impressive. Each pallet has a self-contained recordkeeping system, eliminating the paperwork that is common with pallet shipments. The combination of resilient RFID tags and reusable pallets is a cost-effective solution: wooden pallets and bar-code labels are both consumables, while plastic pallets and RFID tags are recycled and reused. By accessing the shipment history of each incoming pallet, SRS is able to recoup for lost and damaged pallets by having record of who was responsible for the product at any given time. Customers pay for the length of time they have the pallets as well, so usage costs can be immediately determined and charged.

RFID FOR OTHER PALLET PROVIDERS

Intelligent Global Pooling Systems (iGPS) has incorporated EPCglobal's electronic product code (EPC) into its RFID tracking system, enabling its pallets to be identified worldwide.

The royalty-free standards are the foundations in the continuing construction of a global supply chain information network that combines RFID technology, existing communications network infrastructure and EPC, a number for uniquely identifying an item.

EPC allows companies and regulators to share information, regardless of RFID technology used, thus speeding up the supply chain and reducing errors. With multiple imbedded RFID tags and visible barcodes in each unit, the pallets are 100 percent readable, even when stored near concrete or carrying liquids, which can disrupt some RFID readers, claims iGPS. The GRAI codes provide unique identification for each re-usable plastic pallet when read by RFID readers, allowing transparent, real-time tracking of every pallet through the supply chain, claims the manufacturer.

HOW IT WORKS

iGPS' manufacturing partners embed RFID tags in the plastic pallets at the point of manufacture. The serial number encoded on the tags is then uploaded into the database before the pallets are shipped to iGPS facilities.

The RFID tags in the pallets are based on the Electronic Product Code (EPC) Global Reusable Asset Identifier (GRAI) standard, which provides a unique identification for each pallet. There are four tags in each pallet to ensure readability. iGPS scans the tags at receipt using an RFID reader portal, hand-held reader, or forklift-mounted readers from Alien Technology and Motorola.

Once a customer orders a shipment of pallets, they are scanned again on the outbound side before being handed over to a third-party logistics carrier for transportation to the customer. After customers receive the pallets and load them with merchandise, the pallet tags are scanned before being shipped to retailer locations. For customers who can't read the RFID tags, a non-removable bar code label (which also includes human readable information) is placed on the outside of the pallet.

Topgy Systems & FALKEN Secure Networks implementation to meet these types of multi-location operational requirements positions Network Edge servers from Omnitrol Networks running the Middleware and Application at the various customer depots and customer locations are used to collect data on the pallets. As the pallet labels and RFID tags are scanned, the Omnitrol edge servers push that information up to the central Omnitrol system so that real-time data on the location of its pallets is immediately available.

In this way, multiple locations are federated and provide one single real-time view of the entire operation. After the volumes of data from readers are treated according to a customer definable business rules engine, the Omnitrol edge servers send data to the central Omnitrol server for consolidation, and that's passed to the back-end ERP system. Typically, the system would also transmit information to the edge servers at the customer depots to provide the schedule of orders and shipments that are about to come in at that location. Customer-configurable rules can be set up such that the system automatically sends an alert if a pallet has gone missing.

Using the tracking data, a company can triangulate where the pallet left the system. This provides enhanced asset control for both pallet companies and its customers. Billing is also improved, since a more accurate record of pallet use and loss is provided for each customer. As more retailers require RFID pallet tagging, customers of the pallet rental companies may also be able to utilize the existing RFID tags to meet those requirements. The next step would be using that linkage between the serial number on the pallet and the data about the specific shipment to meet retailer requirements for pallet tagging.

CASE HISTORY

Earlier this year, Wal-Mart announced that it would begin charging a fee for each pallet not tagged coming into its Texas distribution center for shipment to Sam's Club stores. In October, the company will require pallet-level tagging for four other distribution centers, and an additional 17 DCs will be brought online in 2009. The European Pallet Association is also successfully using EPC Gen 2 passive RFID tags to track 1,000 pallets in Switzerland, and plans to expand the pilot to additional countries in 2009.

OUR RFID APPLICATION SOFTWARE – *RFID-SImplicity™*

Despite all progress made during recent year in RFID technology and cost reduction, RFID implementation projects remain complex, tedious and involve a significant risk level. The main reason for RFID projects failures and complexity does not lay on the hardware side, but rather on the software side; Actually, 80% of a typical RFID project overall cost is being spent over development and deployment of specific software. These custom-made solutions are also hard to maintain over the years from the economic point of view as the entire maintenance cost are borne by each single customer; consequently they tend to become rapidly obsolete. Hardware Vendor software packages are always limited to their own hardware, while the success of any RFID projects starts by the freedom to select for each project the most suited hardware.

Our Software, **RFID-SImplicity™** closes this major gap. Being an end-to-end software package and at the same time open to any RFID hardware, **RFID-SImplicity™** reduces significantly the total cost of RFID project implementations, without compromising on RFID hardware selection.

RFID-SImplicity™ offers a wide range of dedicated Application Packages for various vertical markets in order to customize the application to the specific project requirements, each **RFID-SImplicity™** Application Package, includes a powerful parameterization tool, enabling the implementation of RFID projects in a very short time (days to weeks), while completely eliminating the risk inherent with specific development and System Integration projects.

The **RFID-SImplicity™** Core provides services such as **communicating with the RFID hardware, database management, 3rd party integration, user permission** and more. It is shared by all Vizbee Applications, and warrants for a robust performing infrastructure. The core is highly scalable. It allows gradual implementation from a small partial project and up to large multi-site installations, thereby avoiding the risk implicitly involved in big-bang operations. The **RFID-SImplicity™** Core is an open system with exhaustive APIs to facilitate its integration within other systems in the organization like **ERPs, Access control, RFID-enabled**

Personnel ID Badges, Video surveillance, etc. Sharing the robust Core, dedicated Application Packages were developed, to serve the needs of different vertical markets.

HEALTHCARE-ASSET & PATIENT TRACKING	MUSEUMS & GALLERIES	ASSET TRA
DOCUMENT TRACKING	POLICE PROPERTY & EVIDENCE TRACKING	CONSTRUC LAY-DOWN
GUARD TOUR	PRISONS	CONTAINER TE
COLD CHAIN-SECURITY, LOCATION and TEMPERATURE TRACKING	MANUFACTURING WORK-IN-PROCESS (WIP)	VEHICLE TRA
WIRELESS SENSOR NETWORKS	PARKING	IT and MOBILE TRACKIN
WASTE MANAGEMENT	RETURNABLE CONTAINERS & PALLETS	STUDENT &SCH TRACKIN
CORE AND WIZARD-ENABLED BUSINESS RULES ENGINE	RFID-SImplicity™	
HARDWARE	API	RELAYS

Priority to the Graphical User Interface Domains

RFID-SImplicity™ recognizes the primordial importance of Functional and Graphical User Interface simplicity and user friendliness for the success of projects. Benchmarks and test groups are run on each interface design to validate that it is intuitive enough, so that a non-educated operator can use the system after less than 30 minutes of training.

Select the best suited RFID hardware for each project

The selection of the best suited RFID technology is critical to the project ultimate success of any RFID project. Issues like the technology, radio frequency, radio system infrastructure, the lifetime, the physical size of the tags, maintenance requirements etc., must be carefully taken into consideration in selecting the hardware that will be used for each project.

With the **RFID-SImplicity™** platform, the system integrator can freely select for each project the RFID hardware or even combine different hardware in the same project in order to optimize, both technically and economically, the performance of the system.

Business Rules Engine

All **RFID-SImplicity™** Applications include an advanced and intuitive Wizard-assisted Business Rules Engine enabling the seamless programming of business/security rules for every tracked item, whether it is an asset or a person. Complex rules can be programmed easily assisted by the **RFID-SImplicity™** Rules Wizard. Each rule includes the definition of the system reaction to its violation, including: *Display of the*

Examples of RFID-SImplicity™ Graphical User Interface in different domains

MUSEUMS AND GALLERIES APPLICATION INTERFACE

LOGISTICS-REAL-TIME QUAY MGMT.

TEMPERATURE MONITORING DURING TRANSPORT

AUTOMATICALLY VERIFY MATCH OF BABY AND MOTHER

alert on the map, Audio alarm, SMS, emails, opening or closing contacts, focusing a PTZ Camera on the Alert location and commencing recording, or sending commands to third party systems. Multiple condition actions and alerts can easily be added and modified as required.

The system works on standard PCs. Each processor can handle up to 200 RFID events / sec).The numbers of processors and servers are not limited. Web Operator Clients are available. For each dedicated application, specific functions are supported on PDAs.

RFID-SImplicity™ can be used either as the front end and even display information received from other systems. Alternatively, **RFID-SImplicity™** can be used as a service to other systems for real-time location, rule engine, settings etc, while using the other system's user interface.
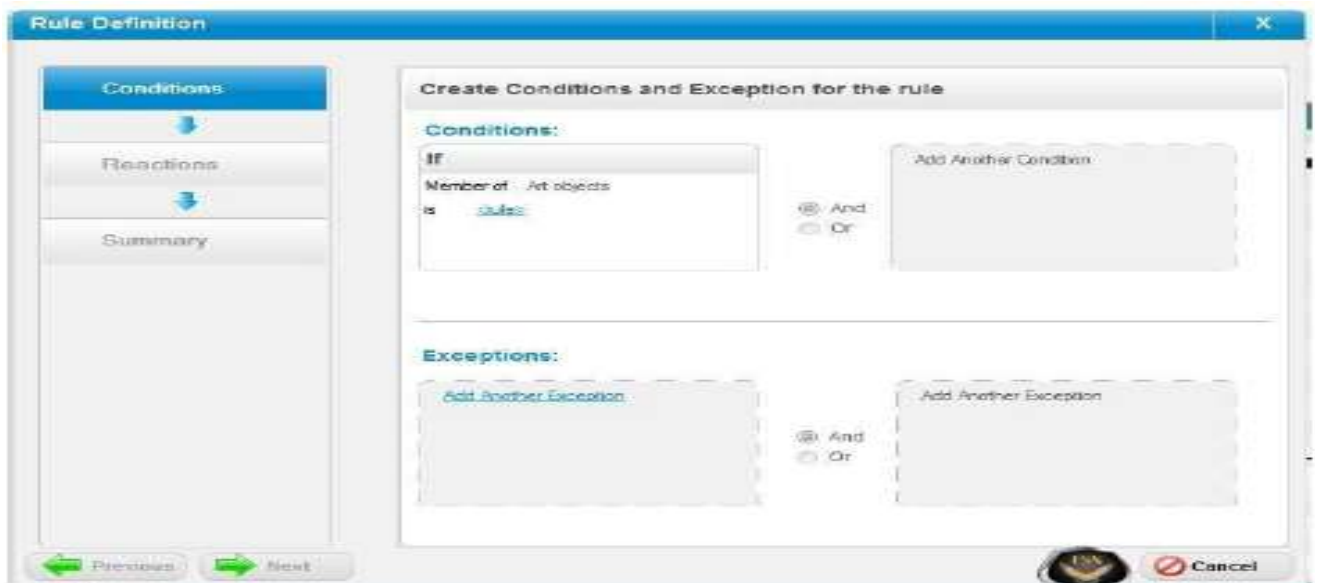
The RFID-SImplicity™ parameter-driven platform enables quick and easy implementation of RFID projects –for any sized application.

The FSN generic platform is a comprehensive, fully integrated solution to drive cost out of RFID system acquisition while offering flexibility and ease-of-use. It enables a total solution include all RFID software and hardware, such as Tags, Sensors, Fixed and Handheld readers, Antennas, GPS and GPRS communications as well as world class Enterprise 802.11n WLAN as required. It can monitor in real-time thousands of tags (people or assets) their presence, location, as well as other parameters, such as movement, tampering, verticality n(tilt), temperature, humidity and more.

- Single, unified interface for multiple applications
- Supports all RFID technologies in a unified, single system
- Parameter-driven customization, no coding required
- Evolves with system needs, Powered by Vizbee™
- Open, flexible architecture and APIs for multi-system integration
- Easy to use SDK allows System Integrator or client modifications and is .NET compatible. Full mobility integration with GPS/GPRS/GSM and 802.11n WIFI. Seamless integration with video, alert and access control systems

Single, unified platform for maximum visibility and low cost of ownership

The **RFID-SImplicity™** generic RFID platform was designed with the user in mind. The intuitive multi-lingual human Interface is map-driven and the software and user interface delivers an intuitive, comprehensive visual overview of system status. Most actions are performed from the main screen with one button click. The system includes Administrator, Operator and Service Web access for customer provided workstations.

Single site small **RFID-SImplicity™** projects can grow gradually into multi-site and multi applications projects with hundreds of receivers and tens of thousands of tags, just by adding tags, receivers, and software licenses at each stage.. New releases of **RFID-SImplicity™** Core and Application Packages are released every year. These upgrades include new functionalities, new hardware options and warrant that the system remains state of the art over the years. Upgrades are provided automatically to all customers on the current Maintenance and Support subscription.
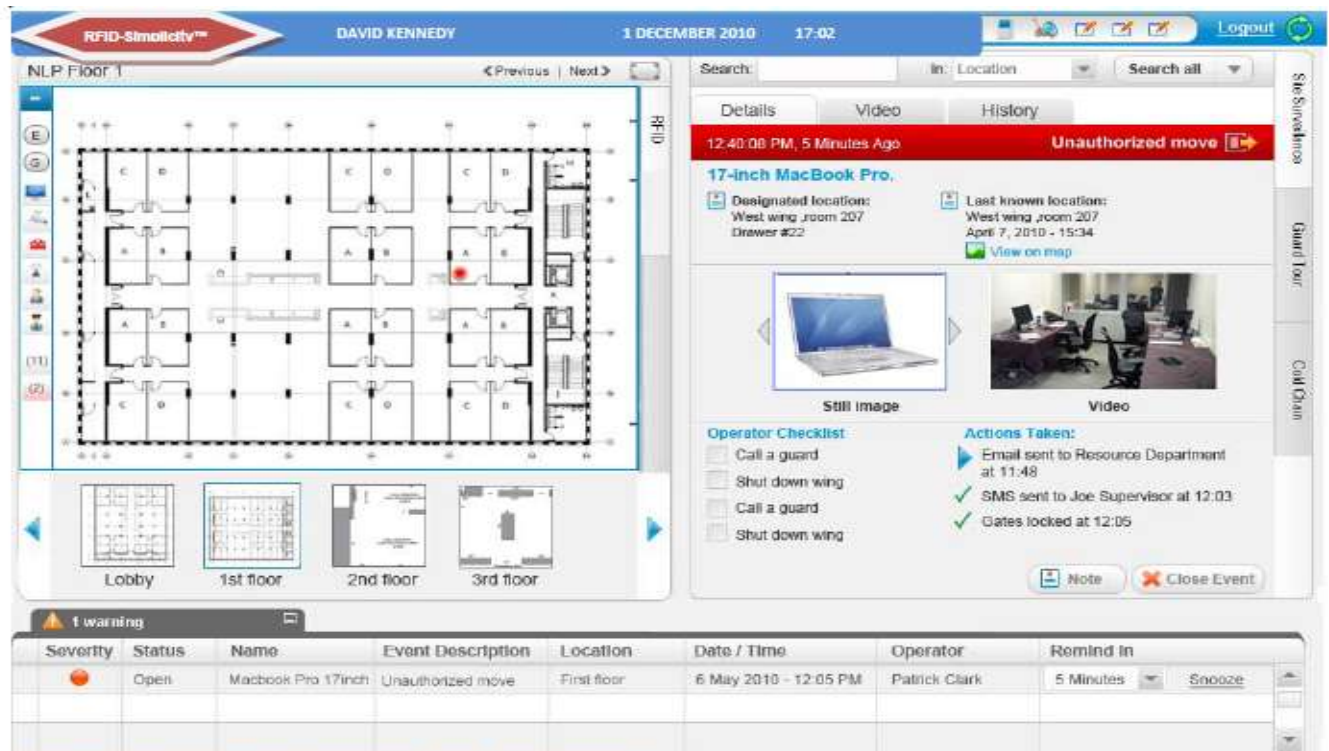
A SCREEN SHOT OF THE IT ASSET TRACKING APPLICATION

TOPGY SYSTEMS & FALKEN Secure Networks (FSN) — Your partner for RFID automation

If you choose to pursue RFID implementation in your organization, here is our commitment to you:

- We will provide solution architects to work with you to define system requirements for your particular installation. Multiple locations can be networked together for a central and real-time view and centralized management.
- We will do a RFID site survey to validate radio frequencies, tag types, system design and performance.
- We will provide all necessary hardware and software to make the system work for you.
- We will integrate the system with your existing enterprise management software.
- We will provide documentation for the system, including operating procedures.
- We will train your people.
- We will provide warranty and continued system support.

For RFID-enabled Document Tracking and Management, Topgy Systems & FALKEN Secure Networks (FSN) bring together the right technologies to give you control over your files and make your office run more efficiently. Our automated and secure processes save time and labor, and prevent problems before they occur. With us, you will get the latest, non-proprietary secure RFID technology with the most powerful and flexible RFID file tracking software available