

## **RADIO FREQUENCY IDENTIFICATION (RFID) FOR ICT ASSET TRACKING**

### **BANKING ON RFID**

Secure and efficient operation of data center is critical for companies and institutions. With data integrity, legal and industry compliance requirements becoming more critical, the ability to document critical Server and SAN components is becoming more important than ever.

Security and effective Data Center Management starts from visibility of ICT Assets by real-time tracking and monitoring of servers, SAN tapes and disks, and critical ICT components. Tracking thousands of assets in a typical banking data center, and ensuring that laptop computers leaving a building are authorized to do so—and are with the properly authorized users—is a cumbersome task for bank security officers. But many financial services and organisations are employing *Radio Frequency Identification* to solve that inefficiency and mitigate that risk in both cases.

### **HOW OUR SOLUTION WORKS**

#### **SOLUTION 1: FOR TRACKING LAPTOP COMPUTERS AND ELECTRONIC ASSETS:-**

We intend to deploy RFID asset-tracking systems for laptop computers where each laptop computer has attached to it, an ultrahigh-frequency (UHF) passive Gen 2 RFID tag with a unique ID number. That number is linked in your organisation's back-end system to the computer's serial number, make and model, as well as the name and a photo of the individual authorized to use it. So as an employee with a laptop approaches the building's exit, an RFID interrogator captures its ID number, and a computer screen next to the guard displays the machine's data, along with the user's name and picture, which the officer then compares to the person passing before him or her. This system saves both guards and employees vast amount of time previously spent looking up laptop serial numbers individually and is much less invasive.

We also intend to deploy asset and inventory-management system, to track electronic assets within buildings. What's more, RFID portals and read stations are now being installed at sites where assets are typically moved, in order to capture that movement whenever an asset leaves one location for another, such as from the "raised floor" area where the equipment is operated, to a storage area or toward an exit.

RFID tags are placed on such items as servers, chassis, blades, storage devices and other data center equipment. Each unique ID number is linked to data regarding that asset in your organisation's back-end system. RFID portals are being installed throughout the buildings at locations where equipment could be moved, for example, between storage areas. If, for instance, a piece of machinery is decommissioned, it will leave the raised floor and pass through a portal that transmits the ID number to the back-end system, along with location, time and date. In that way, the company's ERP system can update each item's status (such as decommissioned) and location. This helps to save significant man hours that employees previously spent walking around the buildings conducting manual inventories or searching for data about specific items.

#### **SOLUTION 2: RFID HELPING OTHER DATA CENTRES:-**

Bank of America has similarly announced a RFID implementation to drive value and mitigate risk for IT Asset Tracking. Bank of America has deployed the technology at 14 of its 38 Data centers to date. The RFID tags are

built into a form factor customized for use on ICT assets—it provides a buffer that prevents the assets' metal frames from interfering with RF signals. He also confirms that the hardware is EPC Gen 2-compliant.

The mobile interrogators are mounted on carts that employees wheel up and down rows of server racks and other assets within the data centers, in order to read the tags attached to assets.

And portal readers, mounted around the doorways leading into and out of the facilities, collect the IDs of tags attached to servers and other tagged assets as they are removed from and returned to a data center, so that all assets can be accounted for.



The movement of individual server blade and SAN components on any rack is immediately known and documented for compliance and security officer in the control room of each data center. The real-time location of each server blade and more importantly, the history of each server blade, SAN and other critical component positions will be recorded and kept as part of the system history and "pedigree" as part of the system data security and compliance.

## **CASE STUDY**

Internally, Bank of America identified three main business areas where it will benefit from automating the tracking of its ICT assets: operational efficiency, risk mitigation and regulatory compliance. Within the Data Centers that have deployed the RFID system, employees are already enjoying significant time savings when conducting periodic inventory. To inventory a row of servers at a data center, workers previously used handheld bar-code readers to scan each server's bar-coded label. Now, using a mobile reader mounted on a cart, they can walk down a row and collect the inventory in just 10 seconds.

In terms of risk mitigation, knowing the location of servers and other hardware holding customer data is a business imperative. Being able to more quickly identify the assets using RFID, relative to bar-code scanning, offers a clear benefit, though one that is difficult to quantify. Bank of America is also beginning to utilize the readers in the data centers to identify the magnetic data-storage tapes that are moved into and out of those

facilities on a regular basis. The system may be upgraded to trigger an alarm when a portal reader detects a magnetic tape being removed from a data center before it is properly cleared for removal.

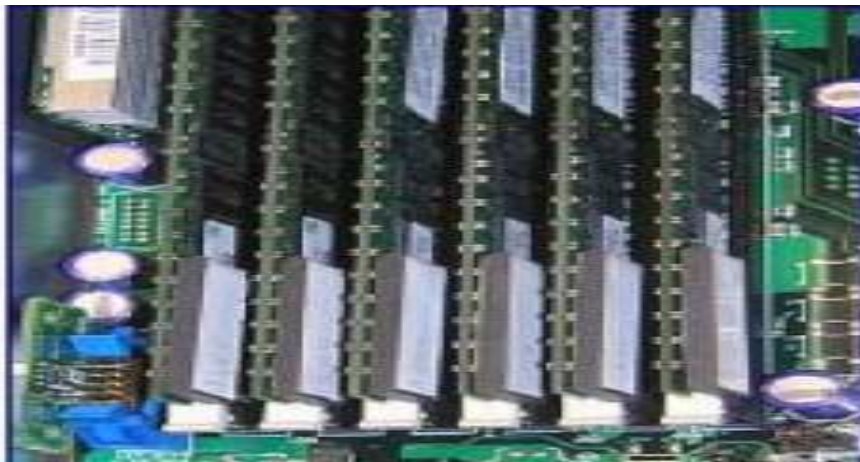
Thirdly, having up-to-date, accurate inventory data simplifies the process of complying with Sarbanes- Oxley and other regulations designed to account for corporate assets. But the RFID system also offers the bank a better method for tracking the shipping and receiving of the ICT assets it purchases. This higher level of visibility will lead to faster payment and order discrepancy resolution with vendors. In addition to attaching an RFID tag to each ICT asset vendors ship to Bank of America data centers, the vendors' advance shipment notices will also include the unique identifier encoded to each tag. When receiving the shipments, the bank will then reconcile the tag data with those numbers listed on the notice.

This can trigger the employee receiving the goods to clear the invoice—if the shipment is correct. The bank's accounting system can thus be prompted to issue payment for the assets, while the equipment is transferred to a staging area, where it is readied to be put into operation. RFID readers installed at the receiving dock, and in the staging area, will also expand the asset visibility throughout the data center.

### **SOLUTION 3: RAM INVENTORY:-**

RAM is a component of servers that is frequently replaced and upgraded. Being able to instantly track these changes would be major benefit to many ICT managers.

The crowded RAM only allows placement of the tags in a non-optimal orientation. The RAM itself is composed of silicon and plastic. One RAM card type includes a metallic heat sink, which provides a favorable backing for tags tuned specifically for metal. The other RAM card type does not include a heat sink, which is suboptimal for tags designed for placement on metal. Figure 18 shows that the Omni-ID Prox tag was unable to function when placed upon RAM without a heatsink. In contrast, the Steelwave Micro was able to perform adequately on bare RAM because it does not depend on a metallic substrate.



*RAM tagging with RFID*

### **SOLUTION 4: OFFICE CUBICLE INVENTORY :-**

Another major element of ICT asset tracking is the cubical inventory use case. Cubicles contain a broad range of assets such as laptops and lab equipment. These assets vary widely in available surface area for tag placement, type of surface material and location in the cubical.

A manual inventory requires direct line of sight between the user and a tracking label or barcode, necessitating an invasive approach to asset tracking. RFID tags, however, can be read easily through the clutter of a typical cubical workspace, without disturbing the cubical.



*Office Cubical Inventory with RFID Handheld*

A handheld RFID reader can quickly and effectively inventory an office cubicle full of various ICT assets. When standing six feet away, few tags were consistently read by the handheld, but when standing two feet away, almost every tag was consistently read. Users completing inventory of distributed assets within a cubicle need to make sure they are within a reasonable read range (about two feet), but they do not have to gyrate the handheld, get within inches of a tag, bend down, or shift objects in order to capture the requisite asset data, which manual and barcode data capture methods require. The physical act of using a handheld reader to complete a cubicle inventory is almost five times faster than a manual checklist and in some cases able to sweep through an entire cubicle in as little as five seconds.

### **Control Point Inventory**

RFID technology to accurately report the items passing through a control point doorway. These tests are important for a variety of reasons, the most obvious being security – with antenna systems mounted at each entry and exit, or integrated RFID Doorway Portals, a manager can instantly know what has come in or out of the building or room. A control point also automates business processes, identifying if an item has been added or removed from a storage room to initiate ordering. The RFID Portal effectively inventories, with 100% accuracy, a stack of Servers passing through a doorway on a cart.



### **RECOMMENDED TAGS FOR IT ASSET TRACKING**

*One size does NOT fit all. The implication for ICT asset managers is that they will need to consider a portfolio of tags optimized to the type of asset*

Two classes of RFID tags are necessary to meet the two different application use cases of RFID tagging in the data center: ***Inventory Management & Supply Chain Management.***

• ***Inventory Management*** is the application of completing a cycle count of the ICT hardware that exists in a data center. It also may include the tracking of equipment in and out of a given data center room, as long as the



room's doors/portals are set up with consideration given to the tag specifications as defined in this document. Inventory Management requirements shall be defined by Individual ICT Asset tag requirements.

- **Supply Chain Management** is the application of tracking ICT hardware that ships either from a OEM Manufacturer to a data center or ICT hardware that ships from one customer site to another (i.e. transfer of assets). Supply Chain Management tags shall be defined by Pallet or Shipping Container Tag requirements.

Tag size and orientation are both fundamentally important to ICT asset tracking, as many assets including blade and rack mount servers, laptops, etc. have limited space to apply an RFID tag. Before selecting a tag, users need to consider how tags will normally be placed on assets and decide how orientation sensitivity may require additional handheld movement to capture data. Unfortunately, smaller tags are ideal for blade servers, but these tags tend to be more orientation sensitive. Larger tags tend to offer more orientation range, so it is less crucial how these tags are placed on assets such as desktop PC's and printers.

Choosing tags that are able to be used on a variety of surfaces gives the user more freedom in designing RFID based ICT asset tracking solutions. A majority of ICT assets are metallic; however, many have plastic cases and face plates. The tags that were tuned to work specifically on metallic surfaces occasionally fail when applied to a surface other than metal. Metal mount tags use one of the following design methods to achieve on metal performance:

**Metallic backplane** – Some metal mount tags consist of antenna technology tuned to operate against a metallic backplane within the tag encapsulation. This method prevents the tag from being detuned by the material it is mounted on.

**Tuned for metal** – Other metal mount tags have an antenna tuned to operate in close proximity to metal. When this tag type is applied to a non-metallic material, the tag antenna is detuned improperly, resulting in poor performance.

### **Blade Server Inventory**

**Purpose** An important aspect of rack inventory systems is the blade server inventory. Blade servers are designed to save space in racks by being stored vertically in custom mounts and being spaced close together. This method leaves little room on the server to accommodate a tag without obstructing air vents, status lights or power switches. Tag placement is therefore determined not by the ideal positioning of the tag, but instead by space constraints of the server. This typically results in smaller form factor tags being oriented and affixed vertically. The trade-off is that smaller tags tend to be more orientation sensitive and as an example may require handheld or mobile readers on a cart to be also turned 900 to align to achieve read performance. For example, the Omni-ID Prox tag is readable over two feet away by a handheld, but only when optimally placed on the face of the server with a handheld perpendicular to the floor. No reads were captured if the handheld was parallel to the floor. Only the larger Omni-ID Flex tag would produce reads from a foot away when the handheld was both perpendicular and parallel to the floor.



*RFID Vertically Tagged Blade Servers*

The **Omni-ID Prox tag** is small enough to fit on assets with low surface area availability. With their low profile and small footprint, Prox tags are ideally suited for tracking and inventory control of small assets, such as: Servers Routers Switches Disk drives Small tools and manufacturing equipment

The **OMNI ID Flex** provides high-performance RFID tag identification in metallic or non-metallic environments with a low profile and a read range of over 16 feet.



### **Compact Form Factor for Easy RFID Asset Tagging**

This tag's compact form factor is convenient for application to assets with limited surface area such as laptop computers, shelf-edge retail warehouse racks or other equipment requiring low-profile RFID tags.



### **RFID Tag Applications-Flex**

With their mid-range read distance and intermediate size, Flex tags provide the flexibility of a longer read range while maintaining a smaller tag footprint. Flex tags are ideal for: Laptops Pallets, carts and tools Construction helmets manufacturing equipment Returnable Transport Items

### Features

- Ultimate reliability and accuracy on any material in any environment
- Optimized to perform equally well both on, off, and near metal
- Best-in-class RFID read performance-to-size ratio
- Supplied with a printed label finish or rigid case
- 240 bit EPCglobal Class-1 Gen2-compliant Silicon
- Ideal for ICT inventory management or location monitoring of high-value metal or liquid assets

### RFID Reader Options

**Mobile Handheld** - equipped with WIFI used for ad hoc tag verification and inventory.



**Fixed Reader or Doorway RFID Portals** – used at control points such as entrances, exits and doorways.



**Mobile Cart with Reader/Antenna**-This cart is specially designed for moving in the narrow aisles of a datacenter with a Reader at the optimum height for reading the tags on server racks and blade servers. Employees can simply roll a mobile RFID cart through the rooms. With the fixed, full power RFID reader, on-



board supply and a WiFi connected ruggedized laptop running the power **RFID-Simplicity™** software application, real-time data was able to be collected for each and every cage in all of the rooms.

## **OUR RFID APPLICATION SOFTWARE – *RFID-Simplicity*<sup>TM</sup>**

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

***RFID-Simplicity*<sup>TM</sup>** 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*<sup>TM</sup>** 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*<sup>TM</sup>** 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*<sup>TM</sup>** 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 TRACKING	LOGISTICS-YARD & FLEET MGMT.
DOCUMENT TRACKING	POLICE PROPERTY & EVIDENCE TRACKING	CONSTRUCTION LAY-DOWN YARDS	LIBRARIES
GUARD TOUR	PRISONS	CONTAINER TERMINALS	RAILWAY LOCOMOTIVE & WAGON TRACKING
COLD CHAIN-SECURITY, LOCATION and TEMPERATURE TRACKING	MANUFACTURING WORK-IN-PROCESS (WIP)	VEHICLE TRACKING	PERIMETER PROTECTION
WIRELESS SENSOR NETWORKS	PARKING	IT and MOBILE ASSET TRACKING	LINEN & UNIFORM LAUNDRY
WASTE MANAGEMENT	RETURNABLE CONTAINERS & PALLETS	STUDENT & SCHOOL BUS TRACKING	PRECAST CONCRETE
CORE AND WIZARD-ENABLED BUSINESS RULES ENGINE			
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 alert on the map, Audio alarm, SMS, emails, opening or closing contacts, focusing a PTZ Camera on the Alert location and commencing*

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

MUSEUMS AND GALLERIES APPLICATION INTERFACE

LOGISTICS-REAL-TIME QUAY MGMT.

TEMPERATURE MONITORING DURING TRANSPORT

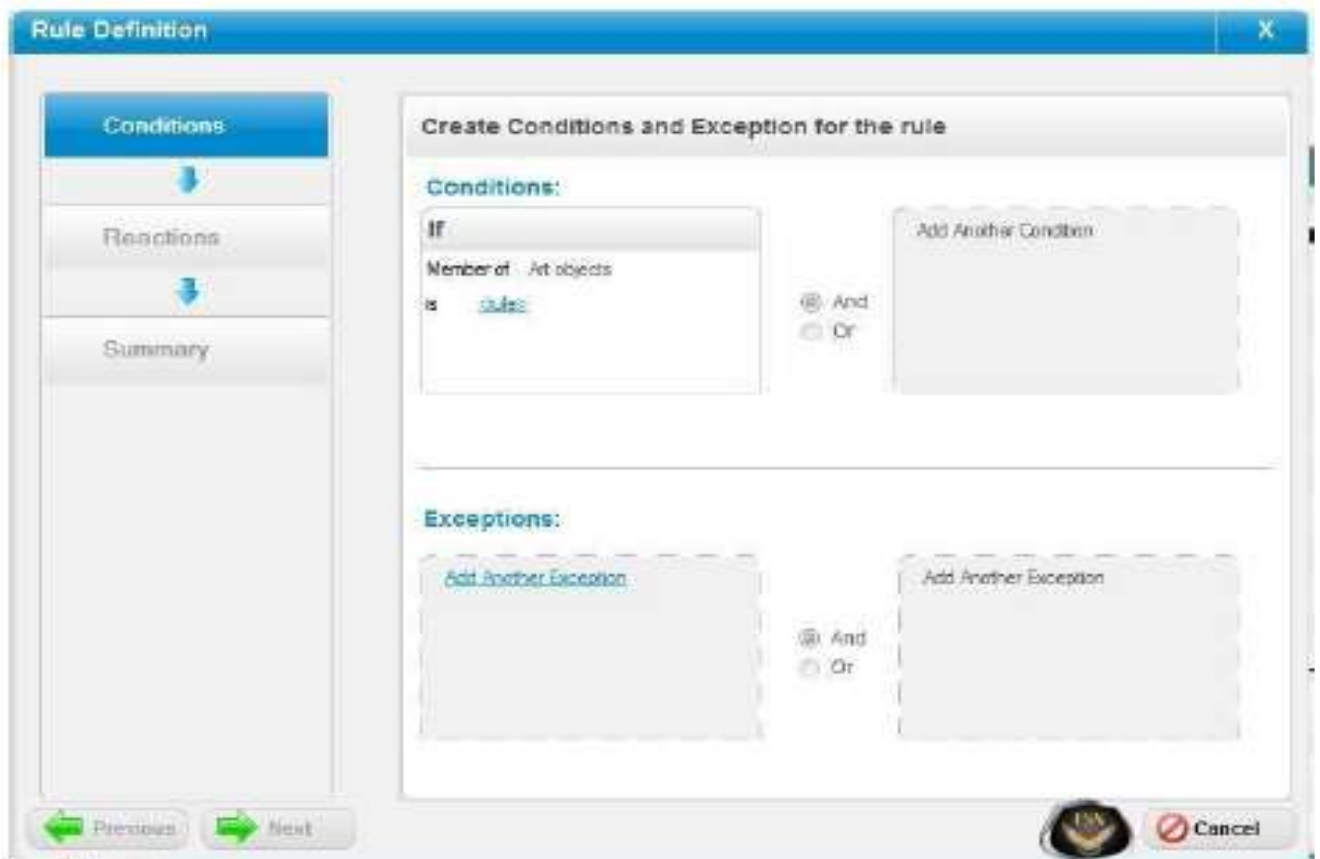
AUTOMATICALLY VERIFY MATCH OF BABY AND MOTHER.

*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.

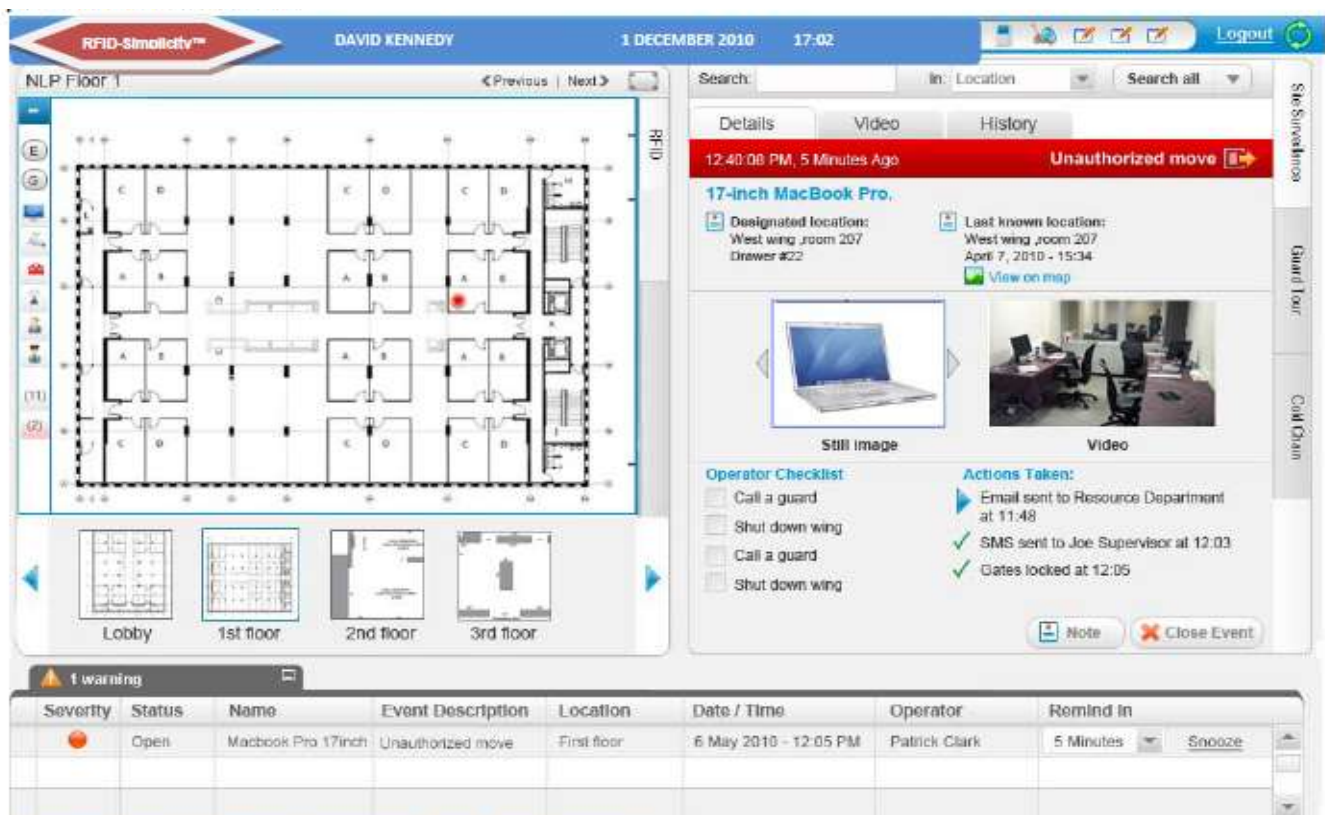
- Single, unified interface for multiple applications
- Supports all RFID technologies in a unified, single system
- Parameter-driven customization, no coding required
- Evolves with system needs , Powered by Vizbee™
- Open, flexible architecture and APIs for multi-system integration
- Easy to use SDK 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

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