fluensee
RFID-Enabled Asset Management

Infinite Integration:

Unlocking the Value of Enterprise Asset Management through Technology Integration

RFID, GPS, sensor, and other auto-ID technologies promise to revolutionize enterprise asset management systems (EAMSs) by efficiently providing real-time, physical asset tracking, locationing and monitoring. With the right technology, asset location and status tracking can be automated in real-time through a fixed infrastructure or can become a less labor-intensive and more accurate manual process using mobile readers. Regardless of the means, accurate asset location and status information provide many significant business benefits:

- Accurate inventory and improved inventory cost accounting
- Increased security and reduced loss (of assets and their critical information) through security alerts
- Improved inventory management and customer service by reducing stock-out
- More efficient and accurate shipping, receiving, and return processing
- Better understanding of asset flow and improved utilization
- Improved maintenance and equipment calibration
- Faster and less expensive audits to satisfy regulatory reporting, certification, and compliance requirements (e.g., Sarbanes-Oxley)

Fluensee AssetTrack™ serves as a perfect platform for integrating various auto-ID technologies to EAMSs in order to take advantage of real-time visibility and monitoring.

AssetTrack's RFID middleware, which provides this capability, offers advanced functionalities such as:

- Concurrent support for multiple RFID, GPS, sensor, and auto-ID technologies
- Advanced rules and algorithms for determining asset location
- Multiple communication mechanisms for enterprise system integration

AssetTrack also provides the following asset tracking functionality to complement EAMSs:

- Built-in workflow for synchronizing, reconciling, and handling discrepancies between EAMS data and real-time asset location and information
- Repository for complete item location and status change history
- Integrated alerting, reporting and analytics
- Support for mobile field operations through mobile readers

Concurrent Support for Multiple RFID, Sensor and Auto-ID Technologies

Not only does AssetTrack manage the interaction between all of the data capture elements in the solution, it also comes with a very robust middleware, which allows it to simultaneously interact with any type of auto-ID technology, including passive RFID, active RFID, GPS, sensors, and barcoding. This allows the right technology to be used to address the right challenges in the right environment. For example:

- Passive and active RFID can be used in the same environment to track assets, with the more expensive RTLS technology used to achieve real-time locationing for mission-critical assets, while passive RFID technology is used for other assets
- Passive RFID and GPS can be combined to track assets in a wide area deployment with minimal infrastructure by using an RFID reader to scan tagged assets and GPS device to assign locations to those assets
- Passive RFID, active RFID and barcode can all be used to track a wide variety of assets supporting many different types of business scenarios

AssetTrack helps minimize the importance of the auto-ID technology decision. It enables a company to select the right technology to fit the asset being tracked and the business scenario being automated.

Advanced Rules and Algorithms for Determining Asset Location

One of the strengths of RFID technology for automated asset tracking is that RFID readers can read multiple RFID tags from a distance without requiring line of sight. However, it also introduces possible ambiguity in locating RFID tagged assets when an RFID tag is concurrently read by RFID readers that have overlapping read areas (e.g., RFID readers adjacent rooms).

RFID middleware products typically support simple rules based on RFID tag signal strength reported by different readers. However, because RF signal propagation can be heavily influenced by the environment, RFID tag signal strength can be an unreliable measure. A typical symptom is that an RFID tag may appear to "toggle" between locations as the tag signal strength fluctuates. This, in turn, may mislead a system into thinking that assets are moving when they are not.

Fluensee's AssetTrack software recognizes situations like this and as a result implements advanced configurable rules and algorithms in a high-performance, complex event processing engine, which allows it to provide accurate asset locations. In addition to RFID tag signal strength, AssetTrack takes advantage of asset location "intelligence" (e.g., expected location according to the EAMS) and historical patterns of RFID tag reads. These additional elements allow AssetTrack to provide better and more accurate asset location information to the EAMS.

Multiple Communication Mechanisms for Enterprise System Integration

Fluensee AssetTrack supports a wide variety of data formats and communication mechanisms for data and system integration. All transaction messages received by AssetTrack are translated by an Enterprise Service Bus (ESB) or Enterprise Application Integration (EAI) layer into internal XML Java Message Service (JMS) messages that are processed by the AssetTrack *Flow Manager Service*. The Flow Manager Service executes different "flows" against each message it receives based on the message type and addressees (or other administrator-definable conditions). The execution of a flow may result in the update of relevant data in the data repository and/or creation of business events. AssetTrack's *Alert Management Service* inspects business events against user-defined conditions and sends event alerts to

notify alert subscribers, generates outgoing transaction messages for processing by external systems (e.g., sending an acknowledgement message), or triggers other user-configurable events or updates.

The following are the key mechanism through which AssetTrack supports data and system integration as well as the import/export of information.

- XML over Java Message Service (JMS)
- Simple Object Access Protocol (SOAP)
- Browser client csv flat file upload
- Browser client search results csv export
- EDI
- Flat file ftp upload
- Custom data integration adaptors

Built-in Workflow for Synchronizing, Reconciling, and Handling Discrepancies between EAMS and Real-Time Asset Location and Status

The integration to customers' existing asset management systems is done through Fluensee's standard interfaces in order to simplify the implementation and ensure forward compatibility with future releases. The existing EAMS can remain the primary system of record for all asset information, while AssetTrack complements it with accurate asset location updates based on RFID or other auto-ID technology. The following is a standard integration flow between Fluensee AssetTrack and an EAMS such as BMC Remedy Asset Management, IBM Maximo and others.

1. Synchronization of asset information (and related configuration information) from the EAMS to Fluensee AssetTrack.
2. Generation of a discrepancy report containing information on differences between the asset information in the EAMS and the real-time, true information captured by the physical asset tracking infrastructure.
3. Delivery of the discrepancy report to users and the EAMS can be provided in a number of different ways.
4. Triggering of a workflow designed to help resolve discrepancies and provide other pertinent asset information to update the EAMS.

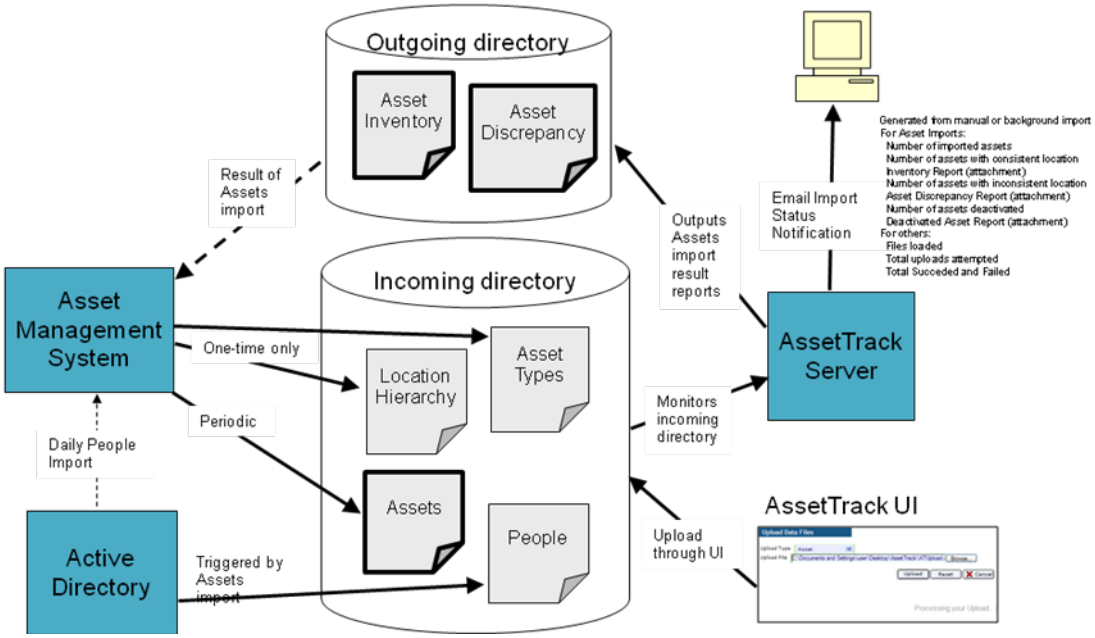

Figure 1. Fluensee AssetTrack Integration to an Enterprise Asset Management System

Repository for Complete Item Location and Status Change History

Many different approaches can be used to track the movement of an asset and capture the details in AssetTrack. For instance, an RFID reader could identify tagged assets as they move, an employee using a handheld computer may validate or update an asset's location in the field, an employee may use a web application to perform manual data updates, or an external third party application could submit transactions. Each time an asset updates the *asset audit trail* is updated in AssetTrack. All of these specifics are maintained in the application and can be tapped to provide comprehensive information that can be used to understand a company's asset utilization, view movement patterns, predict maintenance schedules and much more.

AssetTrack also provides extensive logging of asset activities, alerts, transaction processing and system events. Every change to the asset, whether it is a change to an attribute or a movement, is tracked in the asset history log. The "source" of all changes (e.g., a user making manual edits, an RFID reader scanning a tag, etc.) is recorded with each event to facilitate investigation and resolution of asset discrepancies when they arise. Similarly, all system events (e.g., RFID reader heartbeat or failure) and transaction processing statuses are recorded and visible through browser UI.

AssetTrack can also be considered to be a Configuration Management Database (CMDB) because it records processes and tracks status changes for each configuration item (CI), or, as the Information Technology Infrastructure Information Library (ITIL) defines it, "the CMDB is a database used to store configuration records and attributes of CIs throughout their lifecycle, as well as relationships with other CIs." In this way AssetTrack can serve as a foundation of an ITIL, and serve as a best practice for IT services and operations.

Integrated Alerting, Reporting, and Analytics

Asset movement and status changes can be captured in AssetTrack in a number of different ways, both automatic and manual. Regardless of how the movement is captured, the information is maintained in the application. Through the use of the Flow Manager Service, the movement of an asset can be planned and monitored. If the actual movement of the asset does not match the planned movement, various business events can be triggered, such as an alert to specific users or an attribute update (e.g., adding a "maintenance" tag to assets going into a service area).

AssetTrack also provides a set of standard web-based reports and analytics on top of its repository to facilitate historical reporting and analysis on physical asset tracking events. These reports are designed to provide insightful information to users and help them manage their operations more effectively.

These reports can be generated on-demand or scheduled through the browser UI and can be exported in a wide variety of formats for distribution. This enables users to view, print, save or email the resulting report based on their requirements.

Support for Mobile Field Operations Enabled by Mobile Readers

Fluensee AssetTrack is also integrated with MxTrack, Fluensee's client software application that resides on mobile devices to support mobile asset management operations. It is designed to work in both connected and disconnected/batch mode so it can be used in environments where a wireless connection is not an option.

MxTrack supports a large variety of field asset management and supply chain operations, including:

- Asset tagging
- Asset search
- Physical inventory (cycle counts)
- Location validation
- Owner and user assignment
- Asset retiring and decommissioning
- Shipping, receiving and returns

The integrated support for mobile operations differentiates AssetTrack from typical RFID middleware that only supports fixed reader infrastructure by offering seamless and complete support for RFID-driven business process execution.

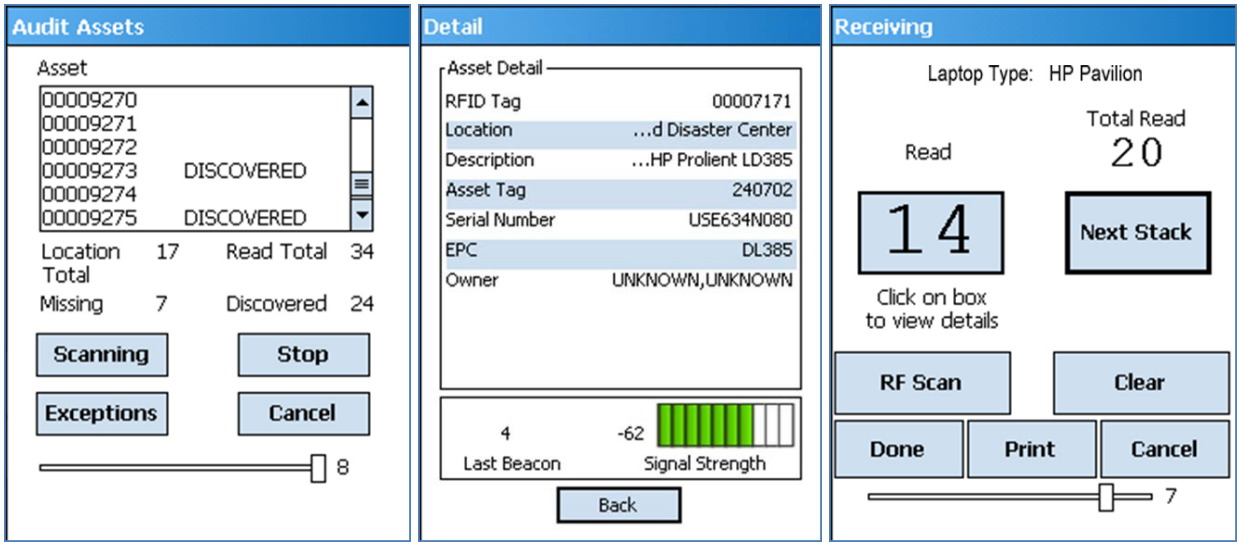

Figure 2. Fluensee MxTrack Mobile Application Screens

Conclusions

Fluensee AssetTrack is a perfect platform for integrating auto-ID tracking technologies, such as RFID, to EAMSs in order to take advantage of real-time physical asset tracking. It provides advanced RFID middleware functionalities, as well as capabilities to enable physical asset tracking to complement EAMSs. It is a web-based, user-friendly and configurable application that can easily fit into customer's current technology infrastructure, and can grow with customers' requirements in the future.

AssetTrack is proven in 24x7 mission-critical operations, handling up to tens of millions of RFID events daily for our customers. It is used worldwide with RFID, GPS and sensor infrastructures deployed in a vast array of environments (offices, data centers, distribution centers, manufacturing facilities, transportation yards and more) to track many different types of assets (e.g., IT assets, circuit boards, pallets, lab/test equipment, trucks, trailers).

Figure 3. Example AssetTrack RFID Technology Deployment Environments