



Delivering Real-Time Asset Visibility from Manufacturing through End of Life

Table of Contents

Introduction pag	e 2
A Path from Last Known Read to Real-Time Streaming Visibility pag	e 3
Real-Time Asset Location and Tracking pag	le 4
Savi IoT^{TM} – Blending Trusted Military and New Technology page	je 5
Better Asset Management and Lower Supply Chain Risk pag	je 7
Cost Savings at the Point of Production and Beyond pag	e 7
End-to-End, In-Transit Visibility and Asset Tracking pag	e 8





Introduction

Across the centuries, wise leaders have understood how vital effective military logistics are to success on the battlefield. From Dwight D. Eisenhower, who said, "You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics," to Sun Tzu, who noted, "The line between disorder and order lies in logistics."

The value placed on military logistics is just as critical now. Today, the Department of Defense (DoD) is tasked with providing "globally responsive, operationally precise, and cost-effective joint logistics support for America's warfighters."¹ This directive is a tall order considering the DoD has over 100,000 suppliers and more than 2,000 systems tracking approximately 4.9 million secondary inventory items, such as spare parts, with a reported value of \$91.7 billion.²

"The line between order and disorder **lies in logistics**."

Sun Tzu

Savi Technology is a proud supplier to military and government agencies of software and hardware, including tags, interrogators, and portable deployment kits (PDKs), to facilitate asset tracking and support mission readiness. Today, as assets enter the military supply chain, Savi's active Radio Frequency Identification (aRFID) tags collect data about the progress of supply shipments or individual assets as they pass fixed or mobile interrogators and share that information with logistics and operations personnel. The DoD uses the most recent aRFID message transmitted from a fixed or mobile aRFID interrogator to identify the last known location of a shipment or asset. The "last known read" is used to formulate an Estimated Time of Arrival (ETA) for assets in transit to U.S. warfighters all over the world and inform operational decisions.

Our white paper will explore how the DoD can use a combination of the thousands of military aRFID tags that are already in use and new Internet of Things (IoT) GPS sensors to know the precise location of valuable assets as they move within the supply chain and then to field use. Adding these next-generation sensors to an existing system of aRFID tags will allow the DoD to improve its ability to mitigate risk, reduce excess inventory, and streamline asset management for greater efficiency and in-theater effectiveness.



A Path from Last Known Read to Real-Time Streaming Visibility

Active RFID tags are deployed in supply chain management to track the movements of assets in yards and through chokepoints, such as doorways, entryways or exits, where interrogators or mobile readers are installed. This process provides last known read locations when assets are manually scanned or pass a fixed reader or interrogator.

However, aRFID sensors on their own cannot provide an update on where an asset is between scans, or when they are outside of the 130-foot read range of a mobile aRFID interrogator or 400 feet from a fixed interrogator. Luckily, new technologies are available now that can give government logistics and military command personnel real-time visibility that provides details on where the asset is at that moment to determine when it will arrive based on current location, traffic, and security conditions.

Sensors that rely on Global Positioning System (GPS) technology are popular because they provide continuous streaming visibility of assets in motion. In fact, a number of complex supply chains are already using GPS sensor technology to achieve on-demand visibility. A cellular communications-capable IoT GPS sensor sends regular updates over mobile networks on an asset's or shipment's location, providing the real-time data necessary for up-to-date tracking as the asset moves along its journey.

These Internet of Things (IoT) GPS sensors are helping to provide the **real-time data** organizations need to build more **efficient and agile supply chains**.

The live IoT data from GPS sensors feed supply chain visibility and analytics software to give logistics leaders insights into order and shipping times. Supply chain managers use this information to identify which shipping lanes or transit routes around the world are running slow due to security concerns, traffic, port congestion, weather, etc. This helps to inform contingency execution plans and to avoid or minimize disruptions.



Government supply chain managers would use live streaming visibility in the same fashion. Using IoT GPS sensor data, military supply chain personnel can more accurately plan for the arrival of assets and reduce "just-in-case" inventory, which adds considerable time and cost to the military's inventories. The DoD can also better determine which suppliers are meeting their time-definite delivery (TDD) commitments, leading to more cost-effective distribution contract awards.

These sensors are particularly well suited for use on mission-critical, high-value assets or assets that frequently move between installations. With real-time visibility of a high-value asset's precise location, operation leaders can accurately determine whether needed supplies and equipment will arrive in time for mission support. Earlier visibility is valuable because it allows planners to divert or reroute a shipment to avoid delays or to mitigate looming security risks.

Real-Time Asset Location and Tracking

Supply chain management and asset tracking used to be two very distinct disciplines, but over the past few years, they have converged. We are now at the point where some of the same people within the government and the DoD are managing both disciplines.

Never lose an important asset

Today's communications-capable, wireless IoT sensors use rechargeable batteries that have configurable update intervals to manage battery life to appropriate intervals, depending on operational requirements. Some, like Savi IoT sensors, can be configured to last up to five years before they need recharging. With extended-life batteries, these sensors are appropriate to track within one or more storage yards or bases.



savi



Savi IoT[™] — Blending Trusted Military and New Technology

Active RFID technology is still the best technology to detect tagged equipment as it passes aRFID interrogators installed at defined chokepoints. However, it does not provide visibility to shipments in-transit between chokepoints, or the location of stationary assets or assets outside the range of an aRFID interrogator. Essentially, aRFID offers a very accurate record of milestones that an asset has passed, but no real-time information.

Now, a new device can provide both live in-transit visibility and asset tracking through the end of an asset's lifecycle. The Savi loT[™] sensor includes an aRFID transponder, an aRFID interrogator, and a communications-capable GPS sensor. We named it Savi "loT" not only because it is truly an "Internet of Things" device, but also because it has a dual function, acting as either an "Interrogator or Transponder."

Instead of relying only on fixed, wired interrogators (readers) to capture data, our mobile-enabled IoT sensor can also transmit data over a cellular network while in transit. In summary, it can send data to an aRFID interrogator (backward compatible), read data from an aRFID tag (backward compatible), or transmit data over a mobile network while in motion or at rest (a new capability).

Our mobile-enabled IoT sensor can transmit data over a cellular network while in-transit, providing both live in-transit visibility and asset tracking through the end of an asset's lifecycle.



Real-Time Knowledge of an Asset's Location

The ability to accurately track the locations of assets once they have arrived at their destinations—and their conditions once deployed—is just as crucial to mission success as monitoring assets as they move through the supply chain. Today, military missions span the globe and involve millions of assets that travel through many hands during rapidly changing situations. Tracking assets' locations and conditions manually isn't practical or feasible in the 21st century.

IoT GPS sensors allow DoD teams to accurately and continually track assets from points A to B, and points in between. Motion sensors can send an alert when an asset moves. A real-time feed of location and automated alerts makes it possible to create electronic asset records for any area. Managers never lose track of goods and save money on labor costs by receiving daily reports of assets that have moved in or out of a storage yard or base or counts of asset types that are currently in a defined storage yard or base.

Improved Asset Maintenance

Consider a case in which IoT GPS sensors aid asset tracking for an Army base. The sensors can track weapons or large equipment, such as generators, tanks, or trucks. In addition to keeping track of an asset's location, an IoT GPS sensor has a time stamp of the last time a tagged asset passed in and out of a geofenced area, such as a maintenance yard. A pre-set alert from Savi's in-transit visibility software can automatically be sent to asset managers, alerting them that a truck is due for routine maintenance.

Flexibility for Small Fighter Forces

Savi's IoT sensor eliminates the time-consuming and expensive need to build out a hardwire installation with read points. Because Savi's IoT GPS sensor has a self-contained infrastructure or instant RFID reader, it easily and cost effectively extends military RFID infrastructure without the need for additional hard installations. This is particularly useful in hostile locations where no existing infrastructure exists or where it would be too dangerous to add reader infrastructure.

Lower Excess Inventory and Better Asset Inventory Management

Accurate inventory reports help avoid over-ordering. Excess inventory is an issue identified in the GAO High Risk report that the military is actively working to address.³ Understanding precisely where assets are located can help the DoD meet its goal to **reduce on-hand, excess inventory**.

IoT GPS sensors can help organizations significantly increase efficiency. For example, understanding assets' precise locations can help the DoD meet its goal to reduce on-hand, excess inventory (items categorized for potential reuse or disposal) to ten percent of the total value of inventory, and on-order excess inventory (already purchased items that may be excess due to subsequent requirement changes) to six percent of the total value of on-order inventory.⁴



Better Asset Management and Lower Supply Chain Risk

With IoT sensors, logisticians can track critical equipment or supplies while in transit from a supplier. They can see when assets pass through established gated storage locations, when they are sitting in a large, insecure, outdoor storage area or when they arrive on base. Alerts and reports can be configured to help logisticians and asset managers manage inventories of large equipment or detect unauthorized movement.

More than one-third of cargo theft occurs in warehouses and distribution centers, according to Cargonet, a national information-sharing system created to combat cargo theft. An additional fifteen percent of thefts occur at secured yards and eleven percent at unsecured yards.⁵ Understanding where cargo is supposed to be and when is beneficial in mitigating risk.

Customers using our in-transit visibility software, Savi Visibility, can easily see an overlay of risk-prone points of interest. Planners and operations personnel can also use Savi Visibility to identify those transit corridors that are more secure for route selection for high-value shipments.

Sensors that don't require readers are extraordinarily beneficial to troops who may be engaged in operations in hostile areas with little to no aRFID infrastructure.

Cost Savings at the Point of Production and Beyond

Integrating IoT sensors as assets roll off assembly lines offers the most robust risk management, cost savings, intransit visibility, and asset tracking through an asset's lifecycle. It also plays a role in reducing counterfeiting threats.

Since DoD assets are often manufactured in dedicated, secure facilities, these sensors can easily be added at the end of the manufacturing line. Adding sensors inside secure facilities eliminates the need to hire expensive, third-party logistics providers (3PLs) to add sensors to assets after they are scheduled for deployment or are in active use.

When sensors are added to assets or pallets at the time of manufacturing, visibility and security are significantly enhanced while the cost to add that visibility lessens. Once applied, no further resource costs will be required to place sensors later in the lifecycle. IoT sensors increase transparency, help protect against tampering, material theft and provide traceability that can keep components from falling into the wrong hands.

Savi IoT sensors provide connectivity to report to intelligence systems from anywhere there is a cell signal without the need for additional hardware. Sensors that don't require readers are extraordinarily beneficial to troops who may be engaged in operations in hostile areas with little to no aRFID infrastructure.

As the military begins to integrate real-time visibility, asset managers should consider investing in new IoT sensor technologies. Besides being backward compatible with current aRFID systems, the IoT sensor's dual function allows it to be used for both in-transit visibility and asset tracking when assets change location.





End-to-End, In-Transit Visibility and Asset Tracking for the Military Supply Chain

End-to-end, in-transit visibility into the military supply chain gives distribution process owners more accurate and precise information about the location and condition of assets. Keeping tabs on these assets throughout their lifecycle aids the DoD in its quest for enhanced efficiency.

Savi's IoT sensors provide the real-time visibility the DoD needs to track assets beyond their movement within the supply chain—ensuring the investments are not wasted due to loss, theft or mismanagement. They also provide greater security and better inventory tracking and asset maintenance management.

An ideal solution provides asset tracking that works with hardware already in use and takes advantage of modern communications networks. Savi IoT sensors offer data that ensure greater adherence to procurement and maintenance policies and a higher ROI from existing technology.

Finally, by adding these sensors, the DoD can be confident that warfighters receive the right tools at the right time and place to complete their missions successfully.



A Trusted Government Partner

For almost three decades, Savi Technology has developed battle- and field-tested sensors to meet the unique needs of government and military supply chains. Our sensors and hardware are trusted, recognized solutions used to track mission-critical supplies as they move around the world. Today, we also offer innovative supply chain software solutions, using artificial intelligence and machine learning to provide customers with real-time <u>in-transit visibility</u>, predictive and prescriptive <u>analytics</u>, and asset management solutions. Our enhanced intelligence supply chain solutions can be used by government and military shippers to understand potential delays better, mitigate the risk of fraud, theft, and loss, and ensure that supplies arrive when and where they are needed to achieve mission readiness.

Leveraging our extensive experience with aRFID hardware, we now deliver both aRFID and IoT GPS sensors and software that provide in-depth data for decision-making and more options for connectivity in the field with little to no infrastructure required. These new backward-compatible solutions can maximize current aRFID investments and help DoD and government shippers to transition seamlessly and quickly to new technologies.

Savi is a proven partner that can quickly deliver software and hardware solutions that self-update and easily fit into existing contract vehicles. Our solutions provide the agility the government and military need to make decisions as a situation unfolds. To learn more about Savi's government solutions, visit <u>www.savi.com/</u> industries-served/government. To view our RFID catalog, visit <u>www.savirfidcatalog.com</u>.



WORLD HEADQUARTERS 3601 Eisenhower Avenue Suite 280 Alexandria, VA 22304 PHONE 1.571.227.7950 1.888.994.SAVI (7284) EMAIL info@savi.com **FAX** 1.571.227.7902

Endnotes

¹DoD: GAO Logistics Roadmap, Washington D.C., 2008.

- ² DoD: GAO Comprehensive Inventory Management Improvement Plan, Washington, D.C., 2010.
- ³ DoD: GAO High Risk Report: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others, February 2017.

⁴ DoD: GAO Defense Inventory: Services Generally Have Reduced Excess Inventory, but Additional Actions Are Needed, April 2015.

⁵ Cargonet and AFN Logistics, Top 10 U.S. Counties for Cargo Theft Incidents Revealed, December 2016.