

Asset Tracking Application—Can It Drive Business Efficiencies?

Executive Summary

In today's competitive environment, businesses are continuously looking for ways to improve their business processes and maintain a competitive edge. There is an explosion of tools and devices in each profession to assist people in doing their jobs more efficiently. The professionals using these devices are very mobile and thus tools and devices must also be mobile. And just as mobile devices help professionals perform their work, when those devices can't be found, their absence becomes an obstacle to getting the work done.

For all these reasons, being able to locate mobile work tools through asset tracking can help business eliminate inefficiencies that directly affect profitability. When asset location tracking is combined with context-aware information, the benefits are even greater. Context-Aware data includes the time of occurrence, condition (temperature, humidity, pressure, etc.) of the asset or it's surrounding, and other such data that is relevant to business processes and applications.

Asset tracking can help businesses by:

- Reducing the loss of equipment and size of equipment inventory
- Improving customer service by making it possible to locate the closest clerk when needed
- Accelerating reaction time for an event needing a quick response
- Enhancing patient care by helping staff quickly find the required device

These are just a few examples of how asset-tracking applications are evolving to increase asset utilization and profitability.

Business Challenges

Businesses may have thousands of physical assets spread across their facilities. With the increasing reliance on mobile assets, to be able to find those assets at crucial times has added new challenges for organizations and has affected efficiency. Workers are seeking answers to questions like:

- Where is the closest infusion pump?
- Where is the crucial component that goes into this engine?
- Is this asset lost?

When these questions go unanswered, businesses may incur unnecessary costs for replacing assets; time and money are also wasted in the search for missing items. Nurses, for example, want and need to spend more time treating patients rather than looking for infusion pumps. Spending more time with patients may accelerate their recovery and certainly increases patient satisfaction with their care.

In many industries, locating assets is at present primarily a manual process and is time consuming and error prone. The inability to locate assets in real-time—and to ensure their availability when

and where they are needed—limits reaction time and efficiency. As businesses look to automate their processes for improved efficiency, there is an urgent need to increase asset and resource visibility, so that assets can be optimally utilized and responsiveness can be enhanced.

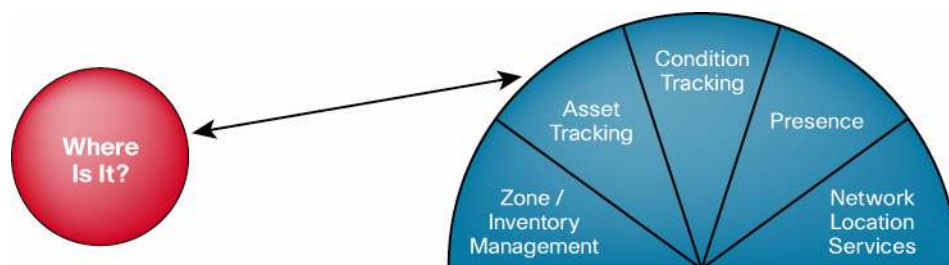
Solution Overview

The Cisco® Context-Aware Mobility solution provides business processes with information on the assets and resources in response critical questions such as;

- Is it here?
- Where is it?
- What is its condition?
- What is his/her status?
- Where in my network is it?

Figure 1 summarizes the different applications supported by the Cisco Context-Aware Mobility solution, including asset tracking.

Figure 1. Asset-Tracking Applications as Part of the Cisco Context-Aware Mobility Solution



This overview focuses on asset-tracking applications—applications that provide an answer to “Where is it?” to enable businesses and organizations to operate more efficiently. Businesses can take advantage of the asset visibility options highlighted here by extending their investment in the Cisco Unified Wireless Network.

The Components of Asset-Tracking Applications

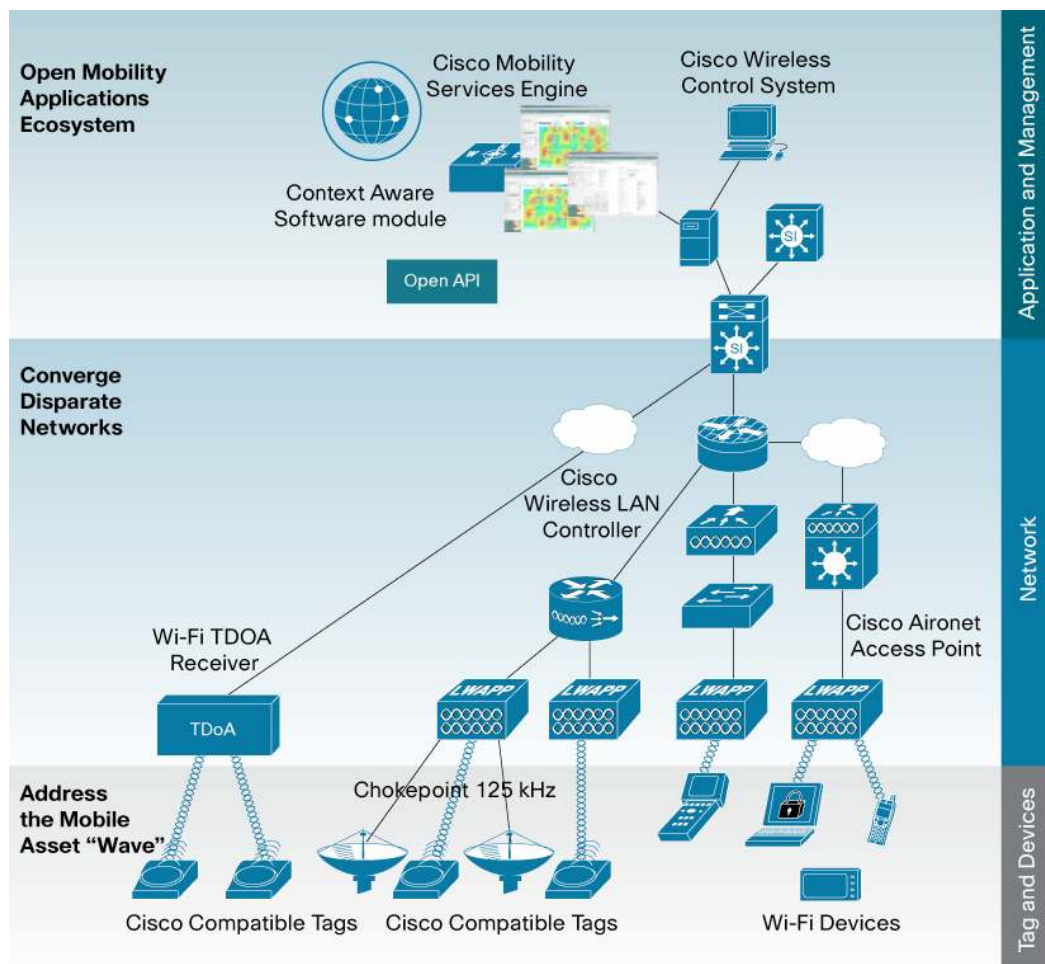
The following components are needed for asset-tracking applications:

- Mobile assets, including devices or tags manufactured by Cisco technology partners.
 - **Devices:** Any Wi-Fi device that connects to the WLAN can have its associated contextual information captured.
 - **Tags:** Any Wi-Fi tag that is attached to a mobile asset and that connects to the WLAN can have its associated contextual information captured.

- **[Cisco Compatible Extensions program for tags](#)**: This Cisco program, open to Cisco technology partners, helps ensure that RFID tags comply with a predefined format so that the advanced information they send, such as motion, humidity, and other variables, is captured and made available to the rest of the solution, including business applications from other Cisco partners.
- **[Cisco Unified Wireless Network](#)**: This multipurpose network is also the only unified wired and wireless network solution to cost-effectively address the wireless network security, deployment, management, and control issues that businesses face in addition to the need for context-aware information.
- **[Cisco Mobility Services Engine](#)**: This platform hosts the [Cisco Context-Aware software](#) that captures, stores, and analyzes contextual information from multiple wireless networks.
- **Time difference of arrival (TDoA) receivers**: These are primarily used for outdoor or RF-challenging environments. They work by computing the location of the tags attached to assets.
- **Cisco open API**: Once all the contextual information has been captured, calculated, and stored by the Cisco Context-Aware software, it can be made available to any business application that needs it by means of the Cisco open API. Cisco's open API is based on the Simple Object Access Protocol/Extensible Markup Language (SOAP/XML) protocols. Access to this API is available to any Cisco technology partner and allows a full integration into customers' business processes.

The Cisco Context-Aware Mobility solution offers a broad range of wireless technologies that deliver solutions to a variety of business problems and also act as a platform open to any type of mobile asset and any type of business applications deployed on customers' premises. It is an adaptive, agile, and intelligent Service-Oriented Network Architecture (SONA) solution that delivers superior end-user experience and enables significant efficiencies for businesses. Figure 2 illustrates the solution architecture.

Figure 2. Cisco Context-Aware Mobility Solution Architecture



Technical Solutions

The Cisco Context-Aware Mobility solution is based on the Cisco Unified Wireless Network. The network provides wireless coverage through which the information about the assets or resources is captured. Depending on the environment where asset tracking is needed and the level of location accuracy required, different methodologies and deployments can be considered.

First, to answer the “Where is it?” question, pervasive wireless coverage is needed for the area where the asset will be located (for example, a retail store or a hospital). Within this coverage area, location information for either client devices or tags will be calculated.

Once the signal from the tag is collected, different location calculation methods can be used. The Cisco Context-Aware Mobility solution includes key technologies necessary for asset tracking, such as received signal strength indication (RSSI) and time difference of arrival (TDoA). These technologies use algorithms to calculate the location of an asset using the information collected by the Cisco Unified Wireless Network.

The choice between RSSI or TDoA technology depends on the nature of the business problem being addressed. With [RSSI](#), the location of the client or tag is calculated based on the signal strength of the Wi-Fi radio signal emanating from the device or asset, picked up by one or more access points. The higher the accuracy required, the higher the density of access points needed. RSSI, which is not dependent on line of sight, is especially useful in environments such as hospitals, classrooms, or office buildings, which are typically full of obstructions. In addition, active

tracking using the RSSI method takes advantage of the data access network already in place and does not require any additional network equipment.

[TDoA technology](#) uses a time-based method of calculating location. With the speed of travel of the radio frequency as a known factor, each of the synchronized Wi-Fi TDoA receivers report the time of arrival of the signal from the tag to its respective receiver. The Cisco Mobility Services Engine correlates the time of arrival for all the tag signals from all the TDoA receivers to find the intersection points of known distances. The greater the number of receivers used in the calculation, the more accurately the tag can be located. Wi-Fi TDoA receivers are typically used for calculating location information in manufacturing or retail warehouse environments (where there are lots of machines or high ceilings or both), in outdoor environments, or in other line-of-site environments.

Healthcare

Business problem: Healthcare organizations are constantly looking for ways to improve patient care. Hospitals want to maximize the time nurses spend with patients, in part because this is the most efficient use of nurses' time. Often, however, nurses are challenged to balance their time between patient care and looking for equipment, such as infusion pumps or wheelchairs.

Solution: Healthcare organizations can take advantage of the asset-tracking capabilities part of the Cisco Context-Aware Mobility solution to help caregivers quickly find wheelchairs, infusion pumps, or other equipment. From an RF perspective, hospitals are similar to indoor office environments and thus RSSI technology is typically used to make location calculations. The solution can also be used to combine asset tracking with [condition tracking](#)—that is, with the collection of contextual information about the asset, such as its temperature. These combined capabilities can be used to monitor medication, for instance. If the temperature at which medication is stored moves out of the acceptable range, caregivers can be alerted to take immediate action.

Benefits: When a nurse needs to administer medicine to a patient, the ability to find an infusion pump quickly leads to better patient care and greater patient satisfaction. The nurse is able to work efficiently and provide more attentive care to the patient. When asset tracking is combined with condition tracking, treatment efficiency is further increased and medication waste is reduced or avoided. With software applications provided by Cisco partners through the Cisco Open API, hospital staff can use the contextual asset tracking information to perform everyday tasks in a simple manner, and automate their workflow. For example, a nurse can search for the nearest wheelchair and view its location and status on a floor map, or a shortage of pumps in a nursing unit can automatically trigger a call for replenishment.

Manufacturing

Business problem: Manufacturing facilities are typically large and spread out. Misplaced parts and tools often result in production-line disruptions, excess inventory, and low productivity of specialized labor. In addition, factories also often have high-value tools or test equipment in small quantities. When this is lost or is not available for some reason, it can become a huge impediment to keeping the assembly line moving, not to mention the cost of replacing lost tools and equipment.

Solution: Manufacturing facilities have challenging RF environments because of high ceilings and the presence of heavy machinery and other potential sources of radio interference. This type of environment is best supported by [TDoA technology](#) to locate the specialized equipment or

inventory in the facility. By placing tags on machinery tools or test equipment, plant managers can track these assets in real-time indoors and outdoors.

Benefits: During the assembly process, specialized workers looking for tools and equipment can quickly locate much-needed assets, minimize production interruptions, and increase labor productivity. Waste as well as audit fines can be reduced because lost parts don't need to be reordered. By tagging the equipment and using the Cisco Context-Aware Mobility solution, factories are able to quickly locate tools and equipment, and the assembly process experiences minimal interruption, thus helping to ensure business continuity. Manufacturing staff can use the contextual asset tracking information to perform everyday tasks in a simple manner, and automate their workflow. For example, a plant operator in a semiconductor Fab can search for the work-in-progress inventory item on their work order and view its location and status on a floor map. The increased productivity and schedule maintenance have a direct positive impact on profitability.

Retail

Business problem: Retailers are constantly working to increase their sales and maintain high levels of customer loyalty and satisfaction. Customers gauge good service not only on availability of the items they want to buy but also on being assisted by knowledgeable staff. Retailers need to know the availability of merchandise in their stores using [inventory management](#), and they also need to be able to provide the right product or the right kind of assistance to customers exactly when the customer needs it.

Solution: Using asset tracking, retailers can locate both merchandise and the specialized devices used by sales assistants. Merchandise is tracked by putting tags on the pallets of merchandise or individual items, while the rugged devices will already be Wi-Fi-enabled. Staff assisting the customer will find where the merchandise is by using their mobile devices: they help the customer to find either the item itself or the product expert in the store. Combining asset tracking with other applications such as Cisco Presence, a sales clerk can locate their sales manager quickly on the first try.

Benefits: Retailers who are able to provide customers with timely information or products reap the benefits of customer loyalty and increase their revenues. Providing support at the point of sales is a retail differentiator and fosters customer loyalty as well as staff efficiency.

Summary

Businesses and organizations make investments in technologies and devices and need ways of improving productivity to positively affect their business. As businesses continuously look for ways to improve their processes and maintain a competitive edge, location services and contextual information help them make business decisions. Businesses that have an existing WLAN network will be easily and seamlessly able to deploy asset-tracking applications made possible by the Cisco Context-Aware Mobility solution to help them achieve maximum asset utilization. Taking advantage of the network as a platform and converging different wireless technologies to automate the data collection and help ensure compliance with business needs is an essential part of answering the "Where is it?" query. The Cisco Context-Aware Mobility solution not only provides answers to questions that businesses face daily but also helps them lower the total cost of ownership by taking advantage of the WLAN.

For More Information

For more information about the Cisco Context Aware Mobility Solution, visit:

<http://www.cisco.com/go/contextaware>

To learn more about Cisco customers who have deployed the Cisco Context Aware Mobility Solution, visit: http://www.cisco.com/en/US/products/ps6386/prod_case_studies_list.html

As a Cisco partner, find more information on the Cisco open API at:

http://www.cisco.com/cgi-bin/dev_support/access_level/product_support

For more information about the Cisco Mobility Services Engine, visit: <http://www.cisco.com/go/mse>

For more information about the Cisco Unified Wireless Network, visit:

<http://www.cisco.com/go/wireless>



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