

RFID IT Asset Tracking

Giving Assets a Voice



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Identify with innovation



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RFID IT Asset Tracking
Giving Assets a Voice

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1.0 What happens when assets have a voice

RFID is a quiet revolution for IT asset management and IT asset security. In the past, IT assets could only be identified through active human intervention. A human had to locate and record a serial number on the asset, or initiate a bar code scan. Assets had no voice. With RFID, assets can now speak for themselves.

Human discipline

While the network connectivity of IT assets such as servers, laptops, and PCs enables them to communicate with each other, their physical location is not being tracked. If an asset is moved, there is typically a reliance on human discipline to track asset movement and to hunt for missing assets. How would you know, however, that an asset is being removed from a secure area or a building? Even the most vigilant security person can miss some items.

Physical inventory

Another hurdle in IT asset management is the need to conduct a physical asset inventory or comply with an asset audit. The network communication is disregarded. Physical inventories are typically required quarterly or annually for high value and sensitive assets, or need to be done when asset responsibility is transferring from one person to another. The physical inventory is arduous: a person must canvass an entire office building or data center, crawl underneath desks, find misplaced or moved items, and double-check the data accuracy of the inventoried items. The limitations of the old methods are self-evident. Assets were silent.

- When assets can speak for themselves, they can say, "I am a laptop with a specific serial number, permissions and pedigree". Systems can validate these assets for physical inventory or movement authorization.
- When a person is present, all of the assets can speak at once so inventory identification time goes from hours to minutes.
- When a person is not present, the system can still identify the asset and create an automated history of its lifecycle and movements.
- The solution can even automatically associate the IT asset with people using secure access cards, resulting in asset movement being linked to location, time, direction and a person.



These changes are dramatic. RFID makes processes faster, records more accurate and facilities more secure. RFID is changing the way organizations think about asset tracking at a time when high value assets are proliferating and fewer resources are available to track them. Given the current situation, RFID's capabilities are more than just useful; more and more they are becoming necessary.

How would it help you if your IT assets had a voice?

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2.0 Not just more convenient: less cost, better data, better security

The loss of an IT asset is costly. A large financial services company estimates a lost hard drive costs over \$3 million in terms of recovery and remediation expenses. The Department of Veterans Affairs settled a lawsuit in 2009 for \$20 million over a single stolen laptop – even though the laptop was recovered and the investigation concluded that the missing data was not improperly used.¹

An RFID-tagged hard drive can speak, allowing its movement to be monitored or restricted and making it more easily found. An RFID-tagged laptop can identify its movement into and out of facilities by authorized personnel. PCs and servers with RFID tags can be received and inventoried five to ten times faster than with other methods. This reduces operational cost by over a hundred dollars per asset and also improves accuracy.

There are three primary use cases for RFID and IT asset tracking in use today:

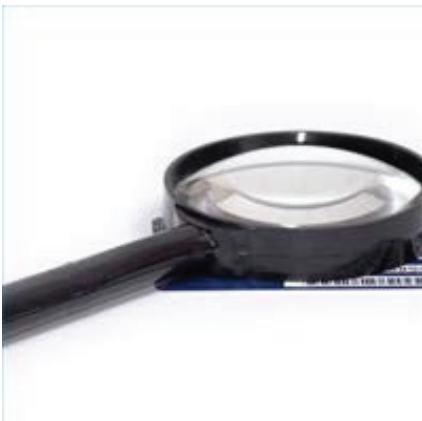
- Inventory
- Audit
- Security



Each use case delivers specific financial benefits such as efficiency, visibility and security while also improving accuracy and reducing risk in the organization.

2.1 Inventory

Over the past decade, inventorying IT assets has become a burden in nearly every large organization (Figure 1 - IT Asset proliferation and capacity gap). The need to conduct physical inventories and find missing IT assets remains. Moreover, stricter security policies and new regulations, such as Sarbanes-Oxley requirements, have increased this need in most organizations. The core challenge is that the number of IT assets has proliferated while available staff time to conduct inventory has contracted. This has led to a clear capacity gap for most IT departments. Since most do not have the luxury of adding staff to count inventory, the logical solution is automation. RFID is becoming the automation of choice for IT asset inventory processes.



The use case is simple. In the past, the inventory process for IT assets typically involved one of two methods. In the first, staff walked around with print outs of assets and checked off each asset identified and its location. These data were later updated in the asset tracking database or system of record. A list of missing assets was then generated and the staff would again walk around looking for the assets throughout the facility, each time checking an asset tag or serial number of IT assets to verify it was not the item sought.



The more advanced IT departments employed barcode. In this instance, the list is generated by software resident on a barcode scanner and each item scanned is recorded as present and its status and location are updated. This reduces the need to rekey data into the system of record and improves accuracy. However, it still requires that one asset be identified at a time. It also often requires the IT staff member to find the barcode and ensure it can be reached for scanning. This step may be easy or it may require crawling under desks and squeezing around server racks.

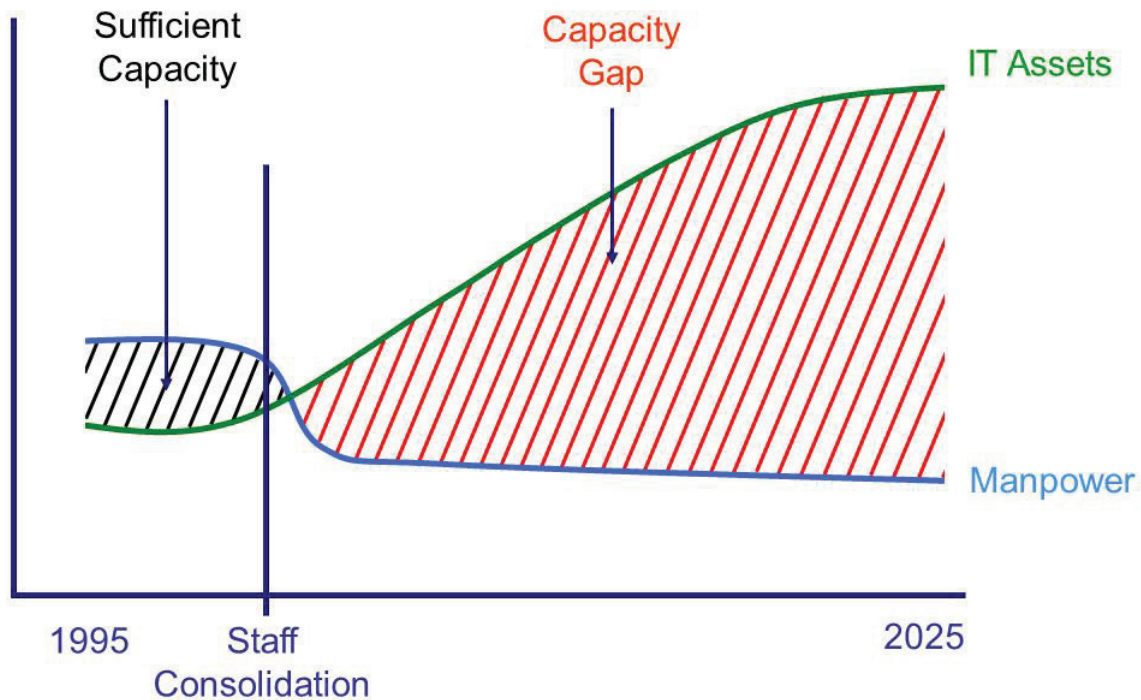


Figure 1 - IT Asset proliferation and capacity gap

By contrast, RFID can read dozens of items at once and can read tags that are not within line of sight. Inventory data capture becomes faster – typically 5-10 times faster than either fully manual or partially manual methods such as barcode.

RFID also helps ensure that IT assets can no longer hide in plain sight. Many asset managers are familiar with the scenario in which assets are moved from one area to another but the relocation is not recorded. When conducting inventory by manual methods you are typically looking for items you expect to be in a specific location. This often leads to overlooking assets that have been moved to that location, but not recorded in the system of record.

A remarkable feature of RFID is its ability to pick up asset tag data that isn't even being sought. This effectively eliminates the need to search for assets that have been moved because RFID can read tags and then record the new location automatically. This improves asset location accuracy and eliminates a significant portion of missing asset search activities.

Consider the benefit of inventorying assets in 1/5 the time



2.2 Audit

Another key use case is supporting the audit function. An audit can either be an annual or quarterly full physical inventory that is performed to ensure the accuracy of balance sheet reporting, or it can be an ad hoc spot check. In both situations, physical validation of the asset status and location is typically required. A full physical audit is similar to the inventory use case along with additional reporting. The spot check audit is different.

The spot check audit occurs when someone from a compliance or control function requests that an asset manager validate the accuracy of asset location and status data contained in a system of record. They typically request to see additional validation that the asset is physically where the system says it should be. If the data are accurate, there is no problem. The system of record reports the location and it is physically validated. If the data are not accurate, a search must ensue to locate the asset and update the details.

RFID provides three key benefits in support of audit activities. First, since it is easier to track and update data with RFID, companies typically find that personnel are more likely to update the system when status or locations change. This improves overall data accuracy. Second, RFID provides an affirmative, serialized method for validating the presence of an asset in a location. It picks up the tag read and automatically records it which can then be included in an audit report. Third is RFID's unique feature for finding items that manual and barcode methods do not provide. Similar to the concept of a Geiger counter, RFID can be used to efficiently search for a missing asset by looking for the asset tag read and zeroing in on its exact location. This reduces the time spent searching for missing assets during an audit since entire rooms can be swept for a single asset tag in a matter of seconds. The reader sends out a command looking for a specific tag identifier and the asset tag in question responds.



2.3 Security

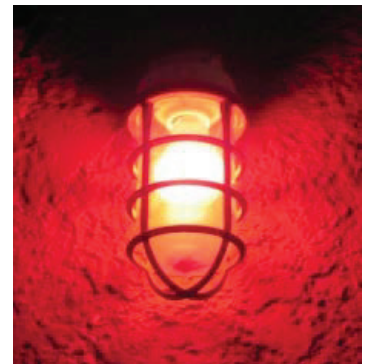
IT asset security is a growing concern across both commercial and government organizations. The value and sensitivity of the data continues to increase as do the hard costs associated with lost IT assets. The key problem today is that IT asset security rests almost solely with human vigilance. When vigilance breaks down or is not present, there is no back-up system.

Some organizations have experimented with systems similar to theft prevention tags used in retail. Unfortunately, these solutions tend to be too large for many IT assets, only work in limited scenarios and do not provide any added benefits for supporting inventory processes.

When RFID gives IT assets a voice, human vigilance gains an ally in the asset tag itself. Merely moving the asset near a read point creates a read event that can then trigger an alert, record the activity or even lock a door. The assets participate in their own security.

Could an asset tell you it is walking out the door?

It is important to note that not all IT assets go missing because of nefarious activity. Some are moved for good reasons but simply not recorded. RFID provides a means to



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automate tracking and update systems or generate alerts so that asset locations and movement are recorded. Another common use of RFID in security occurs at security check-points. Many people are familiar with the routine of removing a laptop from a brief case so a security guard can record the serial number and validate that the item may be removed from the building. In the morning and evening these queues can take a long time, as each item is inspected and data are recorded. RFID can automate this process entirely. Users don't even need to remove items from their bags as RFID tags can be read through the bag which authenticates both asset ownership and permissions.

There is a wide range of RFID features that end users can adopt to support IT asset inventory, audit and security. The justification is even more compelling today than it was two years ago when inexpensive and standardized RFID technology suitable for IT asset environments was just emerging. Today the applications and technology are mature and more easily adopted.

3.0 Why RFID adoption is accelerating now

Many IT asset managers know that RFID has been around for several years. However, in the past there were several sound reasons for delaying adoption such as bulky and expensive tags and proprietary technology. Times have changed. Three key trends have accelerated RFID adoption over the past 18 months:

- Inexpensive tags
- Tags that work in IT environments
- Global Standards

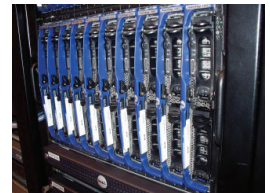


3.1 Inexpensive tags

Most organizations were first introduced to the technology through active RFID. Active RFID uses bulky tags that have batteries in them. They have great capabilities in terms of tracking, but tags cost between \$10 and \$40 each, and they are too large to be placed on many IT assets. The introduction of passive RFID (tags without batteries) made tracking IT assets viable from an economic and form factor perspective. These tags became more widely available in at price points that can range from \$0.10/tag to around \$10.00/tag, typically on the lower cost end.

3.2 Tags that work in IT environments

Just as important, those passive RFID tags were designed to work well in common IT environments. They are small enough to fit on blades and routers and were designed to be mounted on metal objects with the capability to read well at a reasonable distance even when surrounded by a metal environment such as a server rack or cubicle. This took some quality RFID engineering, but was eventually a success. In fact, Quake global's RFID IT Asset Tracking Benchmark™ published in 2008 identified seven suitable passive RFID tags. Today there are several dozen and the performance continues to improve while price points are down as much as 50%.



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3.3 Global standards

Global standards stabilized around passive RFID technology as ISO 18000-6c became widely adopted. This justified more investment by manufacturers, which led directly to the price and performance improvements. It also reduced technology risk for end users.

No longer do IT asset managers have to roll the dice on a proprietary active RFID technology. They can install a standardized process that will work worldwide and is supported by hundreds of vendors with inter-operable equipment. Some industry associations have taken this a step further. In the financial services industry, the Financial Services Technology Consortium adopted the ISO standard and set data formatting and performance standards to further facilitate adoption.

The business case for RFID IT asset tracking has been compelling for years. However, for broader adoption, it was critical that low cost, strong performance and global standards emerged. That is clearly the case today and it has paved the way for adoption worldwide.

What if you could use one technology worldwide?

4.0 Key capabilities that make RFID different and better

RFID introduces several new capabilities to IT asset managers that have not been available in the past. Most IT asset managers employ a combination of networked device discovery with barcode and fully manual methods for physical asset identification. The limitations of existing capabilities are well understood.

Network discovery solutions don't account for disconnected devices and are not sufficient when full physical inventories are required. Barcodes typically require a human to capture the tag information, are limited to identifying a single device at a time and the barcode symbols are often in hard-to-reach locations. Manual methods are cumbersome, error prone and slow. RFID addresses each issue directly leveraging a few core features related to:

- Bulk identification
- Item locate
- Authentication
- Awareness

4.1 Bulk identification

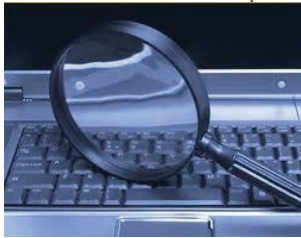
Bulk identification is the workhorse of the inventory use case. Manual and barcode methods require each item to be singulated (i.e. individually identified). RFID enables dozens and even hundreds of items to be identified virtually



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simultaneously. This is true during scheduled inventories, receiving and even ad hoc audits. Older manual inventory processes are time consuming and therefore costly. RFID dramatically reduces those costs. It is a classic business process automation technology.

4.2 Item locate



Item locate or find capabilities transform the traditional search for missing IT assets from a visual hunt to an electromagnetic sweep. Instead of relying solely on visually inspecting areas and each asset encountered, RFID can transmit radio waves and indicate when the missing asset tag is identified while ignoring everything else. The electromagnetic sweep enables even assets hidden from view to announce their presence. This feature benefits standard inventory processes as well as audits that require a few specific items to be physically identified. Item locate with RFID can eliminate hundreds of man hours annually that are spent looking for missing IT assets.

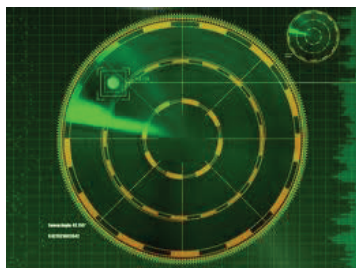
4.3 Authentication

Authentication is another area in which humans and barcodes struggle. Many IT assets require authorization to move from one area to another or outside of the building. In addition, organizations often limit who can move them. Authentication of asset moves today is typically a human function. A person validates an asset tag ID or serial number and records its movement out of a secure location. They may also assign it to a person or validate that person's permissions. RFID can do this automatically. Tag reads can be compared against a rule set and permissions granted or denied within a second. This speeds up the process and provides additional assurance that policies are followed.



4.4 Awareness

Awareness is the ability of an RFID tag to speak to readers whether or not a human is around. It is the physical world equivalent to network device discovery services. When items are moving, they typically are not connected. To identify the physical movement and location, either people must have awareness and record the event or a broadcast technology such as RFID needs to be in place. When assets are tagged they automatically communicate with readers in their vicinity whether a human acts or not. This provides a record of location and movement automatically and is a critical factor in enabling a new level of IT asset tracking security. Once systems are aware of asset movement, alerting or more aggressive responses can be enabled.



These capabilities of RFID-enabled IT asset tracking solutions combine to deliver many unique features such as taking mass inventory, easy assignment of assets to a location or person, automated physical authentication, tracking and alerting. As you consider your current practices and how you could leverage RFID, consider features that these capabilities can enable in your enterprise. When assets can speak it's not just about doing the same processes faster. It is often about entirely new capabilities and features.

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5.0 Components of an RFID IT asset tracking solution

There are three primary components of any RFID system: tags, readers and software. From here it gets more complicated, but the basic components are always the same. The tags are placed on the assets and serve as the RFID identifier for the device. Readers identify the tags and record their location. The software manages the RFID devices and integrates to existing systems of record and may provide user interface functionality as well.

5.1 RFID tags

RFID tags come in many different types, including tags that will not operate well on IT assets. The first factor is to ensure you select a tag that will work in your environment. This typically requires what is referred to as a metal mount RFID tag. This is a tag that can be read effectively even when mounted on metal surfaces common to IT assets such as laptops and servers.

The second factor is to identify a tag that has the right form factor for your assets. Many IT assets have limited surface area available for mounting tags. This limits the size and shape options. Tags come in a variety of shapes and sizes, but each one operates differently. In general, smaller tags have shorter read ranges than larger tags. A larger tag surface area is often leveraged to embed a larger antenna which can in turn harvest more electromagnetic energy and be read successfully at longer distances.

The final factor is the required performance characteristics. For example read distance is related to the business process and orientation of the reader to the tag. RFID physics can provide answers to determine which tag will best fit from a performance perspective.

5.2 RFID readers

When you consider readers, you need to know how, when and where you intend to capture tag transmissions. There are different types of RFID readers. They can be mobile handheld units, embedded in tables and shelving, mounted to walls or simply overhead. The reader is the workhorse of the RFID system. It is constantly looking for tags, receiving their transmissions and pushing those data back to the RFID software and to the enterprise systems of record.

Your business objectives, process, user ergonomics and environment typically dictate what type of reader you need to install. How the readers are deployed has a substantial impact on the usability of the RFID solution. The reader selection and configuration are what determine the performance.

All the readers exhibit different performance characteristics and allow for different levels of configuration. It is important to match the reader to your performance goals as well as to the software. There have been situations in which the reader itself could be configured to meet performance requirements, but the software limited its performance.



5.3 RFID software

RFID software, often referred to as middleware, has two key layers of functionality that need to be considered. The basic services that the first layer controls are device connectivity and control, reader performance, data smoothing and system integration. This layer can connect directly to existing enterprise systems using a solution such as EasyEdge™, or can interface with a business process and user interface layer.

If you are going direct to existing systems, you only require the connectivity and control layer. If additional features are required for business users, a second layer must also be implemented. This involves more traditional application software and most companies selling themselves as RFID software providers actually spend 90% of their resources in this area; building databases, workflows, business rules and graphical user interfaces.

As an end user you need to pay attention to the first layer of connectivity and control, and ensure that your software partner can really support multiple devices in a heterogeneous reader vendor environment. Our experience is that many end users pay more attention to the business interface when the critical factor in solution success is actually at the device level.

6.0 Elements of a successful IT asset tracking RFID solution

End users adopting RFID for IT asset tracking no longer need to be pioneers. Those first implementors of RFID for IT asset tracking have helped identify four elements of a successful RFID solution implementation:

- Define your objectives
- Prioritize your use cases
- Pay attention to the physics
- Don't forget sustainment

6.1 Document your objectives

First and foremost, be clear about what you want to achieve and how you will measure success. RFID is powerful technology with broad application. You need to ensure you are channeling it into areas that are well aligned with your goals. For example, do you need to cut the time it takes to inventory your IT assets from six weeks to two? Do you need to put a solution in place that will formalize your compliance and audit processes? Or do you need to ensure that laptops don't walk out the door and result in the CIO finding himself on the front page of the Wall Street Journal and the Washington Post?



The objectives will determine your priorities for your initial roll-out, your integration requirements and even your user base. These factors will enable you to clearly articulate what you need and in turn, determine the appropriate timeline and budget.



6.2 Prioritize your use cases

At a high level, we discussed inventory, audit and security use cases in section 2.0. This will define what capabilities you require from a hardware and software perspective. It will also enable you to adopt the technology using a method that provides the most immediate benefit while building a foundation for expansion and additional leverage off the initial investment.



6.3 Pay attention to the physics

$$\begin{aligned}\epsilon_0 \oint \mathbf{E} \cdot d\mathbf{s} &= q \\ \oint \mathbf{B} \cdot d\mathbf{s} &= 0 \\ \oint \mathbf{B} \cdot d\mathbf{l} &= \mu_0 \epsilon_0 \frac{d\Phi_E}{dt} + \mu_0 I \\ \oint \mathbf{E} \cdot d\mathbf{l} &= -\frac{d\Phi_B}{dt}\end{aligned}$$

When it comes to RFID, physics matter. Physics is shorthand for RFID performance. IT assets in office environments and in data centers create some challenges. However, careful attention to the tag and reader selection, reader and software configuration and process design can ensure a successful solution implementation. One mistake can lead to an underperforming system that doesn't meet expectations.

6.4 Don't forget sustainment

Finally, once the RFID solution is installed, you are going to start relying on it; plan for support from the beginning. RFID systems are very robust, but issues can arise. Incorporating a support, maintenance and even real-time monitoring capability into your solution can offer peace of mind and more importantly, uptime. You wouldn't consider support after the fact for other enterprise solutions so don't forget it when deploying RFID.

At Quake Global IT asset tracking is one of five core areas where we place our focus. We have continued to focus in this area because of the tremendous benefits the technology provides to end users. We encourage you to reach out to us to ask additional questions and learn how others have successfully implemented RFID IT asset tracking in the past. To speak with a Quake Global engineer about what solution configuration might best fit your organization, please contact sales@quakeglobal.com or call (858) 277-7290.



What if you could follow best practices of early adopters?

7.0 About Quake Global

7.1 Tackling the tough RFID challenges

Long before any mandates were announced, Quake Global was already focused on challenging RFID deployments built around specific client needs. Quake Global is the recognized leader in applying the physics of radio frequency (RF) to engineer and deploy successful RFID solutions. Our team of physicists and RF engineers has successfully applied

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its expertise to tough-to-tag product materials, challenging RF environments and demanding process requirements. While many people subscribe to the misconception that the physics of RF are the biggest barrier to successful RFID projects, Quake Global is applying well established physics principles to overcome tough RF challenges and deliver successful results. Physics actually provides the key to understanding how to best deploy RFID solutions and reduce the project risks and pitfalls so common in early RFID initiatives.

7.2 Over 500 Projects Completed – a leader in RFID best practices

Quake Global simply has more experience than any other organization in RFID solution engineering and installations. Completing over 350 projects for many of the world's largest organizations, Quake Global leverages commercial best practices honed on client projects for global organizations such as Airbus, Johnson & Johnson, Cardinal Health, CareFusion, Mayo Clinic, Cerner, Smith & Nephew, Medtronic, Bristol-Myers Squibb, Banner Pharma, the U.S. Departments of Homeland Security, Defense and State. These commercial and government best practices are infused throughout ODIN solutions and are leveraged on project delivery.



8.0 About Motorola

Motorola's RFID solutions enable you to advance your business to a new level of efficiency by providing greater visibility into your inventory as it moves across the supply chain. With real-time tracking information, you'll always know where your critical business assets are. From the warehouse and loading dock to indoor customer-facing and carpeted environments, our fixed, mobile and handheld RFID readers help you achieve maximum visibility into your enterprise assets.



9.0 About OMNI-ID

Omni-ID® is the leading supplier of passive UHF RFID tags. Through its patent-pending technology, Omni-ID eliminated the interferences to metals and liquids that cause conventional RFID tags to underperform in harsh environments. Omni-ID's unique "plasmonic" design offers unrivaled read distances, global functionality, reliable RF performance, and the ability to function in a variety of environments. Omni-ID takes passive RFID technology to a new level, enabling a wide range of asset tracking applications including supply chain management, container and cargo tracking, and work-in-process.

