RFID File Tracking for Military Personnel Records

Executive Summary

Radio frequency identification (RFID) technology is used in an extensive array of industrial, government and commercial applications, including inventory and supply chain management, file and specimen tracking and the monitoring of high-value assets. The U.S. military is now exploring several applications of the technology for file tracking. A 3M file tracking pilot project conducted by the Personnel Administrative Center at Marine Corps Base Hawaii (MCBH) in Kaneohe, Hawaii, on the records of over 8,000 Marines suggests that the use of RFID can help improve productivity, reduce administrative errors and speed accepting, deploying and reassigning of personnel. For organizations interested in replicating the file tracking successes at MCBH, the 3M™ File Tracking System and procedures can be adapted and implemented to effectively and efficiently integrate with existing computer hardware and software applications.

RFID Technology: A Primer

Antecedents of RFID technology can be traced to the1920s and 1930s. During World War II, allied forces routinely used a similar technology to distinguish friendly aircraft from enemy forces. The technology was refined over subsequent decades and is now ubiquitous. RFID is used in warehouse and retail establishments to help simplify and improve the accuracy of inventory management; it can be found in vehicles (keyless ignition and automatic toll-payment systems) and passports; it is used in high-value asset tracking (lab samples and pharmaceuticals) and disposable shoe-tags for amateur races. Libraries around the world use it to manage print and electronic media, while hospitals, insurance companies, government agencies and legal firms use RFID tags to keep track of extensive archives of paper files.

In the simplest terms, an RFID system has two parts: a tag and a reader. Information is encoded on the tag; the reader accesses that information and passes it along to the person or system that needs it. The tag is composed of a microchip (which holds the information) and an antenna. This assembly is usually covered with a protective overlay. The back of the overlay has an adhesive so the assembly can be installed.

Modern RFID systems can be either passive or active:

- In an active RFID system, the tag has its own power source (usually a battery). Active tags can be read from up to 100 feet away, so they are useful for toll road collections and tracking hospital equipment, railcars, and other valuable assets. Because of their bulk and expense, active tags are usually not used on files, books or retail items.
- Most offices, libraries and retail establishments use passive RFID systems. These tags do not contain an internal power source. Instead, they are powered by the signal generated by the reader. Passive tags are less expensive and usually smaller and thinner than active tags. Also, the absence of a battery significantly extends the useful life of a passive tag.

Passive RFID systems are differentiated by their frequency, which affects the distance at which the tag can be read:

Frequency	Low	High	Ultra-high
	128 KHz	13.56 MHz	915 MHz
Range	0-6 inches	0-36 inches	0-15 feet

For many file tracking systems, high frequency (HF) tags are preferred; the 36-inch range of HF tags allows a handheld scanner to conveniently search an office or shelf, but limits the likelihood of false positives. (False positives occur when a scan of one office or file room inadvertently reads a tag in an adjoining office or file room.) Some systems employ ultra-high frequency (UHF) tags, which can allow real-time remote tracking of files using ceiling mounted readers. The limitations of UHF tags include the possibility of false positives and difficulties pinpointing file locations; some systems allow this problem to be minimized by reducing the scanners' read range.

Other RFID file tracking considerations:

Durability Versus Cost. Passive RFID tags are typically designed for either supply chain management or asset tracking. The distinction is important. With a supply chain tag (such as those found on retail merchandise), the emphasis is on low cost; durability is much less important because the item will be sold within a few months. In an asset tracking application (such as legal files or medical records), long-term tag durability is critical. Materials and assembly processes are designed to help ensure that the tag's longevity matches that of the item to which it is attached. In most cases, these tags are slightly more expensive than supply chain tags.

Other RFID Characteristics to Consider. When considering an RFID system, a potential purchaser should inquire about tag construction details (including the attachment of the antenna to the microchip, which can be a weak point), the adhesives, and the covering or sheathing, which is a key to protecting the electronics from physical damage and environmental harm. Tag testing procedures should also be discussed. Ideally, testing should include initial qualification of materials as well as accelerated aging tests that can reveal problems in key assembly processes (such as curing, lamination and the precise registration of RFID components).

Future-Proofing Your System. RFID is not an emerging technology; its performance and reliability are well documented. Nevertheless, RFID remains a fast-changing technology. Data formatting standards continue to evolve along with other tag characteristics.

Purchasers should only consider equipment that reflects the latest advances in RFID technology. They should also look for a system with flexibility, so that it can evolve along with new standards as they are promulgated by the international standards organizations.

Because upgrades and improvements are inevitable, purchasers should work only with suppliers that have a reasonable track record in the industry, a willingness to guarantee their equipment and tags, and a commitment to continued research and development.

RFID file tracking for civilian applications

File tracking is emerging as a valuable application of RFID technology. Legal offices, government agencies, medical clinics, insurance companies and others have found that the technology allows improvements in productivity and efficiency. A typical system includes tagged file folders, pads (or readers), software and handheld scanners.

Results have been generally positive:

- The DeKalb County Juvenile Court in Georgia uses RFID to track 12,000 manila file folders for more than 9,000 cases. The initial cost of the system—about $50,000—was quickly offset by annual savings of about $30,000.
- In Arizona's Maricopa County, where the United States fourth largest county attorney's office opens 100,000 case files a year, an RFID system generates savings estimated at $200,000 annually.
- Fulbright & Jaworski L.L.P.—one of the largest law firms in the world, with over 800 attorneys in eight offices throughout the U.S. and three international offices—recently instituted an RFID system at its intellectual property department in Dallas, which manages several thousand active legal files and adds up to 1,500 new files each year. Even though the department had a barcode system in place, it was able to increase its tracking accuracy from 65 percent to 95 percent. And the affordability of the RFID system meant the investment could be recouped in less than two years.

It is noteworthy that the use of RFID for file tracking continues to grow despite the movement toward a more digitized society. While many documents are now composed and disseminated electronically, paper documents remain important. Because they are less likely to be erased with an inadvertent keystroke, and because they can be harder to counterfeit and tamper with, they are considered more secure than digital documents.

RFID file tracking for military applications

Initial implementations indicate that military applications experience the same productivity gains realized in civilian applications of RFID file tracking. Furthermore, these RFID systems provide benefits that have particular value in a military setting:

- The tags have the durability to withstand global deployments over lengthy careers;
- The systems are affordable, particularly in light of the productivity gains they enable;
- The systems are typically intuitive, so they do not require extensive training;
- They also support the frequent need for swift and error-free deployment.

3M has recently installed two RFID file tracking systems for the U.S. military. At Fort Hood, Texas, a 3M™ RFID Smart Shelf System is tracking 150,000 medical records for the U.S. Army; this installation was launched in October 2008. In November 2008, the Marine Corps Base Hawaii (MCBH) in Kaneohe, Hawaii, installed a 3M file tracking system to monitor the personnel records of 8,000 Marines.

The MCBH (Kaneohe) installation:

The MCBH installation is a useful example of the productivity gains that can be achieved with an affordable system at a mid-sized base.

The base maintains personnel and medical records on approximately 8,000 Marines, in manila folders that can be up to 1.5 inches thick. When a Marine is reassigned, these folders move with him or her. The reassignment cannot proceed until the folder is located and physically transferred to the Marine; any delay or loss can impede the movement of the individual and his or her unit. In addition, maintenance of the filing system was becoming very time-consuming and a drain on resources. Monthly inventories of MCBH files frequently took a full week and required additional manpower to be assigned to the task to complete it in that time.

In 2007, base officials began to actively review file tracking technologies that could be used to improve productivity and speed administrative actions. After considering several options, MCBH officials selected a conventional 3M file tracking system, similar to those that have been used for many years by government agencies and law firms.

System components. With this system, an RFID tag is affixed to each folder. When a folder is removed from the file room, it is placed on a tracking pad along with the badge of the person removing it. The removal is automatically recorded; when the file enters a new area of the building, it is placed on the tracking pad and the new position is recorded. A handheld scanner is used for file room inventory and shelf management; it can also be used to scan an office for a missing file.

The MCBH system was tailored for the base's Installation Personnel Administration Center (IPAC). Each deck (or level) of the three-story IPAC building was equipped with a 3M™ RFID Tracking Pad. In addition to the three pads, the MCBH purchased the 3M system software (which was installed on computers provided by the base) and a 3M™ RFID Handheld Tracker.

System implementation began in November 2008. All 8,000 files were encoded in two weeks, using a tracking pad and information derived from the IPAC data base. (Downloading file information from a data base is easily performed and is the preferred method; when data is entered manually with a keyboard, errors can be more likely.)

Results. Initial results of the MCBH installation indicate immediate gains in productivity. The monthly inventorying of files, for example, previously took up to a week and often required work on weekends. Since the installation of the RFID system, monthly inventorying can now be performed in two to three hours.

Replicating the Kaneohe installation at other Department of Defense bases and facilities

The results of the MCBH installation suggest that RFID file tracking systems can help provide significant benefits in productivity, cost-saving and speed of acceptance, deployment, and reassignment of personnel and transfer of files. To replicate these benefits and help ensure a smooth implementation, Service officials will want to keep the following general principles in mind as they begin consideration of procuring and implementing a file tracking system:

System Design Considerations

Officials in personnel administration desire 3M RFID file tracking applications because large benefits appear to come as a result of little effort: the system is reliable, effective and unseen. It operates in the background, integrated seamlessly into an organization's daily administrative activities. However, those benefits are the product of real effort by those who assess the requirements, build the acquisition plan and implement the RFID system. To achieve an effective implementation, they must define the goals for their new system and make the final decisions about scope, budget and timing.

In designing an RFID file tracking system, four rules of thumb can be helpful:

Know what you do today. Begin with a snapshot of current activities (including a process map that details how files flow in and out of the facility) and determine the frequency of files becoming missing or lost.

Know what you want to do. Assess needed improvements in current operations; estimate future needs and expectations; set goals for the use of a file tracking system.

Understand the technology. Learn about RFID capabilities, tag standards and, especially, tag reliability. Sales consultants can be helpful, but their information should be supplemented with research that draws on other sources, including conversations with other users about system performance, speed of conversion, and vendor performance.

Design a system, not a shopping list. Ensure the components of an RFID system will work together and that warranties cover the system, not discrete pieces of equipment.

Vendor Selection Considerations

Conversations with vendors usually start early in the project's design phase. These vendors can provide initial guidance on the benefits of RFID systems, the process of mapping current operations and common strategies for planning and implementation. When evaluating and selecting an RFID supplier:

Compare the warranties. The guarantees offered by vendors can differ considerably. Special attention should be paid to tag warranties. Some suppliers will offer low-cost solutions based on tags designed for relatively short-term use (such as retail applications). A tag designed for file tracking should be warranted for the life of the file to which it is affixed.

Compare written commitments. Product warranties are only part of an RFID vendor's responsibilities to the customer. In addition, the vendor should commit in writing to periodic and timely system upgrades that reflect advances in technology.

Seek independent endorsements. Vendors are not always the best judges of how well their equipment performs, or of their after-sale service and reliability. Ask for a list of their customers from the past two to five years.

Compare service contracts. A qualified vendor should be able to offer a long-term service contract. This is an additional cost, but most purchasers find it a wise investment. The service contract should spell out expectations, including remote assistance for simple software problems and a guarantee of timely on-site support (by a factory-trained technician with a stock of commonly needed parts) for more difficult problems.

Implementation

Once you've settled on the design vendor, the physical installation can begin:

Begin site planning as soon as possible. Thoroughly analyze your site and determine your new workflow; this will help identify where you will place work stations. To assist you in this effort, most vendors will provide a project manager on request.

Create a detailed implementation plan. Determine your schedule and resources for installation, tagging of files and staff training.

Prepare the organization. Implementing an RFID system will require changes in the organization. Managing that change begins with a thorough explanation of the new system, how it functions, and how it will improve staff members' work.

For additional information about 3M file tracking systems or the MCBH installation, contact:

Erik Johnson
3M Track and Trace Solutions
651-737-1003

About 3M Track and Trace Solutions (www.3mtrackandtrace.com)

3M's cost-effective RFID file tracking systems have been installed in government agencies, insurance companies, hospitals and clinics (including Ft. Hood, Texas), and a number of the country's leading legal firms. The technology at the core of 3M's file tracking systems is also found in libraries around the world, and in specialized systems for tracking high value assets, such as lab specimens and cancer-fighting pharmaceuticals.

3M Track and Trace Solutions
3M Center Building 225-4N-14
St. Paul, MN 55144-1000
USA
1-800-944-3512
www.3Mtrackandtrace.com

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