Streamlining Government Activity with Mobile and Wireless Applications

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Introduction

Government agencies at all levels are learning how to improve responsiveness, manage assets more efficiently, decrease capital expenditures and reduce labor requirements by adapting mobile and wireless technologies that are used extensively in the private sector. The proven benefits these technologies provide for government operations are driving an explosion in usage. Municipal governments alone will increase their spending on mobile and wireless systems more than tenfold, from $802 million in 2005 to $8.6 billion in 2010 according to Juniper Research.[1]

Mobile computers, automated data collection (ADC) devices, and wireless communications can be used for a variety of common public sector activities, including inspections and reporting, asset management, inventory control, security, personnel management and more. Supporting operations with proven technology solutions can significantly reduce the time, expense and clerical support required to manage paperwork, improve asset availability, reduce losses and improve productivity. For example, Maricopa County in Arizona predicted it would reduce the time required to take asset inventory by 75 percent and save at least $40,000 annually in labor by implementing a new handheld computing system. New York City officials estimated a new wireless computer system will reduce the time needed to record and report environmental data for emergency response from five hours to just minutes.

This white paper will describe these and other real-world programs, provide an overview of mobile, wireless and ADC technologies and explain how to take advantage of them for public sector applications.

Technology Building Blocks

By using mobile computers and supporting technologies, organizations can eliminate the errors, delays and clerical costs associated with recording information on paper forms and the additional step of keying the data into a computer system. With mobile computers and automated data entry, information is entered one time, in the field where the data is encountered, and checked for accuracy before it is forwarded to the host computer system. Wireless communication technologies enable information to be exchanged in real-time across an office or across town.

The main building blocks for automated operations are mobile computers, automated data collection (ADC) technology, application software and host system connectivity, which is often wireless. Mobile computers include laptops, vehicle-mounted units and handhelds. The leading ADC technologies used in mobile operations are bar code and radio frequency identification (RFID). Bar code and RFID reading capabilities are often built into rugged handheld computers. Real-time wireless connectivity to the host system is also common, although mobile units can also perform batch downloads through a cable connection.

Mobile Computers

Mobile computers must be matched to their usage conditions to provide reliable performance and ongoing value. Some important selection criteria include whether the computer will be used indoors or out, ruggedness, the preferred software operating system, screen size, memory, available card slots and interface ports, support for desired input method (e.g. touchscreen, key

entry, forms-based pen computing, bar code scanning, RFID, etc.) and support for desired wireless connectivity and security. Most consumer-grade PDAs and combination cell phones/organizers are unsuitable because they are not durable and often lack the memory, processing power, interfaces and accessories needed to run enterprise-type applications. In fact, industrial-grade mobile computers provide a total cost of ownership (TCO) advantage over consumer PDAs after only two years, according to industry research firm Venture Development Corp.[2] For more information about TCO considerations for mobile computing systems, see Intermec's white paper "It Pays to Understand the Total Cost of Ownership for Mobile Computers," which is available free at www.intermec.com.

Common laptops are also often unsuitable for mobile applications for many of the same reasons PDAs and cell phones are not practical. Ruggedness is always a concern with laptops. They are also designed to run standard, keyboard-intensive enterprise software, not specialized mobile asset, inventory and personnel management applications that take advantage of ADC technologies.

Rugged mobile computers are available with full touchscreens, smaller screens and full keyboards, and numerous screen-keyboard combinations. Many run a version of the Windows operating system that is optimized to conserve power and support other features important to mobile users while providing a familiar environment for enterprise support, integration and software development. Some rugged mobile computers can simultaneously support multiple forms of wireless communication. For example, a single device can have a WiFi interface for use on wireless LANs, use cellular networks for wide-area data exchange, plus support a Bluetooth interface for communicating with peripheral devices such as wireless portable printers.

Wireless Communications

The three general types of wireless communications for public sector applications are local area (wireless LAN, e.g. WiFi), wide area (cellular) and personal area (Bluetooth). Wireless LAN and wide-area wireless communication are commonly used to eliminate the latency between when an activity occurs and when it is recorded in a central computer system. It is also used to communicate work orders, messages and dispatch changes in real time. Bluetooth, when used as an alternative to cables for connecting peripherals, can reduce maintenance and improve ease of use. Applications may also use other types of wireless communication peripherals and systems, such as RFID, Global Positioning System (GPS) and Geographic Information Systems (GIS).

Most municipal and commercial wireless hot spots are built on WiFi technology, which is the popular name given to IEEE 802.11 -standard wireless LANs. 802.11b was the dominant standard for many of the first wireless networks that cover offices and campuses. 802.11g is a later version that is fully backward compatible with 802.11b and provides more bandwidth, which enables stronger security and provides other advantages. Mobile devices enabled with 802.11b/g radios can be used on any network that supports the standards, although network security can be set to exclude access by unauthorized devices.

1   Juniper Research "Mobile Governance," January, 2006.
2   Venture Development Corp. "Total Cost of Ownership Models for Mobile Computing and Communications Platforms" January, 2004.

There are many security protocols, standards and architectures available to make wireless networks highly secure, including the Federal Information Processing Standard FIPS 140, which is required for U.S. federal government wireless implementations. To prevent loopholes, all wireless infrastructure equipment and mobile devices used on the network should support the same security protocols, so compatibility is an important purchasing consideration.

Wide-area wireless connectivity is available through private dedicated voice and data networks typically used for public safety operations, and through data services offered by commercial wireless carriers. The explosive growth in cellular use and services in recent years has made wireless communication available, affordable and practical for many municipal activities. These operations and their benefits will be highlighted in the Applications section.

More information about all these wireless technologies and wireless security is available at the White Papers section of www.intermec.com

Automated Data Collection

Workers can enter information by bar code, RFID or speech recognition faster than they can record it manually using pen and paper. Forms-based applications on touch-screen and pen computers are usually time-neutral compared to paper-based procedures, but improve accuracy by providing limited response options that prevent erroneous information from being recorded. All these forms of automated data entry have been proven to produce significant time and cost savings in the office, because no clerical support is required to file paperwork or transcribe it into a computer system.

For bar code and RFID applications, a label or tag is typically encoded with a serial number, location code or another identifier and applied to an object. The encoded data is typically a unique identifier that links the item to a record in a database. When the bar code or RFID chip is read, the ID is passed through an interface to the database or software application that holds information about the object. An alternative is to make the tag or label itself a small database of relevant item information by using a two-dimensional (2D) bar code symbology or a high-memory RFID chip.

Bar code readers process information by illuminating the symbol and recording the differences between dark and light, and narrow and wide bars and spaces. Bar codes therefore require contrast between dark and light and must be kept reasonably clean and visible for scanners to perform. If the proper materials are used, bar codes can be applied to a variety of materials for permanent identification.

RFID doesn't require a direct line of sight between the reader and the tagged object, which is an extremely useful feature for environments where objects aren't easily accessible to workers, or where hazardous conditions prevent other forms of data collection. The reader sends an RF signal to the tag, which responds with its stored data. RFID tags are also rewritable, so they can be updated with inspection/audit data, service histories and other information. RFID is widely used by the federal government and military for asset tracking, file and document management, inventory control and secure identification.

Whether for simple identification or more data-intensive applications, bar code and RFID readers record information much more quickly than workers can do manually and do not make typos or other data entry errors. More information about the technologies is available on Intermec's Web site. The following sections will show how these technologies have been successfully integrated to improve operational performance, responsiveness and security.

Applications

The principles of accurate identification and real-time system updates can be applied many ways to improve how people, assets and records are secured and managed. Maricopa County, for example, uses handheld computers with integrated bar code readers to track assets, conduct annual inventories, assign supplies to work crews and to track documents. The county, which is the fourth largest in the U.S., credits the system for improving productivity enough to allow it to provide more services and serve more residents without increasing its staff.

RFID technology is used in ID cards that improve security at facilities and borders, and is also used for wireless inventory tracking that has saved the U.S. Navy millions of dollars in lost time and materials. These and other applications are profiled below.

Asset & Inventory Management

Asset management and inventory control applications present some of the best opportunities to reduce expenses and improve responsiveness. By accurately identifying inventory, assets and their locations, organizations reduce safety stock and the associated purchasing, storage and handling expenses while simultaneously improving asset availability. Mobile, wireless and ADC technologies make it convenient and practical to attain these benefits without imposing time-consuming data entry requirements on workers. Because information and transactions managed with automated applications do not need to be manually entered or transcribed into multiple computer systems, clerical support time and labor is also reduced.

Maricopa County uses handheld computers with bar code scanners to check out equipment and supplies assigned to work crews, to record goods entered and removed from inventory, and to identify and record items for the county's annual asset inventory. The county estimates the system provides labor savings worth $11,900 annually because of the time savings gained from managing inventory and supplies. Without the productivity improvements provided by the system, the fast-growing county would have needed to hire three additional employees to manage its increased workload. County officials project that taking the annual inventory by bar code scanning with mobile computers will save 75 percent of the time required to take inventory by clipboard, pen and paper.

At Rock Island Arsenal, wireless inventory tracking eliminated a one-day delay between when materials were received, moved and processed and when the information was available in the central computer system. The U.S. Army facility assembles tool sets, some with 3,000 individual pieces, to support military operations and also provides distribution services. Because of the data entry delay, inventory records were not up to date and accuracy was only 93 percent.

Rock Island Arsenal installed a wireless LAN with FIPS 140 security to cover a 770,000 square foot distribution center where tool sets are assembled and shipped. Workers now use handheld and cart-mounted wireless computers with integrated bar code scanners to record work-in-process activity plus all material movements. Activity was previously recorded manually and wasn't entered into the central computer for 24 hours. Real-time data entry through the wireless LAN has eliminated information latency, reduced cycle times and raised inventory accuracy to more than 99.5 percent.

The bar code supply tracking system used at more than 100 U.S. military hospitals illustrates more benefits to automating operations. Personnel use handheld computers with integrated bar code scanners to count shelf inventory and reorder supplies. The mobile computers use a wireless LAN connection to the host system to provide real-time inventory updates and status checks. Improved inventory accuracy from bar code scanning and real-time reconciliation led to an 81 percent reduction in excess inventory, which saved $389 million in pharmaceutical costs alone. The order-to-receipt cycle time was cut from 20 days to 24 hours, which ensures facilities will have critical supplies on hand without having to overstock inventory.

RFID tags are frequently used for tracking high-value or time-sensitive inventory and assets. The Navy uses RFID tags on kits, repair parts and supplies for delivery to ships as part of the Philadelphia Inventory Management System (PHIMS) program, and for aircraft part tracking in another program. Kits for supporting aircraft frequently contain 500 to 600 parts packed into a single container. By taking advantage of RFID's high-speed and no-line-of-sight reading capabilities, the Navy has reduced the time to inventory and record these parts from 24 hours to 30 minutes. If fully deployed, the system will produce $2.2 million in annual labor savings. RFID tracking in the PHIMS program improved inventory accuracy by 48 percent, raised productivity by 50 percent, and produced $5.3 million in excess inventory savings.

File & Record Management

Files, documents and records can be tracked much the same way as assets and inventory. Using a bar code reader connected to a PC or mobile computer to scan labeled materials is a cost effective, convenient and accurate way to record file transfers and to build a chain-of-custody record. Maricopa County calculated that this process would save between five and 10 minutes each time a box of records was checked out of or returned to its archives.

Automated file and document tracking applications can be adapted for use in offices and remote locations to manage permits, licenses, applications, tax records, inspection reports and other documents. Applications can also be extended to storage warehouses. The U.S. Social Security Administration ran an RFID tracking trial that reduced the labor requirement at a document and forms warehouse by between 30 and 35 percent. Virtually any office or process that has paperwork can benefit from the proven time savings and accuracy improvements provided by automated tracking systems.

Field Data Collection

Automation benefits can also extend to the field, where information is captured and reports are created. Recording inspections, citations and test results on mobile computers can eliminate paperwork altogether while making information available more quickly. These applications can be learned quickly because they feature electronic versions of familiar forms. Organizations that implement field data collection systems often experience significant accuracy improvements from the error checking built into the software, improved mobile worker productivity, and significant office paperwork reductions that lower costs and support staff requirements.

Wireless technologies add value to field operations by enabling two-way messaging and communication and by providing remote access to maintenance histories, past inspection reports and other information stored in central computers. Work performed in the field can be recorded instantly on host systems using real-time wireless connectivity, which can also be used to update work orders and dispatch instructions. GPS and GIS help streamline operations by providing maps and driving directions, and by automatically recording locations where work is performed.

Wireless handheld computers make New York City health and environmental inspectors more productive in daily operations, and improve safety and responsiveness during emergencies. Inspectors use rugged mobile computers to complete inspection reports, enter test data and take notes. Violation codes and other commonly used information is presented in software menus, which enables faster data entry and prevents typographical errors. A GPS receiver and software built into the handhelds automatically fills in location information, ensuring results are entered for the correct location.

The mobile computers have GPRS wireless communication which enables them to share results and access information from central records systems from anywhere in the city. Inspectors can also use the radio to instantly share information with first responders in case of emergency. A separate Bluetooth radio integrated in the handheld lets inspectors collect readings from Bluetooth-equipped radiation monitors remotely without having to walk straight to the source.

Emergency Management and Security

There are many other ways to take advantage of mobile computing systems to improve emergency response and security. In mass casualty drills, the Seattle Fire Department has reduced the time required to identify patients and share their medical information during triage to just 10 seconds. Victims brought to triage are given an RFID tag that provides accurate identification whether or not the patient is conscious. Medical staff members create patient records by reading the tag with a handheld computer with integrated RFID reader and entering vital signs and other critical information by pen input. The computers have wide-area wireless connectivity, so medical staff on site and at remote hospitals can view the medical information in real-time and make informed transport and treatment decisions. For day-to-day operations, the mobile computers are used to track department assets and inventory.

RFID is also commonly used for security, specifically to control access to facilities and even for border crossings. Because low-cost RFID tags and ID cards can be read from a distance with no direct line of sight, the technology is ideal for managing access and relieving congestion. The NEXUS program is a good example. Low-risk U.S. border crossers can apply for a NEXUS ID card which is encoded with a unique tracking number, and which has their digital photo printed on the card. NEXUS members can use special RFID-equipped car lanes at border crossing points. The clearance process

takes only about five seconds. RFID is more commonly used to control access to numerous gates, parking facilities and doorways at businesses and office buildings, and at many ports, military bases, labs and other government facilities.

Intermec Provides Experience, Expertise & Technology

For more than 25 years, government agencies at the local, state and federal levels have worked with Intermec to develop real-time information systems that help them improve safety and service, operate more efficiently, reduce errors and better utilize their resources. Intermec is a leading provider of mobile, wireless and data collection technologies to the public sector. All the examples referenced in this white paper are Intermec customers. Visit www.intermec.com to see complete case studies on all these systems plus many more government and military agencies, including the City of Boise, New York City Sanitation Department, San Jose Police Department, Social Security Administration and the U.S. Coast Guard. The Web site also has an extensive library of free white papers about mobile computing, wireless communication and security, ADC technologies, project management and applications.

Intermec's CN3 mobile computer is the smallest and most advanced rugged wireless computer available, and has proven popular with public sector organizations for a variety of uses. It offers integrated wireless voice, data and e-mail communication, plus GPS, with wide-area wireless, Bluetooth and secure, 802.11-standard WiFi wireless LAN connectivity. The CN3 also includes an integrated 2.0 megapixel color camera that can attach photo records to inspection reports, maintenance forms and other records, and supports bar code and RFID data entry. These advanced features are built around standard components for easy integration with legacy systems. The CN3 is a Windows Mobile 5.0 computer with an Intel processor and Cisco Compatible Extensions (CCX) for seamless connectivity to Cisco wireless networks. Intermec's extensive partner network offers many software applications that take advantage of the CN3's capabilities to automate safety, security, service, materials management and other operations.

Summary

Mobile, wireless and ADC technologies can be readily adapted for a variety of uses by public sector organizations of all sizes and levels. These technology solutions produce proven results and strong return-on-investment, which is helping drive the current explosive growth in adoption.

Contact Intermec to learn more about how Intermec can help government operations. Intermec Inc. (NYSE:IN) develops, manufactures and integrates technologies that identify, track and manage supply chain assets. Core technologies include RFID, mobile computing and data collection systems, bar code printers and label media. The company's products and services are used by customers in many industries worldwide to improve the productivity, quality and responsiveness of business operations. For more information about Intermec, visit www.intermec.com or call 800-347-2636.

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