Intermec

White
Paper

WHAT RETAILERS NEED TO KNOW ABOUT RFID & GEN 2

INTRODUCTION

2005 is proving to be a momentous year for RFID in the retail industry. The standards clouds have lifted, top retailers in the U.S. and Europe have gone live with implementations, new pilots are sprouting, existing pilots are spreading and interoperable products from multiple manufacturers are starting to reach the market. The number of retailers planning to implement some form of RFID in 2005 more than doubled from the previous year, to 35 percent, according to a study by the National Retail Federation (NRF) Foundation and BearingPoint.

Retailers need to know what is driving this growth, where it is going, and if they should go along. This white paper will start to answer those questions by providing a concise look at the top-of-mind RFID issues in the industry and presenting an overview of RFID applications and possibilities. It will also explain why the new EPC UHF Generation 2 (Gen 2) standard is enabling retail implementations and provide guidance for evaluating and implementing Gen 2 technology.

RETAIL RFID ISSUES AND ANSWERS

Why are retailers interested in RFID?

Leading retailers are interested in RFID for its bottom line-benefits. Early adopters have shown that RFID can be used to collect more information with less effort, resulting in more timely and accurate inventory counts. The availability of this data will enable leading retailers to make advantageous business process changes, both internally and with their consumer packaged goods suppliers. Retailers can use this information to hold less safety stock, and can create new business processes that take advantage of RFID to reduce the time and labor required for receiving, put-away, shipping and other inventory handling operations.

Out-of-stocks are of particular interest because they cost retailers an average of four percent of sales, and cost the CPG industry billions more according to a Grocery Manufacturers of America (GMA) study. For the top 25 grocery categories alone, out-of-stocks put more than $6 billion in annual sales at risk according to a 2002 GMA study. Losses from unsaleable products add billions more to the total, including an estimated $565 million from expired products in 2004, according to data from the GMA and the Food Marketing Institute (FMI). In 2003 the NRF's annual study measured shrink in the U.S. at $33.6 billion, the highest level ever recorded. These problems have persisted for years and make new solutions worth exploring.

Will retailers, in general, start to deploy RFID to some degree in 2005?

According to a study of more than 300 retailers based on a survey by the NRF Foundation and BearingPoint, 35 percent of retailers indicated that they will deploy RFID to some degree in 2005. That is up from 15 percent in the same survey the previous year. The study also indicates that deployment will increase gradually , because fifty percent of respondents said they would tag between six and 10 percent of their merchandise, and 11 percent saw RFID deployment in 2005 as being of key strategic importance.

What do standards like the emerging EPC UHF Generation 2 mean to retailers?

The recently ratified EPC UHF Gen 2 standard and the RFID standards work being done by ISO are the key to progressing RFID acceptance into the mainstream. With global RFID standards coming into place, the key technology providers are now spending the millions of dollars that are necessary to gain the system performance increases and cost reductions that the market needs. This will result in more affordable solutions and a better variety of choices.

Is item-level tagging moving forward?

Item-level tagging will move forward on products and product categories where the business case warrants it (higher cost, higher theft, regulatory compliance, etc.) or in situations where a single unit

is a "case" (e.g. TV, refrigerator). The Association of Retail Technology Standards (ARTS), a division of the NRF, predicted in 2004 that 50 percent of retail items will be tagged by 2010. Most pharmaceutical items will be tagged by 2007 according to an ARC Advisory Group study.

There are many additional benefits that can be derived from tagging on an item level over pallet/case tagging. Intermec expects that as Gen 2 products become available, it will be practical to tag a number of items that were impractical to tag with previously available EPC technologies. The performance, cost and breadth of choices with Gen 2 will provide relief to some of the limitations plaguing EPC Class 0 and Class 1 Generation 1; however the majority of activity will continue to be focused on the pallet/case level for the near term.

How could RFID impact the consumer's shopping experience?
RFID will help keep the products consumers want on the shelves by helping a retailer and its consumer goods suppliers to better manage their inventories through increased inventory visibility. Self-service kiosks, unattended shelf monitoring and other advanced applications could also enhance the shopping experience, particularly as item-level tagging becomes available.

What should retailers consider when purchasing RFID hardware?
Two of the key issues effecting retailers' purchasing decisions are compatibility and the ability to be upgraded. It is critical that retailers and their CPG suppliers have compatible readers and tags. The EPC Gen 2 standard is clearly the leading protocol for use in the retail and CPG industries going forward. Current RFID users are getting ready to migrate to Gen 2 and most new industry implementations will be built on the technology.

How should retailers determine which suppliers to work with on RFID pilots/ implementations?
The ideal candidates would be suppliers that are doing an important amount of business with them, have the necessary business systems in place, are technically capable and are willing to work through some start-up problems.

How does RFID data relate to data synchronization?
RFID data complements, and is based upon, the data that is specified in Global Data Synchronization Network (GDSN) related systems. RFID data can be dynamic and based upon transaction activity, whereas GDSN data defines the products to be transacted and is static.

Much like bar code technology, RFID can automate the data that is collected in a CPG supplier and retailers' operations, thereby reducing errors. This holds the promise for improved collaboration between retailers and CPG suppliers and better decision making that is based upon good, clean, timely data. The GMA, FMI and National Association of Chain Drug Stores (NACDS) issued a joint report in 2004, "Connect the Dots: Harnessing Collaborative Technologies to Deliver Better Value to Customers" that concluded that maximizing the benefits of EPC implementations requires a strong global data synchronization foundation.

How long should retailers wait before implementing RFID?
We expect that RFID implementations will see an increase this year with the greater availability of the products and services that are global, integrated, cost effective, high performing and reliable. As retailers that are using RFID are able to benefit from improved supply chains and business relationships they will gain competitive advantages. The competitive marketplace will determine when other retailers will need to follow to reap the benefits that RFID technology has to offer.

What should retailers do to prepare? What technologies should they be anticipating?
It is very important for retailers to understand their existing systems and business processes so that they can fully identify their opportunities for improvement and pain points. It is also important for retailers to understand the specific advantages and nuances of RFID and other alternative data collection technologies

such as voice and bar codes. This will increase the retailer's confidence that they are applying the right solutions to the right problems. The knowledge and insight from pioneering retailers, consumer goods suppliers and technology providers will also greatly help retailers to increase their benefits and reduce the risks of a RFID implementation. This can be initially gained by the information that has been shared publicly, but needs to be validated by actual experimentation and experience with the technologies within the retailer's operations. Finally, it is critical that retailers are in lockstep with their consumer goods supplier partners so that they can both benefit to the fullest.

WHAT THE EPC GEN 2 STANDARD MEANS TO THE RETAIL INDUSTRY

Gen 2 refers to the EPC UHF Generation 2 RFID standard from EPCglobal, which is a subsidiary of GS1 (the name adopted in 2005 for the Uniform Code Council and EAN International organizations), the same not-for-profit organizations that issue U.P.C. and EAN numbers and manage the EAN. UCC system. The EPC system is unique among RFID technologies because it creates serialization and provides a data structure that meets consumer goods and retail industry needs, in addition to defining technical specifications that meet real-world performance requirements. EPCglobal ratified the protocol as a standard in January, 2005 and submitted it to the ISO for international standards recognition, which is expected to be completed in 2006.

There was unprecedented user involvement in developing the Gen 2 standard, with retailers and consumer goods manufacturers taking a leading role in determining which features and performance requirements were necessary. In the U.S. alone, more than 200 end-user organizations have joined EPCglobal US, in addition to dozens of technology developers, standards bodies and research organizations. The GMA, FMI and NACDS called for EPC to be adopted as the global standard for electronic product identification. Albertson's, Best Buy, METRO Group, Tesco, Wal-Mart and other leading retailers are committing to Gen 2 for their RFID development efforts, and so are many of the CPG manufacturers who supply them. A research report by Incucomm predicts "By 2006 EPC-type RFID will dominate the volume of tags sold." Explosive growth is also predicted in several other professional market research reports.

RFID technology manufacturers have rallied behind the Gen 2 standard. Gen 2 can be used around the world, which is critical for the ultrahigh frequency (UHF) RFID technology necessary for supply chain applications. A standard that can be used worldwide provides a global potential customer base that creates unprecedented economies of scale for RFID product manufacturers. The result could be similar to the impact that ratification of the IEEE 802.11b standard had on the wireless networking industry. Wireless networking was available prior to the 802.11b standard, but was only used in select niches because the technology was highly proprietary and offered no multi-vendor interoperability. The standard created a very competitive marketplace marked by rapid innovation, falling prices and widespread adoption.

There are several other reasons EPC is poised to become the dominant RFID standard in the retail industry and is stimulating more RFID implementations than ever before. The standard was created to facilitate the use of Electronic Product Code™ (EPC) numbers, which uniquely identify objects, such as pallets, cases or individual products. Retailers can take advantage of unique EPC numbers to gain new levels of visibility into inventory status. The information can be used to create efficient new business processes for replenishing merchandise, controlling shrink, automating shipping and receiving, managing recalls and satisfying traceability and pedigree requirements.

The extensive input from the user community, who shared results of technology trials and prior RFID experiences, led to Gen 2 standard specifications that overcome the international compatibility and performance limitations present in previous-generation EPC technology. Gen 2 is the first RFID protocol that truly meets user needs for data and technology performance.

HOW EPC GEN 2 MEETS RETAILER REQUIREMENTS

Gen 2 provides specific advantages in six performance areas that are important to retail supply chain operations: speed, efficiency, reliability, range, security and cost. The following sections describe the retail industry's real-world RFID performance requirements and how Gen 2 satisfies them.

Speed

Retailers can reduce labor, improve accuracy and cut costs by using RFID to record goods in, track and count inventory, and to record outgoing shipments. To realize these benefits, systems must be able to read tags at the speed items move on conveyors and forklifts. The Gen 2 standard does not state a minimum reading speed for products because too many variables (e.g. interference, number of items to be identified, reader power output) impact performance. However, the specifications in the Gen 2 standard should enable readers to perform up to 1,500 tag readings per second in North America and 600 reads per second in Europe, where regulations for power output, bandwidth and duty cycle are more restrictive. These speeds support the ability to identify objects on conveyor belts moving 650 feet per minute, and those being carried by forklifts that pass through reader portals at eight miles per hour. The write rate, which is highly dependent on the amount of data being written, is about 10 tags per second and is fairly consistent worldwide.

Selective reading is an important requirement for distribution operations. For example, workers at a distribution center often need to quickly locate specific items from incoming shipments so they can be cross docked to fulfill waiting orders. The Gen 2 spec supports "group select," a feature that is very important for providing high-speed reading and sorting. Group select enables RFID interrogators to be set to seek and read select groups of tags and to ignore others in the read field. For example, interrogators could be set to seek specific cases in a shipment and to alert the operator once the cases are identified. The rest of the shipment could be identified after the needed item was read and pulled from the pallet to complete a rush order. Interrogators can also be set to ignore case tags and only record pallet tags. The feature reduces the amount of data the system must process, which enables faster reading.

Users need to be assured that all selected tags will be identified as they pass through the read field; it is more important for reads to be right than to be fast. Tags on the edges of the reading field don't receive full power from the reader, and therefore may not remember if they have been identified. "Persistence" is a feature that gives tags the ability to remember their status if they lose access to reader power. Persistence greatly improves read performance, especially in large tag populations. Not all Gen 2-compliant products support persistence, so it is important to investigate this capability when evaluating equipment.

Bandwidth Efficiency

One of the most important and valuable features of Gen 2 technology is that it can be used throughout the world. Global compatibility overcomes a fatal flaw of previous-generation EPC technology and was developed in direct response to retailers and CPG manufacturer needs. The same EPC tag can be applied at a factory in Asia, read throughout the logistics processes and used at distribution centers in North America and Europe. Multiple tags are not necessary to meet different international wireless regulations, and site licenses are never required for Gen 2 systems. RF regulations still vary by country, but Gen 2 satisfies international requirements because tags are frequency agile, which means they support a range of frequencies (860-930MHz).

The Gen 2 standard also has specifications so users can manage bandwidth efficiently and optimize their system performance. The standard actually defines three separate Gen 2 reader environments – single reader, multi reader and dense reader. Specifications for readers operating in each of these environments are intended to provide improved performance. EPC Gen 2 tags are not made specifically for different reader modes and can be read and written to by products from each category.

The single reader specification is intended for implementations where there will only be one interrogator per facility. Single reader mode allows bare-bones compliance with FCC requirements for bandwidth

management. It provides acceptable performance, but is not a good neighbor to other RF devices that may be operating nearby. There could be interference among Gen 2 equipment, wireless phones, older, non-802.11 wireless networks and other devices in the UHF frequency band.

Readers capable of operating under Gen 2 multi-reader conditions are more RF friendly and are intended for operations with up to about 10 readers present without causing significant performance problems.

Dense reader operation is required for facilities with more than 10 readers, which includes most distribution centers and stores where RFID systems operate. RF channels are used very precisely to minimize the chance of interference. For example, readers transmit within a different sub-band than tags respond. These sub-bands are defined so that readers never interfere with the much weaker replies from their tags. Using separate bands also minimizes interference and aids high-speed reading.

Selecting equipment capable of operating in dense reader conditions is the safest choice for implementing EPC equipment. It provides the most focused and efficient use of bandwidth, which optimizes performance and protects against interference.

Just one single-reader or multi-reader device in a dense-reader environment could easily overpower other devices and cause interference that prevents tags from being read. Therefore, starting a pilot with a single-reader mode interrogator and planning to add more units as needs grow is not a sound approach. Single-reader mode products are the easiest to design and cheapest to produce. Legacy RFID equipment that is said to be "software upgradeable" to comply with the Gen 2 standard may only be upgradeable to single reader operation. There are extremely limited opportunities to use single reader model products, so it is important for customers to specify dense reader capability where it is called for, keeping potential future system expansion in mind.

Reliability

The Gen 2 standard includes several improvements over the Generation 1 specifications and other forms of RFID to make reading performance more reliable. There are also ways to implement beyond the minimum requirements of the standard to further improve data integrity and system reliability.

Trials of previous-generation EPC technology produced false positive readings of tags that did not exist. These "ghost tags" are recorded when the reader picks up portions of data from different tags and interprets them as the identification of a single (non existent) tag. The Gen 2 standards developers recognized this flaw and modified the reading and verification protocols to prevent ghost tags from being recognized.

The Gen 2 standard also provides new flexibility for tag data content, and options for validating additional data. Gen 2 allows rewritable memory and supports larger memory sizes to accommodate additional data. The ability to record new data on tags at different points in the supply chain creates value-added application possibilities, such as generating electronic pedigrees, writing receiving, storage and handling data to the tag for automated stock rotation, FIFO and other inventory management applications. Shipments can also be associated with specific stores to facilitate returns processing, recalls and anti-diversion security programs.

Unlike CDs, Flash memory and other storage media, Generation 1 RFID tags do not automatically verify data written to them. Generation 1 technology users experienced lost and corrupted data, and made verification a requirement for the Generation 2 standard. Gen 2 adds support to verify data written to tags. Generation 2 is by design a more robust and reliable protocol that overcomes the Generation 1 data reliability problem. Insist on products that provide write verification if the integrity of written data, or the assurance that tags have been disabled, is important to your operations.

Security

Standard EPC Gen 2 tags are password protected against tampering. Disabling (killing) tags in the field so their data can never again be accessed is a requirement in the retail industry to satisfy consumer privacy concerns, so the standard supports this ability. Killing tags also requires a password, to prevent unauthorized and accidental disablement.

There are multiple ways to implement additional security, which will create differentiation among Gen 2-compliant products. "Cloaking" is the ability to set tags so readers must provide a password before the tag will respond with any communication. Passwords may also be required to write to tags or disable them.

Tracking by lot code, expiration date, and other new applications likely will emerge to take advantage of the data content flexibility that Gen 2 allows. Supplemental data doesn't automatically get the same protection as the originally encoded EPC number, so users must take steps to secure and validate data. Security is required to ensure additional data written to tags is protected. Supplemental tag data also can be password protected so it is available only to select business partners or internal users. Write protection and password protection are not standard features and will not be supported in all Gen 2 products.

Range

A major reason EPC Gen 2 adoption is poised for rapid growth is because it is the first standard available for use around the world that provides enough read range for RFID to be used in common supply chain business processes. Gen 2 systems should be able to read tags from at least 10 meters away, which will enable EPC tags and readers to be integrated into conveyor belt, automated sortation, forklift and dock door systems. High frequency 13.56 MHz RFID technology, which is available for use worldwide and is supported in several international standards, proved insufficient for these applications during user trials because it provides only a fraction of the range of the Gen 2 UHF frequency band.

Range will be different in every implementation because it depends on several variables, notably the power output of the reader (which is governed by different national telecommunications regulations), the amount of RF devices operating in the environment, and other potential sources of interference. Because of these differences, users can get more range from Gen 2 systems in North America than some other regions. Therefore it is important to test and evaluate equipment for all the locations and environments in which it will be used.

Cost

The previous sections have described how Gen 2 is the first RFID standard to fully address retail supply chain user requirements. Gen 2's capabilities are a reason it is widely predicted to become the dominant RFID technology. The other major reason is cost. Despite the performance advances, products based upon EPC Gen 2 will likely cost less than alternative RFID technologies.

Market forces will have the largest impact on Gen 2 tag and equipment costs and should make the technology cost effective for companies at all levels of the retail supply chain. Prior to Gen 2 standard development, vendor support for different forms of RFID technology was fractured, resulting in limited options for retailers and CPG suppliers. Gen 2 represents the first EPC technology that all the leading silicon suppliers, including Philips, Impinj, Texas Instruments and others, have committed to producing. Manufacturers of antennas, read/write equipment, printer/encoders and industrial computers also strongly support the Gen 2 standard in their product lines. Many middleware and software applications are being developed to support Gen 2 data structures. As a result, Gen 2 is expected to become the most competitive product segment within the RFID industry, giving users more product choices and competitive offerings.

BENEFITING FROM GEN 2 IN RETAIL OPERATIONS

The Gen 2 specifications provide the performance needed to efficiently read and update tagged objects throughout typical retail operating environments. Combining these capabilities with the serialized data structure paves the way for innovative new business processes that can improve inventory visibility and reduce product handling. The results, being confirmed in ongoing rollouts by METRO Group, Tesco, Wal-Mart and other early adopters, are increased product availability and improved inventory management with less labor requirements. Organizations are also well positioned to efficiently satisfy emerging traceability requirements such as the Bioterrorism Act and the Prescription Drug Marketing Act (PDMA), and improve security by deterring product counterfeiting, tampering and return fraud. The earliest retail rollouts started before Gen 2 technology was standardized and available. Results will improve as the more efficient Gen 2 technology is implemented.

Inventory Management

Improved inventory management is the leading motivation driving RFID in retail. Because RFID tags can be read through packaging, without concern to orientation, without direct line of sight between object and reader, without human intervention and can withstand exposure to dirt, heat, moisture and contaminants that make bar code unusable, the technology can provide visibility into areas where tracking previously wasn't possible. Retailers, logistics providers and manufacturers can all take advantage. The serialization the EPC system provides helps synchronize inventory activity throughout the supply chain. Unattended reading and synchronization combine to remove blind spots from inventory and supply chain operations.

Out-of-stocks can be reduced by creating new business processes to take advantage of RFID. Between 70 and 75 percent of out-of-stocks result from problems at the retail level according to a GMA study, which also found these problems cost retailers an average of four percent of sales. Various business case studies and pilot programs have found retailers can improve sales between 0.5 and 3.0 percent by using RFID to improve item availability.

A lot of attention is focused on using RFID as part of "smart shelves" that monitor tagged items on shelf locations to trigger timely replenishment. Until smart shelves are enabled by item level tagging, retailers can get similar benefits for significantly less cost by monitoring inventory at the case and pallet levels with RFID. METRO Group has proven the concept by reducing out-of-stocks by 11 percent since implementing RFID case and pallet tracking at select stores and distribution centers in Europe. By using RFID to record goods as they are received an accurate, real-time inventory record can be automatically built that can be accessed in real-time by enterprise applications and trading partners. Readers covering dock doors, warehouse racks, shelves and other storage locations could automatically record the movement of items and update inventory records. If an item was misplaced or needed urgently to complete an order, RFID readers could automatically search for the item by reading for its specific ID number.

Gen 2 EPC tags can be updated with supplementary information throughout the supply chain, such as processing locations, operator ID, lot codes and expiration dates. This additional information can be used to create more sophisticated processes. For example, RFID could aid adherence to FIFO management by monitoring inventory by expiration date and issuing alerts about products that are nearing the end of their shelf life. Associated business processes could reduce unsaleables by quickly getting the items to the retail floor for sale or marking them down.

Shipping & Receiving

Imagine identifying the cases on a mixed pallet in less time than it takes to scan a single bar code label. RFID can identify more than a thousand items per second without the worker intervention needed to scan objects or position them for processing by a fixed-position bar code reader. By positioning RFID readers at dock doors, organizations can automatically record the contents of

incoming shipments as they are unloaded from trucks. Because Gen 2 RFID systems can work side-by-side with 802.11b wireless LANs, inventory and warehouse management systems can be updated in real time. The fast, labor-free shipment identification is especially useful for cross-dock operations to help quickly route fast-moving items to waiting outbound trucks.

METRO Group has implemented a variety of dock-door and forklift-mounted RFID readers from Intermec for automated receiving at its distribution center in Unna, Germany. METRO reports trucks are being unloaded 15 to 20 minutes faster since the system has been in place. RFID readers are also used to assist outbound shipment preparation. The applications are producing an estimated 14 percent savings in warehouse labor at the facility and a 17 percent labor savings for case handling at stores with RFID receiving systems.

Using RFID to read tagged cases can save time and improve accuracy for outbound shipment processing. Readers in the packaging or shipping area can identify cases being loaded onto a pallet and match them with an order to verify the shipment is complete and that no extra items are included. The data (which requires no worker intervention to collect) can also be used to create an advance ship notice (ASN), a bill of lading and a pallet shipping label (with or without an encoded RFID tag). Reading at the dock could also automatically record the time the shipment left the facility, which could be used for tracking and traceability applications.

Traceability and Recalls

Serialization and automated data recording are valuable tools to help retailers comply with emerging product tracking requirements such as the TREAD Act, Bioterrorism Act, the Prescription Drug Marketing Act and various pedigree record laws. The FDA Anti-Counterfeit Task Force praised EPC technology for its ability to efficiently meet pedigree requirements and said RFID is the "most promising approach to reliable product tracking and tracing."

Efficient traceability is extremely valuable for recalls. Tracking products by EPC number, or by optional lot code and expiration data encoded on the tag, gives retailers the ability to isolate and validate products. RFID technology makes it practical to track serialized cases to the store level without requiring significant labor for data collection and processing. If a recall occurred, retailers could quickly determine which stores received recalled products so unaffected items would not have to be pulled from shelves.

Security

Improving traceability also improves security. Because RFID tags are highly tamper resistant, they provide an excellent method to identify shipment authenticity at any point in the supply chain, which is a deterrent to diversion and counterfeiting. RFID is also proving to be an effective safeguard against employee theft, which costs U.S. retailers an estimated 0.8 percent of sales according to the NRF. RFID readers can be positioned to cover all entry and exit points at the back of store or in distribution centers. The unattended, uninterrupted reading capability would automatically monitor merchandise. Notifications, alerts or alarms could be issued based on pre-set conditions, such as an attempt to remove items at an unusual time. METRO Group estimated it has reduced shrink by 11 to 18 percent by integrating RFID reading systems into its security processes.

CONSIDERATIONS FOR IMPLEMENTING GEN 2

Many of the applications and benefits described above depend on features and functionality that Gen 2 supports. However, not all these features and performance capabilities are required for products to be considered standard-compliant. Some Gen 2 features are optional and not all products will support them. Optional features include the ability to validate and secure data written to tags, the ability to recognize tags that enter the read field late, group select capability, the ability to kill tags in the field, and conformance with dense reader mode.

Differences in features and performance must be considered when planning systems, evaluating products and assessing implementation expenses. A good starting point for comparison is to determine the features needed from the Gen 2 system and to create a checklist for meaningful product comparisons. Figure 1 provides an example.

Figure 1: User requirements for Gen 2 functionality checklist

	Product A	Product B	Product C
Does range support business processes?			
Are required data structures supported?			
Can the product perform in dense reader mode?			
If no, expected cost to upgrade to dense reader mode?			
Is persistence provided?			
Is group select supported?			
Is write verification performed?			
Can data be write protected?			
Is cloaking available?			
Is password protection available?			
Can interrogator kill tags?			
Is remote management and configuration possible?			

The checklist shows some of the many ways EPC Gen 2-complaint products will differ from one another. Gen 2 provides standard protocols and minimum performance requirements that chip and equipment readers can use to create equipment, which will likely range from highly intelligent and adaptive products to bare bones, limited feature offerings designed to meet minimum requirements.

INTERMEC INTELLITAG® GEN 2 RFID SYSTEMS

Many of the features on the checklist are based on Intermec's patent-protected intellectual property, and are available exclusively through Intermec and our licensees. Intermec EPC interrogators are built for dense reader mode performance and we were the first manufacturer to demonstrate an ETSI-certified, Gen 2-compliant EPC interrogator that meets European radio regulations.

Intermec donated a substantial amount of intellectual property to EPCglobal to help establish the robust Gen 2 standard, so we are very well positioned to support the features and performance users need in our products. Intermec is intimately familiar with the Gen 2 standard, the variations of how it can be implemented, and its potential performance in real-world systems. Intermec Intellitag Gen 2 systems are designed to move beyond the limitations in the basic Gen 2 standard to provide high-level performance.

IF5 RFID Network Reader

IP3 RFID Portable Reader

IV7 RFID Forklift Mount Reader

Intellitag PM4i RFID/ Label Printer

CONCLUSION

Gen 2 provides the reading performance, security and serialization that retailers need. Its ratification as a standard will create a highly competitive market that makes RFID practical and profitable to use. However, retailers need more than these developments to get value. They must create new business processes to take advantage of Gen 2's advanced capabilities, and make sure their Gen 2 systems support all the necessary features. Creating profitable new processes and finding systems to support them can be challenging, but early adopters like METRO Group are proving it can be done succesfully.

Intermec is working with METRO Group and other leaders to improve their businesses with RFID. Intermec has placed high value on creating systems with functionality, reliability and value. We offer the Intellitag family of RFID tags and interrogators, plus complete RFID assessment and implementation services. Intermec was honored to be recognized in 2004 the best radio frequency identification (RFID) hardware provider by the readers of Consumer Goods Technology magazine. Intermec also offers a complete line of data collection and computing products and services for retailers. Products include bar code readers and printers, wireless networking equipment, rugged handheld computers, vehicle-mounted and stationary computers. Intermec has been helping companies profit by taking advantage of data collection technologies for more than 35 years. To learn more about how your company can benefit from Intermec Intellitag Gen 2 systems, contact Intermec Technologies Corp., 6001 36th Ave. West, Everett, WA 98203 USA; 800-347-2636; or www.intermec.com. To learn more about Intermec's parent company UNOVA, visit www.unova.com.

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