



RFID: What Does It Mean? What Should I Do?

What Intel Believes About RFID

Radio Frequency Identification (RFID) is a transformative technology. We're early in the game. Technologies are still being solidified, usage models developed and integrated architectures created. Return on investment (ROI) calculations are in the early stages. But with Wal-Mart, METRO Group, the US Department of Defense and others mandating near-term RFID use for their largest suppliers, the future of RFID is fast arriving. Recent technology advances, demonstration pilots, and a strong industry-wide commitment to standards and investment point to a bright future.

The transformation will generate business value at three levels.

- **Immediately:** By substituting for bar codes. Since RFID tags can be read in multiples, without requiring line of sight or human intervention, and at a distance of around three meters, they can provide efficiencies and cost savings in checkout, inventory control and loss prevention.
- **Midrange:** By enabling track and trace throughout the supply chain. Need to recall a product, enhance product freshness, or keep Mad Cow-infected beef out of the food supply? RFID can add value in asset tracking and management, product recall, product origin tracking and more.
- **Ultimately:** By turning supply chains into demand chains. Collaborative use of RFID data can help cooperating enterprises put the right item in the right place at the right time and the right price. Behind the scenes: A demand-driven product fulfillment system that links consumer behavior back into inventory planning, logistics and even product design.

Standards are essential. To create a frictionless commerce environment, RFID data has to be shared globally, which requires global standards. RFID standards also promote innovation and drive down prices for readers and tags. The key standard right now? The electronic product code (EPC) for product identification.

RFID is just one element in the transformation process. To transform, enterprises must:

- Examine business processes
- Become comfortable with the technology in current business processes
- Identify key performance indicators (KPIs) to impact
- Examine opportunities to change processes thru a combination of technology and real-time data access
- Deploy RFID
- Develop service-oriented architectures and deploy distributed information technology (IT) infrastructure
- Commit to collaboratively share critical data on a right-time basis
- Commit to change

Intel is Committed to Business Transformation Through the Adoption of EPC Standards and RFID Technologies

Intel has provided strategic leadership for some of the world's most advanced RFID-EPC deployments at the pallet, case, carton and even item level. Intel is a primary technology partner, along with SAP and IBM, in METRO Group's Future Store Initiative, which has piloted the use of RFID-based inventory management and "smart shelf"-based replenishment. Intel was also a strategic advisor to Tesco's EPC pilot.

Intel's ongoing innovation — and a \$4 billion annual R&D commitment — means higher performance and lower costs for key RFID building blocks that will go into everything from tag readers to enterprise-class servers to many different client devices. Intel's role in the RFID transformation is providing the industry with standards-based building blocks with which RFID equipment manufacturers can build their own branded product lines.

Intel's commitment to RFID technologies shows in our development and investment in RFID-EPC solution architectures, implementation roadmaps and demonstration pilots. Intel solution architects are working with retail and consumer packaged goods (CPG) leaders to develop robust information architectures for RFID-EPC. Intel® Solution Services offer strategic and technological expertise to accelerate time-to-value for RFID-EPC deployments.

From the blue sky to the pragmatic, Intel conducts forward-looking research in technologies and usage models for RFID and other sensory technologies. How might RFID and other sensory technologies help memory-impaired individuals retain their independence? Can RFID-tagged plants improve crop yields? What technology innovations are needed to enable next-generation smart dust and ad hoc sensor networks? Intel-funded research is finding answers to these questions. Intel has established RFID research laboratories in cooperation with the University of Washington, the University of California Berkeley, Carnegie Mellon and Cambridge University. Intel and its research collaborators are committed to the open publication of research findings.

Widely recognized as one of the world's most advanced manufacturers, Intel is reviewing best-known methods from around the world, as well as developing pilots to test the usage and value of RFID technologies and processes within our own high-volume manufacturing facilities. Intel is evaluating current practices and exploring RFID's use to speed the flow of materials, enhance tracking and tracing and enable breakthrough improvements in manufacturing productivity.

Intel believes in the importance of standards, such as the standards driven by EPC Global, because of their ability to propel innovation, rapidly expand the surrounding ecosystem, and provide end users with lower prices and more choices.

Intel's Leadership Enhances Your RFID-EPC Success

Data has business value when it is turned into information. To deliver a return on investment from RFID-EPC, enterprises must extract the needles of valuable information from the haystacks of RFD reader-generated data. Extracting the core value of RFID-EPC data will require significant computing power before and beneath the reader-based transaction layer.

Because of Intel's open, distributed architecture and aggressive roadmap to continuing performance increases, you can optimize your enterprise RFID-EPC architecture's performance, scalability, affordability and flexibility by building it on the Intel platform. Expand your existing infrastructure with end-to-end Intel architecture-based solutions that include:

- Intelligent, cost-effective RFID readers based on the Intel architecture
- Distributed edge servers where data is aggregated and filtered and critical events are triggered
- Scalable application servers to support new, RFID data-enabled business services
- Powerful database servers to house the filtered data
- High-performance desktops, notebooks and handheld devices for convenient access to data when and where it's needed (i.e., know more, know sooner, make better decisions)

Intel's solution architects and Intel Solution Services can supplement your in-house knowledge base with strategic and technological expertise to architect an optimal solution for your unique requirements. The depth and breadth of services available within the Intel solutions community means you can call on a wide array of consultants and experts.

RFID-EPC Basics

Wireless radio frequency "tags"—small devices with a transponder and antenna that emit data signals when queried by a reader—are attached to pallets, cases and ultimately individual product items, providing a unique identifier for each.

EPC data on the tag provides an industry-standard way to identify the item. The EPC includes a product serial number and can provide links to information like country of origin and use-by dates.

RFID readers are placed at designated points along the supply chain (such as when arriving at or leaving a distribution center). Readers activate the tags, process their signals and receive data. The effective range rate for retail/CPG tag readers is around three meters.

Reader data is filtered and proliferated to product information databases and business services. Data can be used to:

- Improve product availability
- Reduce theft and counterfeiting
- Increase inventory accuracy
- Streamline logistics efficiency
- Improve business forecasting and planning
- Measure supply chain efficiency and highlight problem areas
- Reduce inventory stuck in the supply chain
- Reduce service costs
- Identify location of specific items
- Allow focus on costly process exceptions

Deployment must address four tasks:

- Understand tags and readers and determine where to locate them to maximize accurate readings and operational efficiencies.
- Identify where item data exists throughout the enterprise, then aggregate and cleanse the data to arrive at one version of the truth.
- Analyze business processes to spot opportunities for business value, and determine the processes, job descriptions and data flow needed to achieve them.
- Build out the enterprise IT infrastructure to provide the technical base with which to process this new influx of data and to deploy new applications and business services.

Three Steps to Deploying RFID-EPC

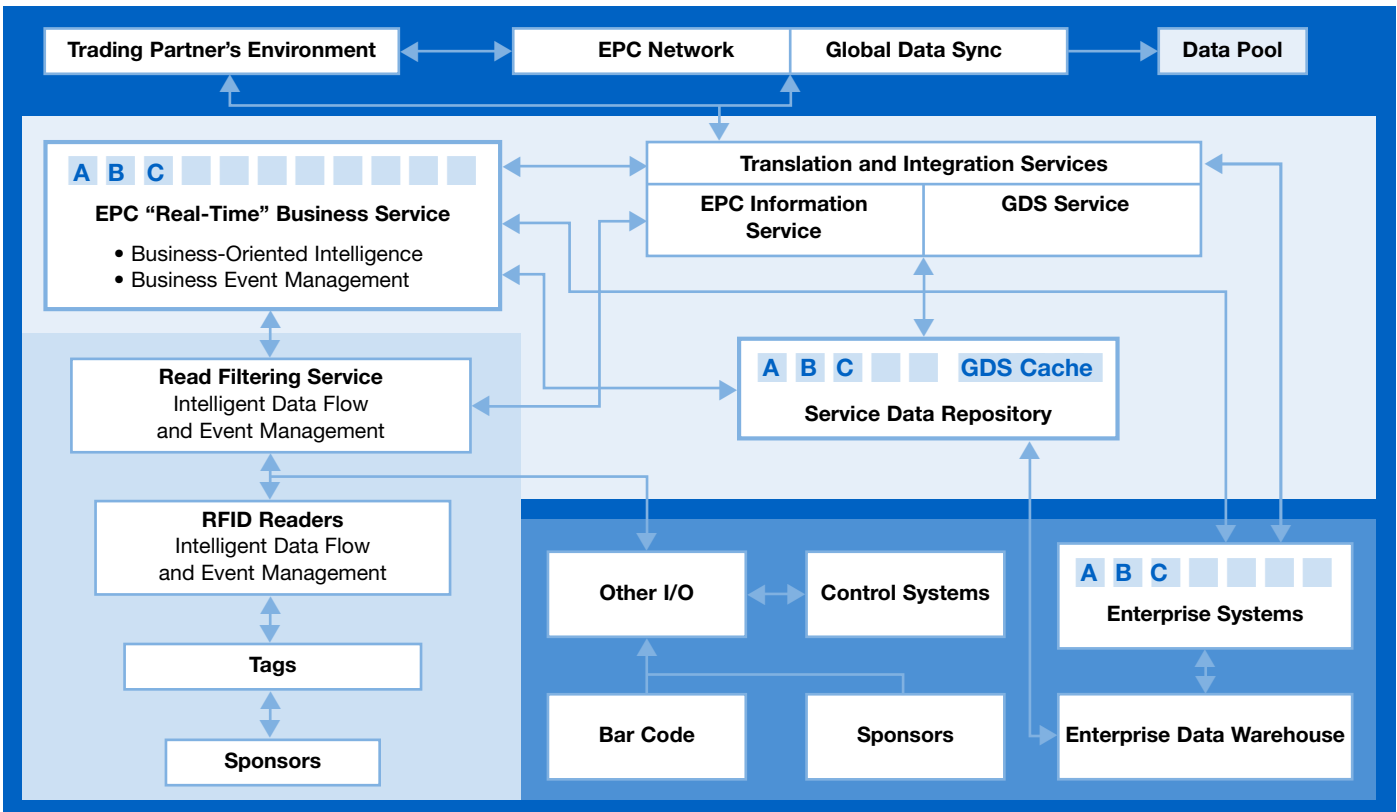
1. Analyze

- Compare your company's supply chain to industry and competitive benchmarks, to determine how your company compares to industry best practices. If the results are discouraging, keep in mind that RFID-EPC, executed well, can vault you ahead of your competitors.
- Identify supply chain efficiencies that result from collaborative relationships with suppliers, vendors and customers. Ultimately, you'll want to synchronize data with value chain partners—the better to cut costs, increase inventory turns, reduce out of stocks and accelerate your response to consumer demands.

- Become familiar with available RFID-EPC technology and how it supports real-time collaboration. RFID-EPC offers an automated way to get item location data into your information system. By integrating that data into business processes, enterprises and their supply chains can derive value everywhere from automated reconciliation to collaborative forecasting.

2. Plan

- Identify the key performance indicators (KPIs) you need to improve and the business process changes critical to impacting them. Then, determine where RFID-EPC data can enhance those processes.
- Perform a physical site survey, evaluating the conditions at each place you want to gather data and determining optimal placement of readers. In parallel, map out a distributed information architecture that can quickly filter RFID-EPC data, prepare it for synchronization and proliferate it throughout the enterprise value chain. Intel technologies provide a single, seamless platform architecture for acquiring, filtering, analyzing, managing and integrating RFID-EPC data — from manufacturer to distribution center to a marketing manager's desktop.
- Plan a roadmap for RFID rollout, starting modestly. Start with a process you have complete control over and include partners later. Keep in mind that small, incremental improvements applied to large, complex supply chains can yield big results—saving 0.5 percent of \$4 billion generates significant value.



To maximize EPC's business value, add powerful, distributed systems to filter and analyze data wherever it is read (lower left), translate and integrate item data to create a single version of the truth (center), and provide scalable business services (center left).

3. Pilot

- Begin piloting at the transaction level. Your site survey may have identified the points where you want to collect data, but where should you locate the readers to maximize accuracy? Where is the best place to put the tags on your cases or pallets? You'll need to test the performance of tags and readers on *your* products in *your* working environments.
- Pilot data movement from transaction to actionable business information. The goal is exception-based inventory management. To achieve that, you need to filter and analyze reader-generated data to gain on-demand visibility to situations that need intervention and response. You need to thoroughly examine business processes and pilot small deployments to make sure you're capturing the data you need, when and where you need it. As you deploy new systems to support your pilots, keep the eventual end-point in mind—your RFID-EPC efforts will scale over the years to come, so infrastructure must be flexible, modular, powerful, standards-based and highly scalable.
- Change business processes according to actionable data. With RFID-EPC tags in place, intelligent readers and filtering applications can query scanned product information and process it according to newly defined business processes. The availability of this information—within the company and shared with value chain partners—can result in more efficient product tracking and placement, more accurate shipping, quicker feedback on retail popularity, and ultimately cost savings and a competitive advantage.

Take It Further

General information

www.intel.com/go/retail

www.intel.com/internetservices/intelsolutionservices

Specific questions or comments

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