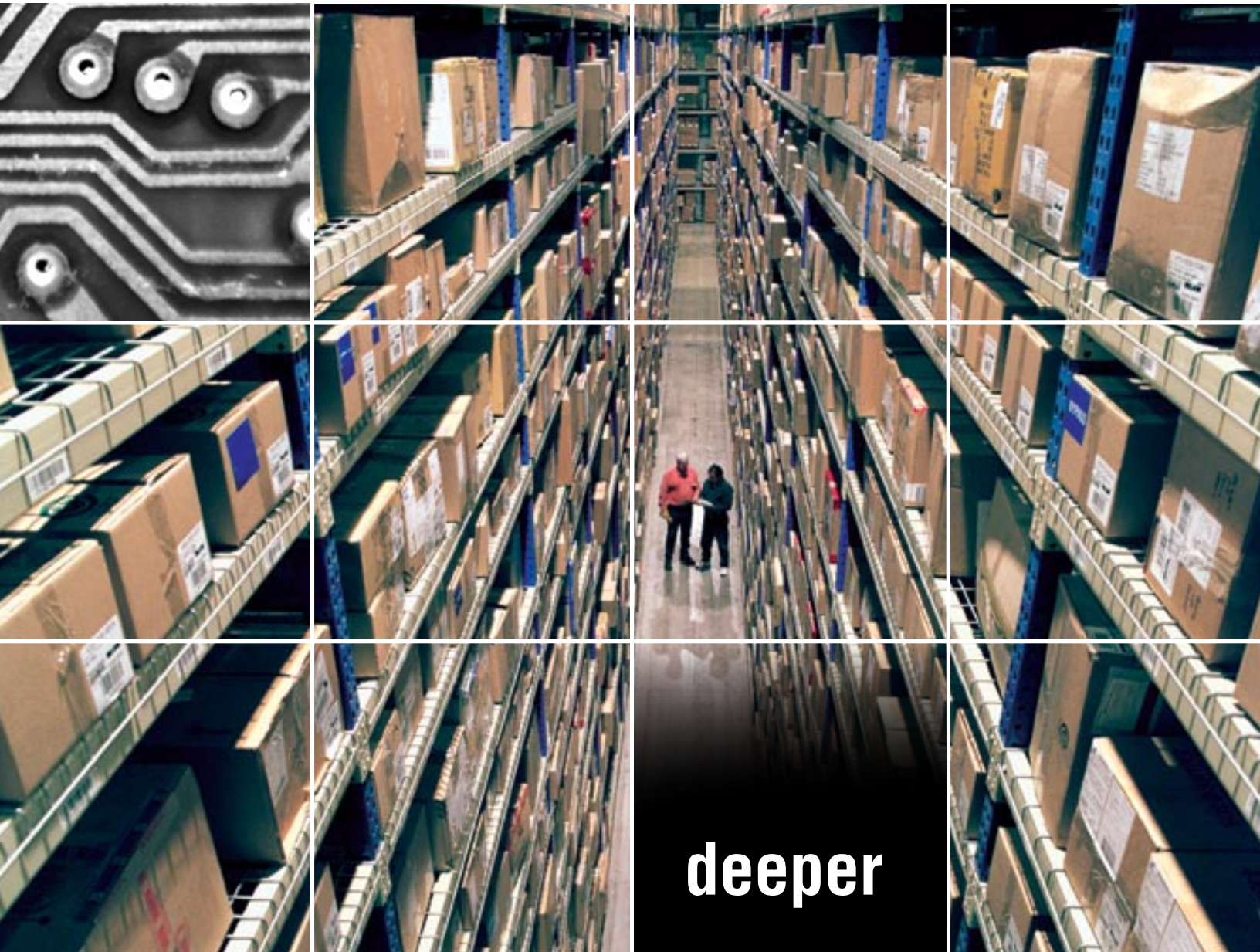


Streamlining the supply chain using radio frequency identification

Radio frequency identification solutions for retailers, manufacturers, and logistics providers



Processes and technologies designed to transform the supply chain

Today's retailers, consumer products manufacturers and transportation companies find themselves stuck between two forces. On one side, they have a demanding consumer base willing to spend top dollar for new luxury items while simultaneously calling for economically priced basics. On the other, they have poorly structured supply chains that focus on optimizing internal systems rather than on delivering consumer value. A primary driver of competitive advantage lies in building a supply chain that is fast, responsive and flexible — all while maintaining a laser focus on delivering value to the end consumer.

Critical to this new consumer-driven supply chain is realtime visibility into the location and movement of products across the trading network and inside the four walls of the store environment. Yet today's supply chains are constrained by barcode scanning, which requires line-of-sight visibility and manual intervention that can limit timely access to data. Manufacturers, retailers and their transportation partners spend countless days unpacking trucks in transit, performing warehouse "inventory duty" and physically checking pallets and cases of products as they move through the supply chain — all driving cost and inefficiency into an already complex system. Retailers often lack visibility into on-hand inventory, and have difficulty managing shrinkage and keeping their shelves stocked appropriately.

Radio frequency identification (RFID) is a powerful enabling technology that, when coupled with the business processes that unlock its true value, promises to streamline the supply chain and transform the retail ecosystem. Based on "smart tags" applied to product packaging at the item, case or pallet level, RFID offers a revolutionary mechanism for delivering accurate and efficient visibility into inventory quantities and movement. Unlike barcodes, tags are read automatically when they pass over or under radio-wave readers that are embedded in floors, doors and store shelving. Readers automatically transmit the electronic product code (EPC) identifier, contained on the tag, to enterprise systems. When integrated with business processes and applications that put the data into context, RFID promises to transform the way companies forecast demand, manage inventory and distribution, and market to consumers within the store.





IBM recognized the potential of RFID while the technology was still in its infancy, and moved aggressively to support RFID through research, involvement in industry standards organizations and pilot projects. Based on this early experience, IBM has developed a comprehensive RFID capability that supports clients from business case through feasibility assessment to implementation. At the core of this strategy is a customizable solution framework designed to deliver rapid benefit while providing a roadmap for long-term optimization.

As part of this end-to-end framework, IBM offers a series of consulting and integration services and software components designed to incorporate RFID information directly into critical business processes. It involves

integrating new technologies with core systems, reengineering business practices and aligning systems with external partners. IBM supports you through the entire transformation, providing consulting teams that understand the process changes involved, the technology required to get you there and the best practices you need to reap the greatest business benefit.

Now is the time to revolutionize operations

While RFID has not been without its challenges, many of the early obstacles to broad adoption have subsided — especially for case- and pallet-level implementation. Rapid innovations in technology have steadily driven down the required investment in RFID hardware. An RFID tag that

may have cost US\$2.35 four years ago is as inexpensive as US\$0.15 today, and predicted to fall even more as adoption rates increase over the next several years. IBM has developed sophisticated RFID testing and network design capabilities that work to reduce the scanning reliability issues prevalent in the past. Standards for EPC and cross-enterprise data sharing have developed to the point that scaled deployments across the consumer products and retail value chain are now realistic. Moreover, major retailers and government agencies are mandating that their trading partners become EPC-enabled, and have set deadlines for compliance, promising to further accelerate adoption rates.

Clearly, now is the time to establish a cost-effective RFID deployment strategy and build competitive advantage. The core technology has advanced — increasing read-range and capability — and companies are now able to add relevancy to the torrent of RFID data they've collected. Industry standards are getting stronger. And real business pressures are creating an opportunity for rapid return on investment (ROI).

Getting you on the path to leveraging RFID technologies

While many executives embrace RFID, they struggle to define the path forward. The challenge is to identify the business processes that will derive the most value from the new technology, and then to develop a plan for execution that delivers rapid ROI while moving toward broad-scale adoption.

IBM helps to reduce the complexities associated with implementing a comprehensive RFID solution, leading you through the entire process from start to finish. Our RFID solution framework, depicted in figure 1, reflects the comprehensive set of components required to support

successful RFID initiatives, bringing together the following combinations of technologies and implementation services:

- Hardware, software and service offerings designed to provide the base-level infrastructure required for RFID enablement and transformation
- Integration middleware and services that link RFID data to the rest of the enterprise and to partners across the trading network, making the information relevant to your business applications
- Best-of-breed partner applications and IBM middleware accelerators that allow you to leverage RFID data to optimize and transform existing business processes
- Consulting services that help you determine the business opportunity RFID represents for your organization, the viability of the technology in your particular environment and the roadmap for achieving success.

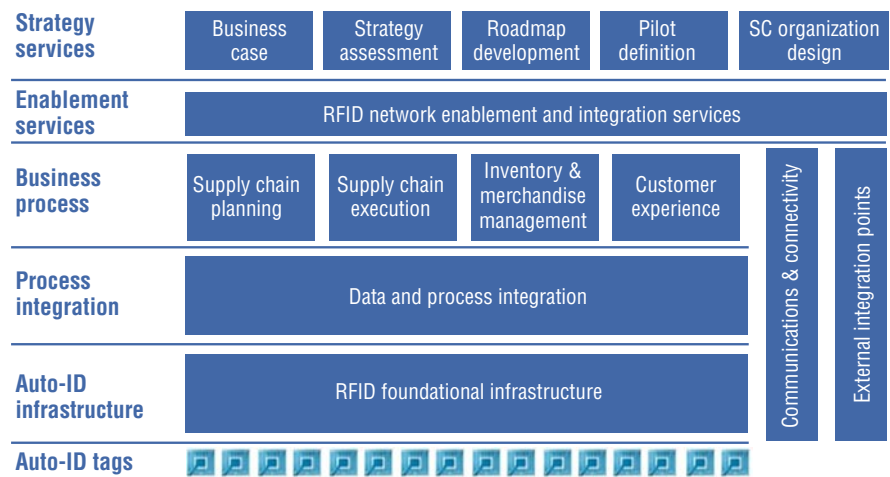


Figure 1: The IBM RFID strategy is based on a flexible framework that leverages strengths from across your company

This flexible, scalable solution framework can be customized for multiple facilities, distribution centers and retail outlets. It is designed to enable collaborative, realtime data sharing with partners, suppliers and customers by leveraging Web-enabled, open architecture to speed connectivity to enterprise applications. Best of all, we design our solutions to fit with existing infrastructure, integrating new RFID tags and multifrequency readers with the barcode and backend systems you already have in place.

The IBM approach

While RFID solutions are designed to automate and simplify data collection relative to the movement and location of goods, the journey to becoming RFID-enabled can be complicated if you don't know where to begin. Fortunately, IBM is here to guide your organization through the transformation, bringing the required business consulting, infrastructure consulting, integration services and scalable middleware, backed by proven, industry-accepted standards.

Transforming a traditional supply chain
 IBM helped Germany-based METRO Group, the world's fifth-largest retailer, design an integrated RFID solution for its prototype Extra Future Store. The implementation is scheduled to begin in November 2004, and initially, 100 suppliers will tag all of their pallets and transport crates for delivery to 10 of METRO's central warehouses and 250 stores. As the RFID system integrator, IBM will lead the project strategy, implementation and rollout — even establishing a lab to test each supplier's interoperability with RFID technologies. The solution is designed to enable METRO to track goods along the entire process chain to optimize order and inventory management, avoid out-of-stock situations and reduce costs.

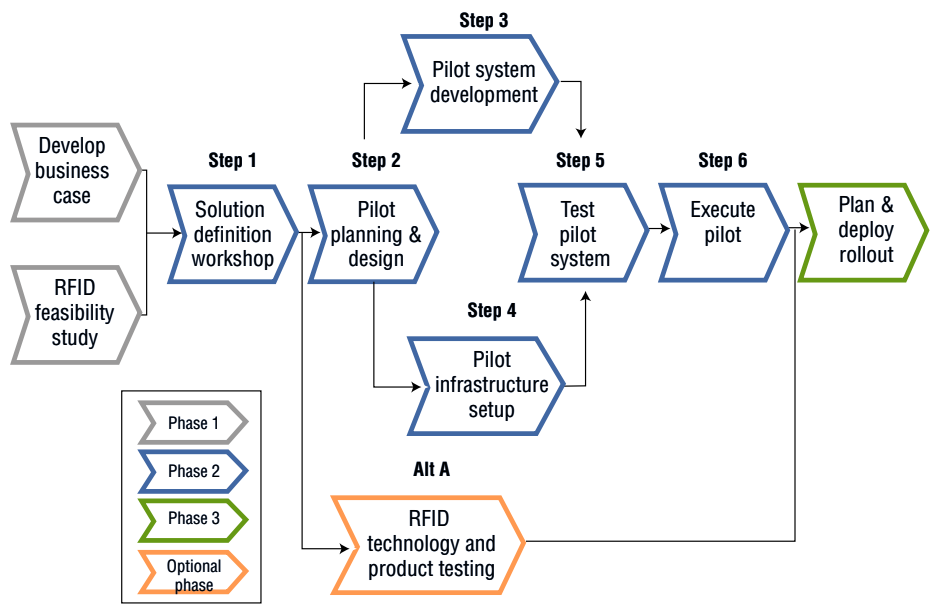


Figure 2: IBM offers comprehensive RFID transformation services that support you from business case through feasibility assessment to implementation.

End-to-end, customized implementation

IBM recognizes that every retailer, manufacturer and transportation company faces a unique set of strategy, business and technology challenges. Because of this, we've developed an RFID deployment model that is customizable to individual needs. Regardless of where you are in your RFID journey, IBM can provide you with the strategic guidance, enablement services, integration skills and key software skills to get you where you want to be — rapidly and cost effectively. While each client will adopt a unique approach, typical projects follow a three-phased model:

- ***Business case or feasibility assessment*** — The first step to RFID transformation is typically to develop a business case or perform a feasibility assessment. In a business case project, we learn about your unique business processes so we can identify the tangible business benefits that RFID offers your organization. We also discuss implementation designs that help reduce business impact, as well as assess your existing technology infrastructure to help determine your most cost-effective, efficient middleware

strategy. Alternatively, an assessment helps us determine the technical feasibility of integrating RFID into your existing architecture. IBM conducts site visits, performs a technology scan, and identifies key risk factors and gaps in technology infrastructure. Either way, the initial phase of work delivers a high-level RFID adoption roadmap.

- ***Solution build and pilot program management*** — We develop and implement a pilot installation, including solution architecture, hardware and application integration. We thoroughly test the pilot to verify that tag data is appropriately captured and transferred into your enterprise applications with optimal accuracy and speed.
- ***Enterprise rollout and integration*** — We estimate capacity and performance needs and establish benchmarks for ongoing tests. Our consultants plan and manage your entire deployment, from installing the data warehouse and setting up data management services to integrating new processes with affected partners.

Optionally, IBM can use its state-of-the-art lab facilities to conduct RFID technology and product testing to help ensure the optimum level of RFID effectiveness in your specific supply chain environment.

An RFID technology platform that can handle evolving needs

The flexible technology platform contained within the IBM RFID solution framework takes data from RFID readers, aggregates it and ultimately feeds it into business processes and enterprise applications. The platform is designed to be scalable to handle the large number of sites and high data volumes associated with worldwide RFID implementations. At the same time, unnecessary data is filtered out early to reduce network traffic and information overload.

Depending on the technology, network capabilities, software and operating platforms you use, IBM can develop a scalable infrastructure strategy that lets you implement an RFID solution across the enterprise in a cost-conscious manner. The IBM framework is based on our own

RFID-enabled middleware including:

- IBM WebSphere® Application Server — Consists of a comprehensive Java™ 2 Enterprise Edition (J2EE™) application server that extends backend business data and applications to authorized supply chain partners via the Web
- IBM WebSphere Portal software — Gives suppliers and distributors visibility into your product tracking and inventory data, so you can improve collaboration and productivity across the extended supply chain
- IBM WebSphere Business Integrator software — Integrates data, applications, processes and people across and beyond your company, so you can leverage existing information technology investments and adapt quickly to changing business conditions
- IBM DB2® Information Integrator software — Helps you access, integrate and manipulate your distributed RFID data through a central server as if it were from a single data source

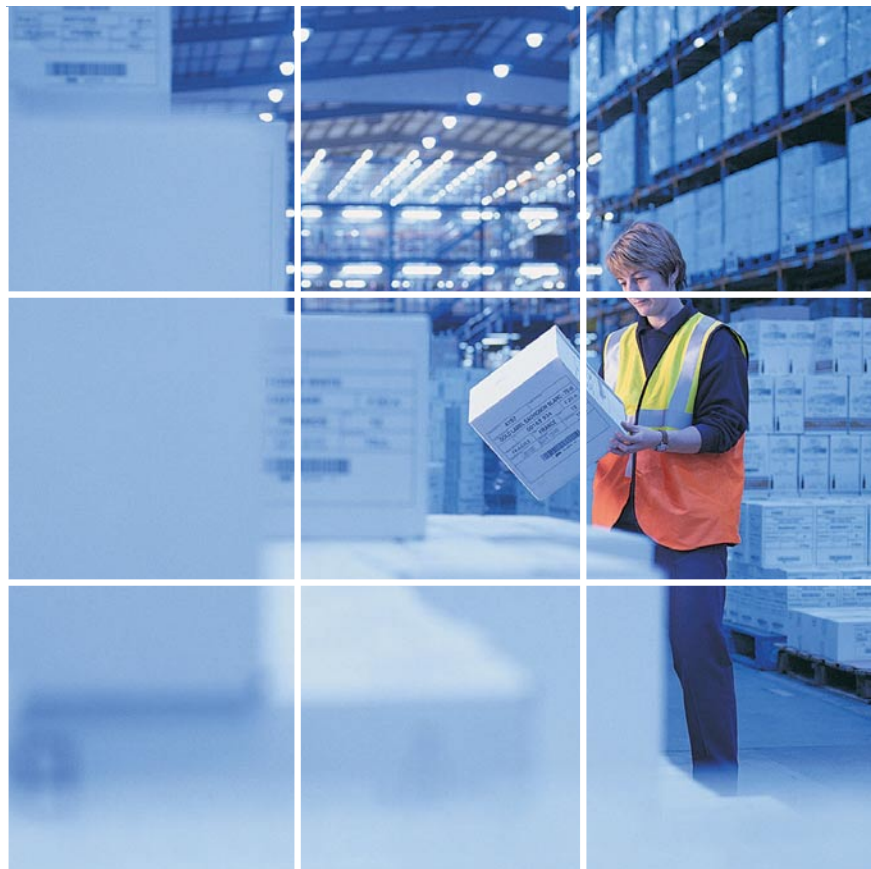
- IBM Tivoli® Access Manager software — Offers policy-based access and single sign-on capabilities, so you can give trading partners authorized access to business-critical supply chain management applications and data
- IBM Store Integration Framework — Helps enable centralized management via integrated in-store information processing across multiple devices, data points and events.

Keeping your solution aligned with key technologies and standards

A leader in RFID solutions for more than 10 years, IBM developed many of the patents that drive the industry today. IBM remains in the forefront, helping the industry establish the standards that will shape how

RFID solutions will be implemented tomorrow — from data synchronization to in-store applicability to common programming languages and database standards. IBM is a member of EPCglobal and has teamed with the Global Commerce Initiative (GCI), leading retail, consumer products clients and technology vendors to create an industry adoption roadmap for RFID.

We have also formed strategic alliances with leading hardware and software vendors to help ensure our solutions leverage the best tags and readers, middleware and enterprise supply chain management applications from across the industry. By grounding our solutions in breakthrough technology and best practices, IBM designs RFID solutions that are tailored to your business needs and optimized for long-term investment protection.



Consumer products: establishing efficiencies from the warehouse to the shelf

Consumer products manufacturers continually battle with getting the right products to the right retailers at the right time. With an IBM RFID solution in place, manufacturers can effectively track products, manage inventory levels and maintain appropriate stock levels to meet retailer needs. Deploying an RFID solution can reduce labor costs by eliminating the need to manually scan pallets before they leave the factory, reducing picking errors, improving returns management and avoiding physical inventory counts. With clear visibility into inventory levels, manufacturers can improve production plans while reducing excess stock and theft. They are also better equipped to react in realtime to retailer — and consumer — demands.

RFID solution in action: reconciling shipping and receiving

Manufacturers often face wide disagreement with retailers regarding the actual product quantities shipped, which can lead to invoice claims and deductions. Claims

management can be time-consuming due to the significant labor cost associated with manually itemizing each case in a shipment. It can also be expensive — shortages often result in a credit to the retailers while overages are often overlooked.

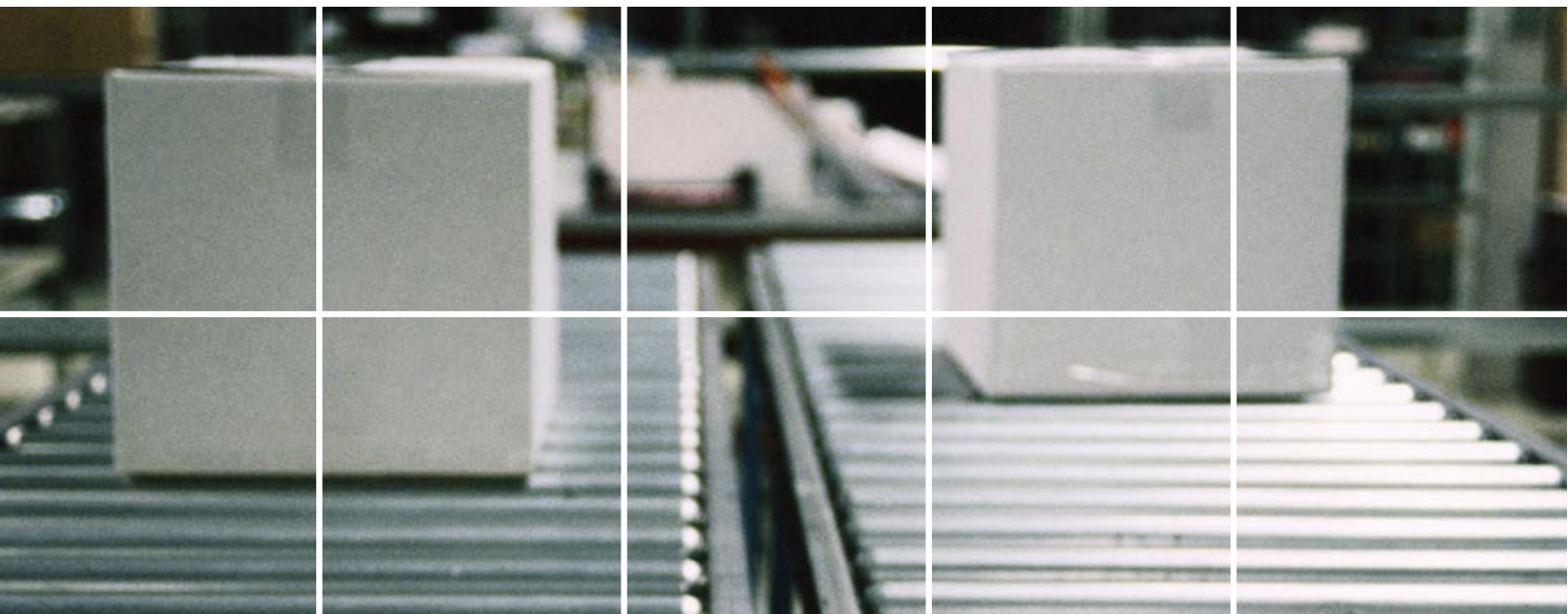
RFID can automatically capture and reconcile bills of lading with physical inventory received, both when the manufacturer ships product and again when the retailer receives it. By eliminating the manual process of counting inventory, accuracy is determined and discrepancies are recorded in realtime. This is especially important when shipping mixed pallets that contain multiple items, as purchase orders can be easily misrepresented or overlooked during a manual assessment of the shipped contents.

Retail: helping to improve profitability

Maintaining profitability is particularly difficult in retail, where competition is tough, capital overhead is high and consumers are notoriously fickle. From increasing sales and improving promotional activity to reducing theft, retailers must focus on innovative ways to boost the bottom line.

By implementing RFID-enabled reading devices in distribution centers and stores, retailers can reduce storage costs, out-of-stock situations and product shrinkage. They can identify, virtually all of the time, how much inventory is available across their supply chain and where it is located — right down to the store level. And labor costs are lowered because stores no longer have to manually perform inventory counts or scan product. Retailers have better insight into on-hand inventory, shrinkage management and merchandising.

Best of all, the RFID technologies implemented today will help retailers develop tomorrow's solutions to enhance operational efficiency, in-store service and the customer experience. As manufacturers tag products at the item level, they will give stores the ability to accelerate many operational processes such as merchandising, shelf-level management, checkout, returns and warranty authentication. Using item-level tags to track realtime shopping patterns, this technology could even help facilitate promotions and merchandising.



RFID solution in action: identifying “hot” shipments and avoiding out-of-stock situations

Retailers typically are unable to identify and expedite hot shipments at their distribution centers or stores, thereby extending the time that it takes to fill stock outages, fulfill back-orders or ship to individual stores. RFID can automatically alert receiving associates of a hot shipment by matching an out-of-stock or hot item file against the receipt. This way, stores can promptly flag the shipment as a priority and move the product to the shelf more rapidly.

Pharmaceutical: streamlining production in a highly regulated environment

Pharmaceutical manufacturers must comply with extensive governmental controls surrounding the way they develop and distribute products. These companies also face the risk of counterfeiters eating into profits, brand equity and corporate goodwill. But with RFID technologies, pharmaceutical companies can monitor the manufacturing process in compliance with regulatory mandates, as well as validate product authenticity to protect against fraud.

From tracking raw materials to identifying products on the shelf, RFID can help across all stages of the supply chain. By placing tags on laboratory samples and equipment, manufacturers can track and monitor testing practices to meet strict federal regulations. Similarly, with an RFID-enabled assembly line, readers relay all captured data to enterprise systems, helping to simplify the process of documenting regulatory compliance. RFID solutions can also help ensure the integrity of clinical trials. Once a product is released, RFID tags can be used to track product location, implement targeted recalls, move product to match demand levels and manage shelf life more accurately.

RFID solution in action: safeguarding against revenue loss and noncompliance

Counterfeiting has been known to affect up to 50 percent of pharmaceutical revenues worldwide.¹ In addition to lost sales, companies have to worry about potential lawsuits and increased compliance costs whenever a counterfeiter exploits a patented pharmaceutical product.

RFID technology can significantly enhance manufacturers' ability to protect their brands and their trading partners from the threat of counterfeit merchandise. Because each product can be tagged with the manufacturer's own, uniquely labeled code, retailers can conveniently authenticate product shipments. Pharmaceutical manufacturers can also prevent theft from the warehouse by attaching tag readers to security gates and all entry and exit points at the distribution center.

Logistics: optimizing transportation and shipping

RFID can be used in the warehouse as well as in the container yard to help build efficient shipment and transportation. Transporting goods from consumer products companies to the retailer is an essential part of the supply chain. As companies compete on speed to market and inventory turn, an integrated logistics process that allows more efficient and effective product movement is essential. RFID helps facilitate vehicle location and tracking, shipment tracing, vehicle routing and electronic toll collection. It can also improve inventory control and billing, leading to fewer shipment discrepancies during the transport of goods.

RFID solution in action: keeping an eye on assets in transit

RFID can be used to track the location of trucks and rail cars, while also keeping an up-to-date inventory of transport vehicles at a specific location. During actual shipment, it can help track merchandise based on realtime location of vehicles and the shipments contained in or carried by those vehicles.

Using RFID to impact the bottom line

Business case analysis performed by IBM for leading retail, consumer product and transportation companies suggests that the benefits of RFID are considerable. Based on this analysis, organizations can potentially:

- Increase data collection productivity for inventory and shipping by 10 to 20 percent, while maintaining virtually 100 percent accuracy
- Enhance retail store productivity by approximately 5 percent, redirecting labor to more crucial, customer-facing activities
- Resolve approximately 33 percent of store execution issues
- Reduce manufacturer shrinkage by 67 percent and retailer shrinkage by 47 percent.²

Trusting your supply chain transformation to one of the industry's best

When searching for an RFID solution provider, look no farther than IBM. Our broad portfolio of capabilities — from solution prototypes, process transformation, infrastructure consulting, middleware installation, enterprise rollout and management services — offers an end-to-end solution, letting you remain focused on keeping your business running. We offer a worldwide network of talented consultants and experienced implementers who are well versed in supply chain transformation. This immeasurable insight, paired with decades of technology leadership, could make IBM the right choice for your RFID solution.

We also realize that every company is in a different stage of the RFID journey. IBM has become a leader in RFID — we have completed more than 50 client business cases, have provided extensive RFID testing

services, have conducted several solution pilots and are delivering the some of the first full-scale RFID implementations. Through this experience, we know that while some clients are in the requirements identification phase, others are nearing final implementation. Whether you want to educate your team on the technology, identify how to comply with industry mandates or develop a strategic plan that will ultimately get you to tomorrow's item-level RFID solution, IBM is here to help.

Moreover, our key role in the industry and strategic alliances with core RFID hardware and software manufacturers help you obtain the best solutions available. And every day, our commitment to RFID solutions becomes stronger as we invest more knowledge and resources into this exciting technology and associated business process improvements. At IBM, we are committed to helping you transform your business across the supply chain and beyond.

For more information

To learn more about IBM Business Consulting Services please contact your IBM representative, or visit:

ibm.com/bcs

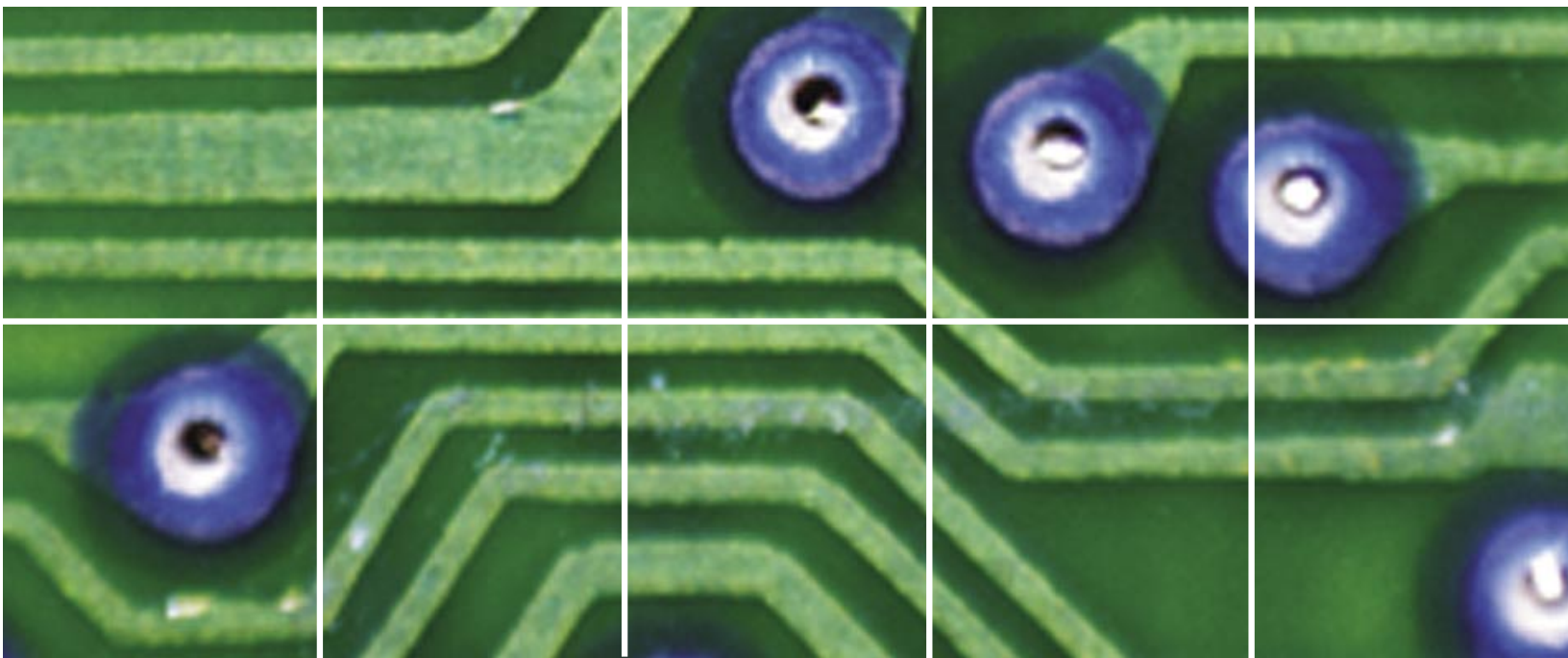
To learn more about IBM Solutions for Radio Frequency Identification, visit:

ibm.com/solutions/rfid

References

¹ "Innovations in pharmaceutical packaging — smart blister packs," Pharmaceutical Technology Europe, January 2003.

² Illustrations of potential benefits are based on IBM business case analyses performed for specific clients and are theoretical. Many factors would contribute to achieving these results and benefits described. IBM does not guarantee comparable results.





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