

BizTalk RFID: Making RFID Deployments Easy, Simple and Economical



By Karen D. Schwartz

Executive Summary

This white paper describes a new approach to RFID with the potential to break through most technical and business barriers that so far have prevented the technology from reaching a critical mass worldwide. It outlines and describes a new infrastructure, based on Microsoft technologies, that includes each of the building blocks developers need to build successful, plug-and-play vertical applications, faster and more efficiently than ever before.

This document is written for IT and operational professionals and managers at companies with either an interest, or need, for RFID. In addition, it is intended to help system integrators, VARs and independent software vendors understand how they can use the Microsoft platform to better serve their customers.

Highlights of the paper include:

- A description of the roadblocks to more universal RFID adoption to date
- Information about how BizTalk RFID overcomes many of these obstacles and how it leverages the company's existing, proven technologies
- The benefits to partners and end-users of building on BizTalk RFID

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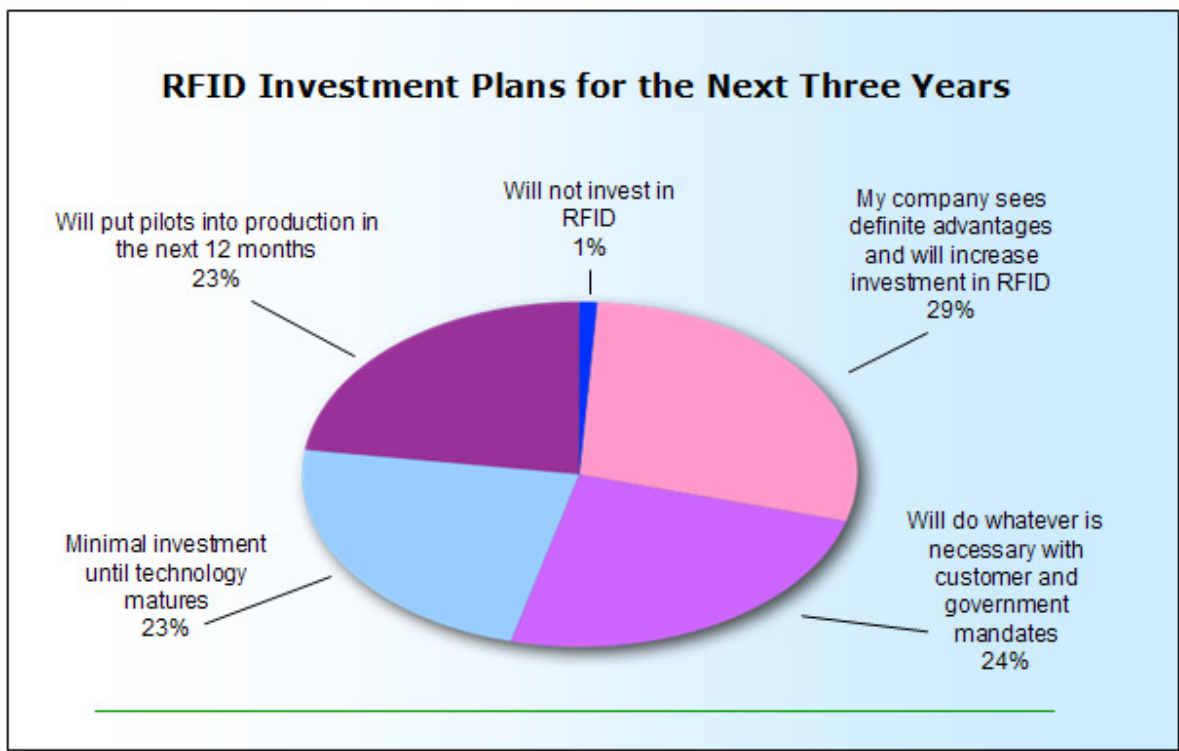
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Challenges to Adopting RFID

For manufacturers and retailers, the business benefits of RFID (Radio Frequency Identification) are compelling. Not only does adding RFID technology to many environments increase operational efficiency, but it provides total supply chain visibility, offers better asset tracking to help reduce internal theft, flags errors and container tampering issues, and enables better processes for product status verification.

As convincing as the benefits of a fully realized RFID solution are, end users, application developers, systems integrators and device manufacturers continue to experience many obstacles to development and adoption. The obstacles include difficulty in configuring and managing devices, making sense of raw RFID data, a lack of standards, a confusing variety of access protocols, and limited integration with an organization's existing systems such as ERP systems, WMS systems and so on. Complexity of translating data into meaningful business events and difficulty in ensuring scalable solutions are also common roadblocks.

Uncertainty over these technical issues is almost certainly constraining near-term market growth. According to a late 2005 study of 250 industry executives conducted by Aberdeen Group, Boston, Mass., nearly 50% of respondents were either unwilling to invest in RFID until the technology matures, or were reluctant to do anything more than a pilot test for the next year (see chart, "RFID Investment Plans for the Next Three Years.").



Source: Aberdeen Group, December, 2005

Introducing BizTalk RFID

Microsoft's approach to RFID eliminates many existing barriers by providing a uniform way to discover, communicate and manage RFID devices on the Microsoft® Windows® platform. BizTalk RFID includes the building blocks developers need to build successful, plug-and-play vertical applications—everything from track-and-trace to asset tracking and inventory control.

BizTalk RFID is designed to allow all users to incorporate RFID into a variety of applications and workflows, simply and easily. It does so by enabling RFID devices to become fully compatible with the Microsoft platform. Microsoft's approach succeeds by adding new software layers approach to the technology—ones that allow all types of RFID devices, including current RFID devices, next-generation devices, sensors and EPC (Electronic Product Code) readers to be incorporated in a plug-and-play manner.

Of equal significance to application developers is Microsoft's powerful approach to event processing and management. A unique event processing engine helps developers to create, deploy and manage end-to-end logical RFID processes that are independent of underlying device types and device communication protocols. The use of logical devices in the event processing engine makes the RFID process truly independent of the deployment topology.

The result for users is simplicity. "It's like the mouse today. You don't care what brand it is—you just connect it and it works," says Anush Kumar, senior product manager, BizTalk RFID. "That's what we want to do for RFID devices today, irrespective of who the vendor is or what protocol is being used."

BizTalk RFID works well with existing line of business applications such as Enterprise Resource Planning (ERP) systems, Warehouse Management Systems (WMS) and more specialized vertical software. This flexibility allows it to work seamlessly and in many cases automatically with minimal modifications required.

Microsoft's Layered Approach

The layers of BizTalk RFID include:

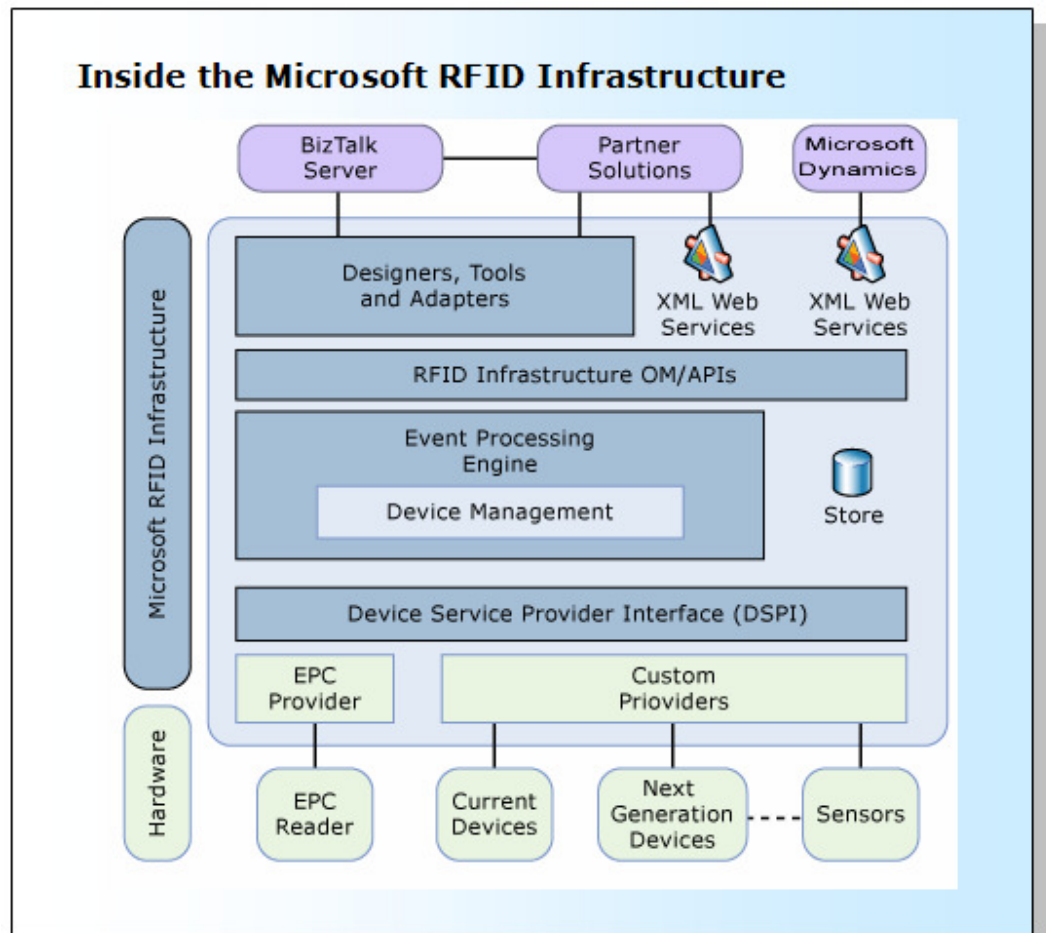
Device Service Provider Interface layer. This layer is comprised of an extensible, generic set of APIs (application programming interfaces) that help hardware vendors to build "device providers," specialized interfaces that allow RFID devices to work seamlessly in a Windows environment. To ease integration efforts, Microsoft provides partners with the platform, specifications and test software in the form of an RFID software development kit (SDK). The SDK allows for normalization across multiple communications protocols and support for legacy readers and other auto-ID devices.

Once device providers are built using Microsoft's SDK, any device on a network—including RFID readers, printers, sensors to smart devices that handle both hybrid barcodes and RFID—can be discovered, configured and managed by Windows-based tools. Equally

important, application developers can easily create line-of-business solutions that finally interact with RFID devices in a uniform, user-friendly way.

For example, Microsoft has embedded many device providers into BizTalk RFID, making it easy to set up and use RFID devices in a variety of environments. "If you have to add one RFID device at a time, it's time-consuming and complex for developers and software integrators, and more things can go wrong," says Pankaj Shukla, Director, RFID Business & Solutions Development at Motorola. "This way, almost all of that complexity disappears."

Engine & Runtime layer. This layer enables applications to leverage RFID for a variety of business processes by eliminating the noise and irrelevancy of raw RFID data. For example, devices often can't detect the direction in which a tagged pallet is moving, or whether the data being read is new or existing data. The Engine & Runtime layer allows applications to filter, aggregate and transform raw RFID event data into business-specific information by using event processes with extensible event handlers and rule-based policies.



Source: Microsoft Corp., 2006

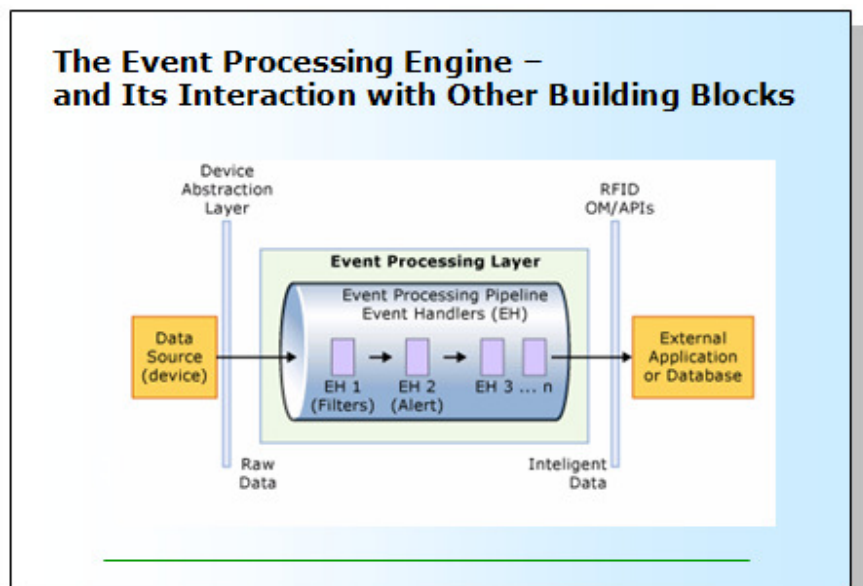
The first part of the Engine & Runtime layer is the *event processing engine*, which lets application developers create and manage logical end-to-end RFID processes independent of underlying device types and communication protocols. The core of the engine is the event pipeline. It provides a mechanism for RFID business processes to execute and process tag read events by grouping readers into logical groups, such as shipping readers, receiving readers, backstore readers and frontstore readers. Using the RFID Object Model and other tools, an application developer can construct an event processing tree that scales from a simple to complex event process.

By following this approach, the application developer focuses on building logical business constructs to process RFID data rather than worry about the actual physical device deployment, which is wired to the event process at runtime. Similarly, the end user is freed to derive business value out of RFID data versus otherwise struggling with device drivers. All of this together enables a unique 'Write Once, Deploy Anywhere' approach to RFID business processes.

Another key component of the event processing engine is the event handler. Like other parts of BizTalk RFID, the event handler is an extensible building block that allows application developers to specify logic to handle and process distributed RFID events based on the business logic to be implemented. Designed to be flexible and extensible, event handlers are used out of the box to model tag processing logic, automatically enforce event policies (via business rules) to filter, alert, enrich or transform tag read events, as well as execute human and system workflow via the Windows Workflow Services.

The second major part of the Engine & Runtime layer is *device management*, which is responsible for managing all devices in a runtime environment. Device management allows end users to:

- Monitor device status;
- View and manage device configuration information;
- Securely access devices; and
- Manage the addition, removal and renaming of devices and maintain device consistency in the architecture.



Source: Microsoft Corp., 2006

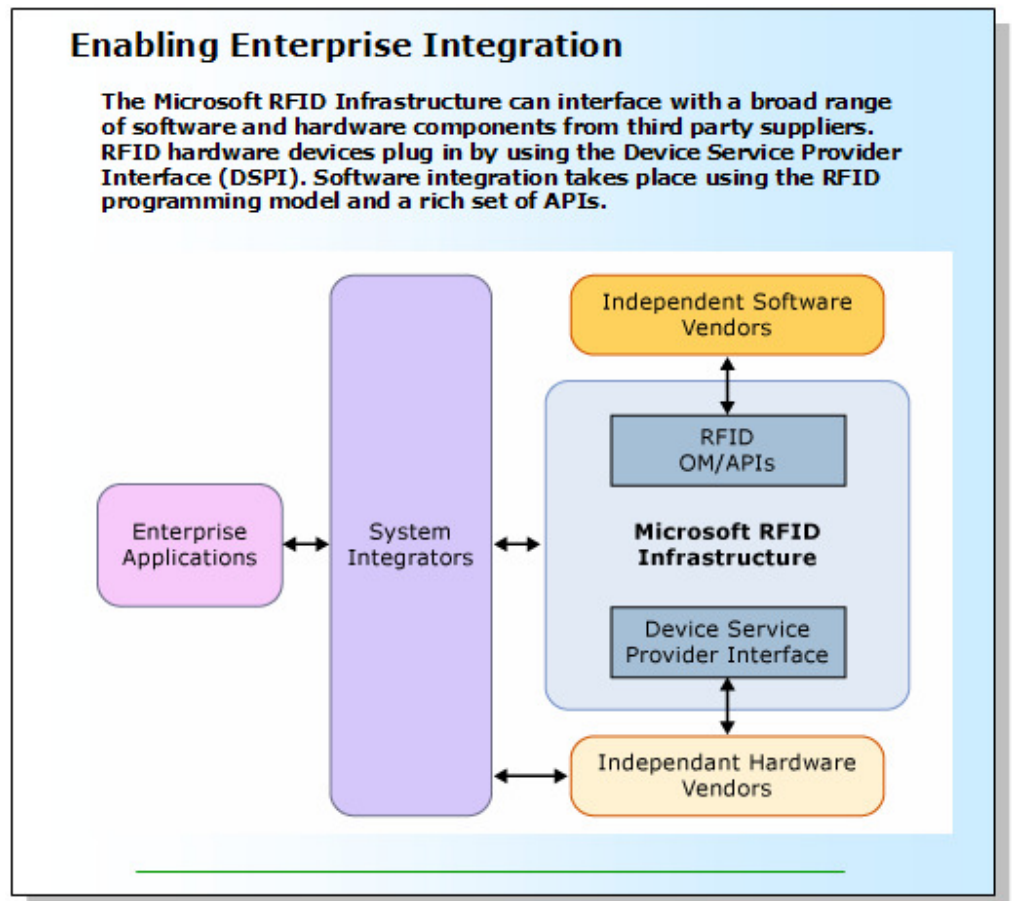
BizTalk RFID OM/APIs layer. BizTalk RFID provides the Object Model and APIs that help application developers design, deploy and manage RFID solutions. It includes the tools necessary to design and deploy the "event processing pipelines" needed to filter, aggregate and transform data into usable information. Using the Object Model in conjunction with APIs, developers can create a variety of tools to manage BizTalk RFID. The Object Model (which includes device management, process design and deployment, event tracking and health monitoring) provides the APIs necessary to design and deploy an end-to-end RFID process quickly and manage it throughout the application lifecycle.

Designers, Tools & Adapters layer. An array of tools is available to help developers create different types of business processes. One tool example is Designers, which can be used at the time of design to author an RFID business process. Adapters are entities that help integrate real-time RFID events with Microsoft BizTalk Server 2006 and/or line-of-business applications that are consuming RFID events and making sense of them in the context of a business process.

Two basic tool types are provided with BizTalk RFID: an administrative console called the RFID Manager; and the Rule Composer tool, a design-time tool for composing rules. Finally, "Adapters" enable effective data exchange between the BizTalk RFID and its users, even when different users employ various technologies for communications.

Using each of these tools, Microsoft partners can build a wide variety of applications and solutions. Systems integrators and application developers, for example, can create a

host of business applications in the areas of asset tracking, inventory management, order management, vehicle and fleet management—essentially anything that improves supply chain visibility. Similarly, hardware vendors benefit by ensuring that their devices are compatible with BizTalk RFID on a plug-and-play level.



Source: Microsoft Corp., 2006

Leveraging Microsoft's Existing Technologies

Because BizTalk RFID is built on the Microsoft .NET® architecture, developers can build applications without reinventing the wheel. For example, applications can be built that incorporate RFID data using the .NET framework and .NET tools.

BizTalk RFID also leverages many of Microsoft's existing, proven platforms, including Microsoft SQL Server, Microsoft BizTalk, Microsoft Windows Workflow Foundation and Microsoft Dynamics. By leveraging these platforms, partners, application developers and end-users are starting from a position of strength, with a solid base of data management, business intelligence and business process integration functionality.

Microsoft SQL Server. All of the RFID data, including RFID events, processed through BizTalk RFID, can be stored in Microsoft SQL Server. Microsoft SQL Server's Business Intelligence framework allows users to analyze a variety of business metrics. With this information, organizations can easily determine how much inventory they are holding on a month-to-month basis or analyze out-of-stock trends. This type of business intelligence information can provide a substantial benefit for an organization deploying RFID.

Microsoft BizTalk Server. Traditionally, BizTalk Server has been used to integrate business processes and workflows. Now application developers can use BizTalk in the same manner when RFID is added to the mix. The process of ordering specific items from various suppliers to replenish inventory, for example, involves accessing data from an organization's ERP system and warehouse management system, as well as incorporating RFID events. "Using those events and multiple streams of data can help you understand where your inventory levels are, which helps you better identify how much of what items you should be ordering," says Anush Kumar, senior product manager, BizTalk RFID. "Essentially, BizTalk Server can be used to enable RFID-workflows that let you seamlessly incorporate real-time events."

Windows Workflow Foundation. Because Windows Workflow Foundation offers a single workflow technology for Windows-based Microsoft products and third-party solutions, it provides a rich set of out-of-the-box functionality, including visual designers for workflows and activities that can be leveraged for RFID-based solutions. For example, Windows Workflow Foundation allows vendors and customers to build custom processes and workflows that are human and system-oriented. It can also be used to help enforce Service Level Agreements.

Microsoft Dynamics. BizTalk RFID was designed from the beginning to tightly integrate across all of Microsoft's enterprise products in a seamless fashion. This is well illustrated in Microsoft Dynamics. A set of applications designed for small- and medium-sized businesses (including ERP, warehouse management, human resources and other key systems), Microsoft Dynamics can incorporate RFID data to further automate and streamline internal processes. A warehouse worker, for example, might consult a handheld RFID scanner to both receive the list orders he is assigned to fill that day and find the products needed to satisfy each picklist. As each item is scanned, the data is sent back to the ERP and warehouse management systems, all through BizTalk RFID. In short, Microsoft Dynamics brings the value of seamless integration of RFID events into ERP applications at a low total cost ownership and a correspondingly high return on investment.

Advantages for Partners and End Users

By offering plug-and-play capabilities, flexibility, scalability and extensibility, BizTalk RFID brings a myriad of advantages to application developers, systems integrators, hardware vendors and end-users.

Faster, simpler application and device integration. The plug-and-play capability makes adding additional RFID-based technologies like tag readers faster and easier for users. As devices from many different vendors become increasingly compatible under BizTalk RFID, both the number and selection of devices in the market will increase.

Ability to design more targeted applications, creating differentiation and competitive advantage. Generic, one-size-fits-all RFID applications provide limited competitive advantage. But with Microsoft's technology, a systems integrator could, for example, quickly build a more tailored RFID solution connecting a manufacturing facility and a distribution facility on the same campus, allowing its client to track case movements from building to building. In the real world of systems integration, applications like this must often stay in step with changing business requirements. "Say the client company now wants to subcontract one or both of those warehouse operations to a third-party provider where the assets are directed to a different data collection system, but management still wants to view the data at the enterprise level," explains Frank Lanza, director of RFID, global solutions, at Hewlett-Packard Co. of Palo Alto, Calif. "BizTalk RFID makes it easy to change. We simply tag inbound, in-process and finished goods at the subcontractor sites. When the goods leave one facility to go to the other, everything is accounted for at the enterprise level, and business managers know exactly how much of each item they have and where it is located in each facility."

More effective integration of systems within an organization. Today, companies want RFID-enabled applications deployed seamlessly, integrated with data in their back-end systems. With most current RFID tools, application developers and systems integrators must rely on middleware products, application software and translation tools, all from different companies, to integrate RFID edge systems with existing enterprise systems. "Traditionally, it's always been a band-aid solution," says Venkat Santhanam, Global Visible Commerce solutions director for Unisys Corp. in Blue Bell, Penn. "BizTalk RFID offers a better integrated solution to capture RFID edge data and process it to trigger other business processes, all on a common platform. It will allow us to build systems for our customers that are more efficient, less complex, easier to maintain and potentially, at a lot less cost of ownership."

Ability to roll out RFID applications specific to various vertical markets with the least TCO and greatest ROI. Because BizTalk RFID simplifies development and systems integration, "you don't need to have four or five different pieces of software that have to be integrated, with data handed off to each one, and you don't have to worry about different standards, data fields and translations," Lanza says. "BizTalk RFID makes it much more seamless, which allows systems integrators and application developers to satisfy their customers more quickly."

The ability to create higher-level services. Instead of developers being forced to focus on low-level plumbing issues, BizTalk RFID allows partners to create higher-level applications that make a real difference to a company's bottom line. A Microsoft partner, for example, could use this technology to create a system that alerts a consumer products manufacturer that it has an abundance of dish detergent in stock. Based on that information, the manufacturer can notify a large national retailer to put it on sale for 79 cents USD per bottle, and know that the surplus will be in the retailer's distribution centers within 24 hours.

Future Capabilities of BizTalk RFID

Because BizTalk RFID is based on flexible, scalable technologies and open standards, it is well-positioned to adapt to future industry developments. For example, the design already supports Gen2, an RFID tag standard developed by EPCglobal Inc. providing cross-vendor compatibility, high reliability, better tag identification and faster read rates. BizTalk RFID also allows developers to build SOA-compliant architectures and deploy them in multiple locations.

Microsoft plans to continue to enhance BizTalk RFID with more functionality and capabilities. For example, plans already are underway to extend the device abstraction infrastructure to communicate with more types of real-time devices. In addition, BizTalk RFID will drive more intelligence down to the device layer, providing more functionality in event management and event processing, such as processing filters or alerts directly on the device.

Summary

Although the use of RFID in a variety of industries has grown tremendously in recent years, its potential hasn't been fully realized due, in large part, to the challenge of configuring and managing a multitude of incompatible devices and difficulty in building meaningful applications and integrating them with back-end systems. "Until RFID can be fully exploited through the use of technology-based applications, analytical tools and hardened enterprise-scale technical infrastructure, adoption rates won't meet the expectations most market-watchers set," notes John Fontanella, author of "The RFID Benchmark Report" from Aberdeen Group.

Realizing the full potential of RFID requires a common set of tools and a framework that partners and end-users can use to build the solutions that improve business processes—solutions like inventory management and asset tracking. BizTalk RFID does just that, allowing Microsoft partners and end-users to create useful, scalable, flexible solutions incorporating RFID much more quickly and easily—applications that offer more value to the customer.

BizTalk RFID achieves its goal by creating a uniform way to discover, communicate and manage RFID devices on the Windows platform and to quickly create business rules needed for system integration in a fraction of the time previously required. Finally, the technology's ability to transform raw tag read events into meaningful business information via a rich, scalable event processing infrastructure promises to bring RFID out of niche status and into the mainstream.

Appendix A -- More Information About BizTalk RFID

For more information about BizTalk RFID, please call 425-707-8067 or send an e-mail to Anush.Kumar@microsoft.com. Click on the links below for additional information on the Microsoft products highlighted in this white paper.

Microsoft BizTalk Server	Microsoft SQL Server
Microsoft Dynamics	Windows Workflow Foundation

Appendix B – Contributing Organizations

The following organizations provided invaluable research and insights for this white paper and the author would like to thank them for their contributions. Industry officials interested in obtaining more information about the research cited in this report should contact the organizations at these Web sites:

[Aberdeen Group](#)

[Motorola Corporation](#)

[Hewlett-Packard Co.](#)

[Unisys Corp.](#)

Appendix C – About the Author

Karen D. Schwartz is a technology analyst for [Triangle Publishing Services Co. Inc.](#), Newton, Mass. She writes about RFID and other technology and business issues for numerous publications, including *CIO*, *InformationWeek*, *Electronic Business*, *eWeek*, *Government Executive*, and *Global Services*.