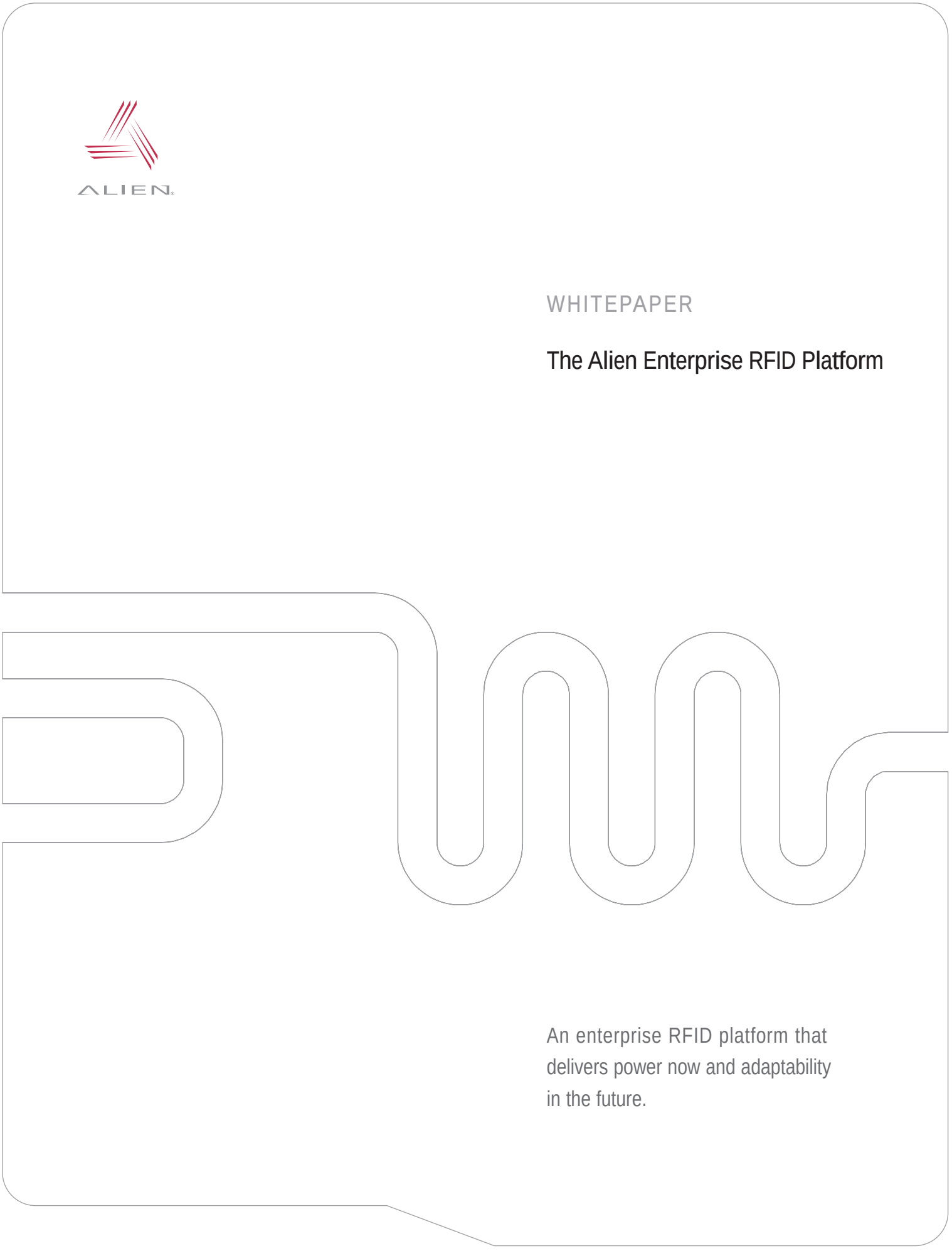


WHITEPAPER

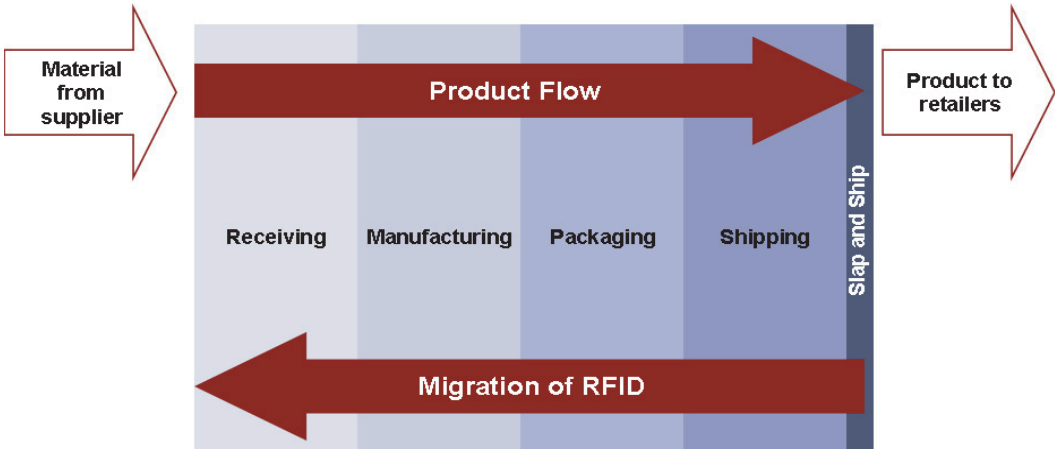
The Alien Enterprise RFID Platform

An enterprise RFID platform that delivers power now and adaptability in the future.

The Alien Enterprise RFID Platform

The Alien Enterprise RFID Platform anticipates a time when the inherent ROI potential of RFID and the sheer mathematics of compliance volume will drive RFID integration into mainstream business processes. Retailers are working towards this goal aggressively now. Among suppliers, early adopters are taking the first steps toward this migration, moving RFID from slap-and-ship back into the core operations of the firm where the management of inventory, the manufacture of product, and ultimately the receipt of raw materials occur. The goal is the same for both retailers and suppliers: to deliver measurable improvement in operating metrics from the day-to-day use of RFID.

This vision requires large numbers of readers operating in harmony with each other and with the enterprise network. End users need to ensure that the infrastructure investment they make will ensure robust RFID performance, efficient manageability and effective interference mitigation. The Alien Enterprise RFID Platform ensures these characteristics through an architecture that delivers power now and adaptability in the future.



The Alien Enterprise RFID Reader Platform enables the deployment of superior RFID system performance across a broad scope of applications and use cases. The Platform provides best-in-class performance today, and sets the foundation for continuing enhancements to the three key links in an RFID system:

- Reader-to-tag
- Reader-to-enterprise
- Reader-to-reader

The Reader-Tag Link – High Performance, Future-proof

Alien's expertise in UHF backscatter RFID systems is well known. The company plays a central role in the development of RFID protocols governing the reader-to-tag communication, and the Alien team is the source of many of the important innovations that make the UHF Gen 2 protocol different from all previous versions. Alien designs tag ICs, tag antennas, and readers, and benefits from understanding all these elements of the reader-tag link.

Alien's Enterprise Reader Platform is the product of this expertise. It enables high-performance, fully-compliant implementation of all current EPC RFID protocols across diverse regulatory environments around the world, while ensuring the ability to implement future UHF protocols as they emerge and evolve.

At the Platform's core is a powerful, programmable, signal processing engine that enables precise encoding and decoding algorithms for optimal RFID performance with all EPC Gen 1 and Gen 2 protocols. This processing power provides the ability to interleave commands of different protocols with low switching overhead, delivering high read rates with mixed populations of Gen 1 and Gen 2 tags. The programmable elements of this engine provide flexibility to implement new protocols quickly, ensuring that customers' investment in RFID hardware and infrastructure will be productive for many years.

The Enterprise Reader Platform is ideally suited to global deployments, where users want to implement a common RFID system architecture across facilities worldwide. The DSP-based architecture allows the readers to be tailored for compliance with diverse global regulatory requirements, while presenting a consistent interface to the enterprise networks. The programmable radio elements enable a common platform with few hardware versions to provide top-performing RFID to the entire world. Alien will deliver readers based on this Platform that are compliant with government requirements for North America, Europe, Japan, Korea China, Taiwan and other regulatory regimes.

The Reader-Enterprise Link – Intelligent, Manageable, Scaleable

To implement a robust control and management link between readers and the enterprise, the Alien Enterprise RFID Platform incorporates an Intel XScale™ processor and a fully-featured, Linux operating system. This platform incorporates the broadly-supported Alien Reader Protocol™, and enables support for future industry-standard protocols for reader communication such as the EPC Reader Protocol and the EPC Reader Management Protocol. Alien provided the first chairman of the Reader Protocol Working Group, and developers working with the forthcoming EPCglobal Reader Protocol will find it similar in many ways to the Alien Reader Protocol.

This standard-based approach shortens time-to-market for both Alien readers and Alien software partners, and accelerates time-to-value for end users, who will benefit from rapid enterprise and application integration on the Alien platform.

Support for industry-standard management protocols such as the Simple Network Management Protocol (SNMP) enables easy integration of the reader with existing network management structures. Use of the open Linux operating system will speed support of standard network protocols, such as network security, as user needs for them evolve.

The programmable architecture makes it possible for Alien partners to deliver differentiated value to their customers by allowing their middleware and application software to reside on the reader. This will enable customized data collection and filtering algorithms at the edge of the network. This “edgeware” will enable an explosion of value for end users and solution providers to:

- Create solutions composed of best-in-class components
- Optimize performance across a range of applications and markets
- Establish a common architecture across physical installations, enterprises and geographies

The first example of this is the integration of the IBM WebSphere RFID Device Infrastructure (WRDI) on a special version of the ALR-9800 reader, enabling instant enterprise integration for end users currently using WebSphere.

The Reader-Reader Link: Collaborative, Well-Behaved

The Reader-to-Reader link becomes more important as users implement greater numbers of readers in close proximity to each other. The expansion of RFID across the enterprise to be integrated with supply chain and manufacturing activities will lead to applications that require “dense” installations of readers. With multiple readers competing for common airtime, managing these so-called “dense reader” environments will require a toolkit of methods to ensure robust RFID performance without degradation in read rates.

The Alien Platform fully implements the Dense Reader Mode (DRM) defined in the EPC Class 1 Gen 2 Specification. By employing “dense reader channelized signaling,” co-located readers adopt “good RF behavior" and minimize interference between them and other readers. But DRM is insufficient in itself to mitigate reader interference in all situations. For example, it relies on the good behavior of all readers. Readers that do not implement DRM can interfere with compliant readers. Also, implementing DRM tends to slow read speed of the system, and some applications may not allow for this tradeoff. In addition, it may prove difficult to run the DRM in all geographies, due to regulatory limitations.

Successful mitigation of interference requires the use of multiple techniques – there is no silver bullet. The Alien Platform provides additional methods for mitigating reader interference, and provides an evolutionary path of increasing sophistication to others. For example:

- Listen-before-talk (LBT), a regulatory requirement in Europe but included in all Alien readers, enables readers to avoid contention by waiting for occupied channels to become available. The Platform supports a proprietary, FCC-compliant version of this technology.
- External event triggering, in combination with Autonomous Mode, an element of the Alien Reader Protocol, enables effective use of the RF bandwidth by allowing readers to turn themselves off when there is no tagged product in the field as indicated by presence detectors or middleware.

The sophisticated digital signal processing capability of the Platform will enable readers to “listen” to the RF environment and adjust mode, data rate and other parameters to optimize performance. Functionality based on this aspect of the Platform is planned to appear in readers in 2006.

Summary

RFID is changing from a collective pilot project to a global, industry-wide expansion. Taking advantage of mandate-driven technology advancement, ROI-based implementations of RFID are emerging across a variety of markets and applications. Retail suppliers operating under mandates know that RFID infrastructure must move from slap-and-ship on the shipping dock toward integration with the core business processes of the enterprise in order to deliver ROI.

This process requires that RFID readers to change from proprietary, inflexible and manually managed black-boxes to expandable, transparent platforms that merge with an ecosystem of software and hardware components. Users require a platform that delivers:

- Robust, expandable RFID performance
- Seamless integration with the enterprise through open standards and intelligent edgeware running on the reader
- Effective interference mitigation through a suite of tools that allow performance optimization across geographies, applications and environments

The Alien Enterprise RFID Platform provides these capabilities through an architecture that delivers power now and adaptability in the future.

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