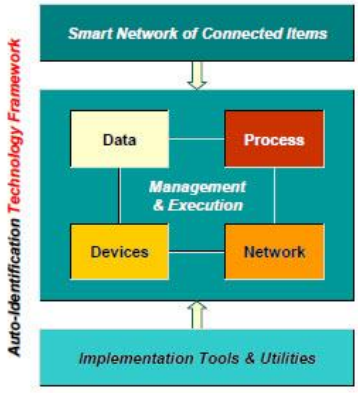
The Smart Network of Connected Items

A Vision for RFID and Sensor-Based Networks

George Brody
Founder & Chief Executive Officer

This is the first in a series of six whitepapers that address significant issues around emerging auto-identification technologies such as the strategic approach and business process changes among others. As the graphic on the left illustrates, a clear and precise view of auto-identification technologies and their impact provides the basis for a discussion of how these technologies will shape our future, how they will fundamentally change existing strategies, business processes and information systems. At GlobeRanger, we have formulated a vision for emerging auto-identification technologies, RFID and sensor-based networks, in that they will lead to the proliferation of the "***Smart Network of Connected Items at the Edge***". This vision expresses our belief that we will soon witness the emergence of item-level traceability throughout supply chains facilitated by machine-to-machine communication before, during and after their usage and real-time data and event management capabilities that allow for true exception management. Ultimately, with the advent of pervasive computing enabled by wireless sensor networks, new supply chain capabilities will evolve for proactive intervention in case of unintended and unwarranted events. RFID and sensor-based technologies will allow end-consumers to experience drastic improvements in virtually every aspect of their lives.



Biography

George Brody

President and Chief Executive Officer

GlobeRanger Corporation, a Fujitsu Company

As a President and CEO of GlobeRanger, George Brody is responsible for guiding the company through its next phase of global growth following its acquisition by Fujitsu in May 2014. George's vision of the 'enterprise edge', born out of his pioneering work in the wireless world, is the foundation of GlobeRanger's market leading iMotion platform. Prior to co-founding GlobeRanger in 1999, Brody served as Vice President and General Manager of Nortel Networks' Wireless Network Solutions division where he managed a series of entrepreneurial start-ups including Satellite Network Solutions, Wireless Intelligent Networks and Wireless New Business Ventures, a business incubator. During his tenure at Nortel, as Vice President of Wireless Technology, Brody was responsible for its global wireless product development programs and the management of the Bell Northern Research Labs in Richardson, a world-class research and development organization that employed more than 2,500 professionals.

Brody holds a bachelor's degree in electrical engineering from the Indian Institute of Science, Bangalore, India. He also earned master's degrees in electrical engineering and computer science from the University of New Brunswick, Canada. He is a member of the advisory council for the School of Management at The University of Texas at Dallas and serves on the board of directors of the Texas–based Metroplex Technology Business Council and is also the non-executive Chairman of MobME Wireless Pvt Ltd, an exciting Wireless technology venture, based in Cochin, India. Brody is a holder of several patents in the area of Wireless Networks.

RFID & Sensor-Based Networks: Changing the Face of Supply Chain and Logistics

RFID, an Inflection Point for Supply Chain

According to Andy Grove, former Chairman of Intel Corporation, there are strategic inflection points in businesses, technologies and the life of a company. These inflection points are a "convergence of forces making sudden and rapid change inevitable" and they create "full-scale changes in the way business is conducted." By this definition, the next inflection point could be RFID and sensor-based networks. Tagging everything from tires to hospital equipment to clothing is expected in the next few years. This change, which will impact current supply chain operations and the logistics associated with moving goods, is driven by a set of new standards, adoption by key companies and the delivery of new technologies that connect the edge of the supply chain.

The Stage is Set

In the 2004-05 timeframe, EAN International and the Uniform Code Council (EAN.UCC) legitimized a set of global standards for product identification, effectively signing off on a number of technologies that launched one of the most important revolutionary shifts in business history. This allowed all participants in the supply chain to know where a particular product began its life, its current location, and where it has been. The underlying technology, RFID, has been around for a couple of decades in a variety of forms. However, it is the new generation of low-cost RFID tags and readers, combined with emerging software solutions that has the potential to deliver unprecedented value for supply chain management.

With the subsequent adoption of a global set of standards, the advent of radically lower-cost RFID technology and ever-increasing demands for a very lean worldwide supply chain, Fortune 500 companies started to trial and implement RFID solutions. In the next three to five years, RFID will be used throughout the supply chain because companies desperately need a fast, efficient and cost-effective way to collect accurate and relevant data for real-time decisions.

The Edge of the Supply Chain

The corporate world has been diligently cutting costs from its supply chains and business operations for years. In their quest for improvement, businesses have invested in tools and systems that optimize their processes and have made significant progress in areas that they can "see" and measure. However, limited visibility and significant delay of information between what is actually happening with physical goods ("items") and enterprise systems have constrained further efficiency improvements.

Information from the edges of the supply chain is typically captured through manual, error-prone processes. If everything went according to plan 100 percent of the time, visibility of inventory in motion would not be an issue, and enterprises would have accurate and relevant information for planning and decision-making. However, exceptions occur with almost every transaction. When the true status of inventory and orders falls out of alignment with what the enterprise system expects, decisions are made based on out-of-date or inaccurate data, negatively impacting

revenue, customer service, and inventory management. Today's inefficiencies cause a number of problems including out-of-stocks, lost sales, expedited shipments, production slowdowns, excess buffer inventory, shrinkage and billing delays.

In the consumer package goods and retail segment, these problems are well understood. Estimates of lost sales due to out-of-stock and shrinkage exceed $100 billion per year. Recent research by the Grocery Manufacturers of America reports that 8 percent of supermarket products are out-of-stock at any particular time; even more astounding, promotional products are unavailable 20% of the time. Studies by IBM have shown that 30 percent of these out-of-stocks items can be found within 100 feet of where it should be. As businesses strive to meet rapidly changing demands with a high degree of certainty, accurate and real-time information from the edge of the supply chain becomes crucial. The ability to track the flow of goods at the edge of the supply chain can enable real-time decisions, bringing immediate value in areas such as inventory management, replenishment, and shrinkage.

Looking For the Right Stuff in a Sea of Data

The new generation of RFID solutions will bring an unprecedented level of real-time, item-level information, fundamentally changing how inventory is managed across the supply chain. New software infrastructure will be introduced to handle the explosion of data on a real-time basis and handle the complexities of deploying and managing a network of RFID devices across multiple sites, and multiple enterprises.

Today, the process to collect bar code data requires an SKU, case, or pallet to be scanned individually. In an RFID environment, data gathering is not such a serial process. The data itself is collected simultaneously in one scan, regardless of the variety or quantity of product. In its raw form, the data does not delineate between pallet, case, and SKU. A new layer of software, called Edgeware, is used to transform an unstructured mass of data into information that the traditional supply chain system can understand and process.

A New Edge Layer is Needed

Companies are beginning to experiment with RFID deployments on a trial or single-site basis. Projects being publicized today are mostly focused on gaining experience in making devices work together. This requires simple software that provides some rudimentary connectivity, data smoothing and filtering. However, in a production deployment that involves multiple readers across multiple sites, the complexities of managing the data and the network of devices will require more robust software solution at the edge, hence Edgeware.

The Role of RFID Edgeware

To achieve cost-effective deployments, Edgeware should be used not only to simplify the initial RFID deployment but also to monitor and manage the performance of the device network. In addition, business logic must be distributed to the location where transactions occur, allowing control systems to work optimally. Edgeware platforms are designed to tackle this and the more difficult challenges of having multiple sites deployed across multiple enterprises, in essence, managing the "network at the edge". The edge is becoming a very chaotic place as numerous varieties of devices, readers, tags and workflows will be in use. The problems of data access,

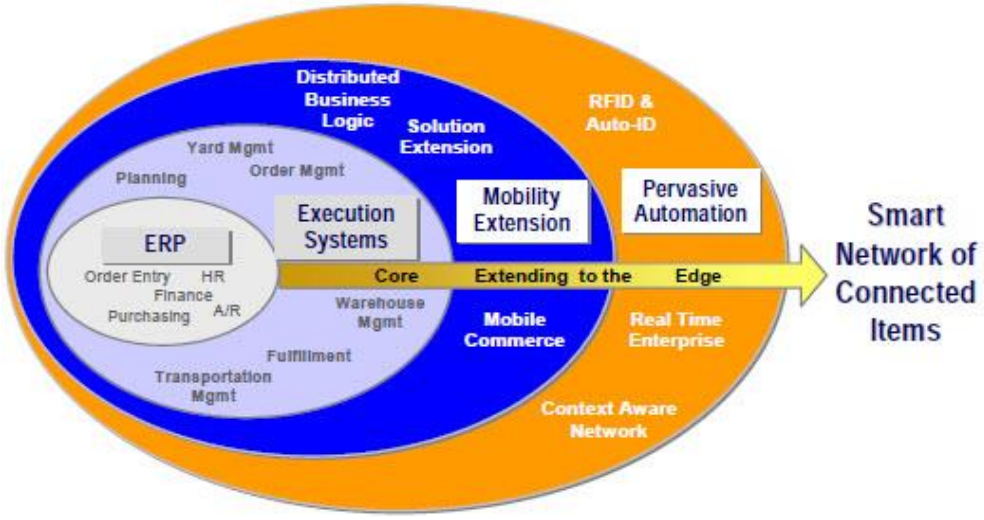
making information mobile, and overcoming the process and network constraints will have to be solved. Edgeware must be able to deal with this environment in an effective manner.

Connecting the Edge – The Final Frontier

The concept of connecting the edge of the supply chain has been evolving rapidly over the last three years. Computing is moving towards the edge of the enterprise, enabled by wireless and pervasive automation technologies. At the core, Enterprise Resource Planning (ERP) systems allowed groups of people within an enterprise to work together. For example, all accountants used the same general ledger. Execution systems including supply chain planning, warehouse management and transportation management systems were built extending the ERP core out to key supply chain operations. Mobile applications enabled distributed functionality beyond the four walls of the enterprise, linking mobile workers via wireless networks.

The next big push is the convergence of a number of technologies – such as wireless, low cost RFID tags and readers plus software that will provide visibility and management control of individual items without human interaction. This trend, called pervasive automation, will allow enterprises to revolutionize the way items are produced, warehoused and distributed.

Moving Towards the Connected Edge



The Pervasive Automation trend will radically change how manufacturers manage their products across the supply chain. Imagine billions of tiny computers and sensors in the real world, connected by a smart network at the edge of the enterprise, bringing us closer to the day when computing devices connect every object to every other object in pervasive and ultimately, unthinkable ways. At the fundamental level, RFID is a starting point towards the vision of a "Smart Network of Connected Items" where item-level traceability throughout the supply chain is

facilitated by machine-to-machine communications. Imagine the possible impact on supply chain management and end-user experiences. Now THAT is a strategic inflection point.