



**Mike Shiff, General Manager of RFID Recruiters, LLC**  
**Interviews**  
**RFID and AutoID Industry Veteran Raj Bridgelall**  
**About the**  
**Current and Future State of RFID**

**Introduction**

As of the first half of 2011, RFID continues to grow in many directions for many applications as an enabling technology across virtually all major vertical industries. From passive (non-battery) tags to active (battery-powered) tags and from near-field (125 KHz, 13.56MHz) to far-field (433 MHz, 915MHz, 2.45 GHz, etc.) RFID technology is proliferating in the United States, Europe, Asia, and other regions of the world.

This article presents an interview with Raj Bridgelall, an RFID, RF, and AutoID technology leader who has a broad and deep understanding of many key RFID initiatives. In this interview Mike Shiff, General Manager of RFID Recruiters asked Raj to share his thoughts on a range of technology and business trends that are shaping the future of RFID and related technologies.

**Mike:** Raj, in a few words please tell our readers what you've been up to for the last decade or so.

**Raj:** Like many "RFIDers" I've been transitioning from an earlier career in barcode to a much more wide open field of RFID, RF, mobile, and of course, Web-based technologies. At Symbol (now part of Motorola Solutions) we ran with a very clear path to the market for barcode technology – we developed dozens of patented products, mostly for laser and imager based barcoding. When RFID appeared on the horizon I spent several years leading R&D at Alien Technology, and then most recently developing sensor-based RFID solutions incorporating energy harvesting techniques.

**Mike:** So what did you learn from all that?

**Raj:** Timing is everything. It takes time to develop infrastructure technology and in turn it takes time for markets to adopt the technology in the form of business solutions. Too early isn't too good and too late probably isn't much fun either – but I think most RFIDers have tended to struggle more with being too early than being too late.

**Mike:** What have you done to get your clock cycle synchronized with the market?

**Raj:** Pun intended I see – well I’ve slowed down my expectations (big smile). Seriously, I’ve come to recognize that large, scalable, repeatable solutions do take time, persistence, and patience – but if you are seeking to change the world for the better, and if you are intrigued by what’s possible, then you have to align your career clock with the market’s clock so that you can “skate to the puck” as they say in hockey.

**Mike:** Ok, before we get into your newest endeavor, let’s talk about your views on some of the key recent technology developments that you think are aligning with market opportunities. What are the key trends you see emerging in RFID and related technologies?

**Raj:** Most recently, we’ve seen passive (EPC) tags take off for the retail tagging of clothing and other apparel at the item level. No doubt, RFID is moving beyond cases and pallets to item tagging. What people might not realize is that we are just now seeing the toe of the curve for passive RFID infrastructure technologies (tags and readers) that have gone through extensive product development and customer testing – but equal in importance to R&D and pilots – passive RFID has benefited hugely from the development and adoption of a standard. Without EPC and ISO18000-6c we wouldn’t be talking about the large uptake in clothing and apparel item tagging, and we wouldn’t be on the cusp of what many people believe will be a much larger proliferation of item tagging in the overall retail market and in the underlying supply chains – all the way back to the manufacturing of Consumer Product Goods.

**Mike:** So you think standards are helpful?

**Raj:** Not just helpful, but required – if you want mass adoption of a technology. You and I both know that industry standards can either be de-facto (proprietary) or standards-body driven, but without a clear path to the future the adoption curve never gets very steep. In the case of RFID, the passive segment has been 5 years or more ahead of the active segment.

**Mike:** How is that changing?

**Raj:** I believe the active RFID technology providers saw the momentum developed by the RFID passive technology providers - with the support of leading passive RFID technology user organizations. You have to give credit to Wal-Mart and others. Over the last couple years the active RFID communities have been diligently working to develop active RFID standards.

**Mike:** When you say “communities” and “standards” it sounds kind of plural. What would you say to people who might ask “why do we need multiple active RFID standards?”

**Raj:** To best understand active RFID you need to look at what users and technologists are solving for – it’s a combination of trade-offs: 1) worldwide operation and interoperable solutions, 2) reliable operating distance, 3) tag throughput and density, 4) operating life with a small coin cell battery or some form of energy harvesting, 5) form-factor/footprint, and 6) price. Pretty quickly you see that you can’t develop a tag that can be all things to all people. So the market is segmenting itself into various camps within the realm of active RFID.

**Mike:** And those camps are?

**Raj:** There are several that are important. The first, and the one that I'm personally most excited about, is DASH7, which is an Alliance, similar to Wi-Fi, that is promoting adoption of and augmentations to the existing ISO 18000-7 standard. In this case, we have to give a lot of credit to the end-user organizations that created a market demand for standards compliant Active Tags, namely the U.S. Department of Defense and the Ministries of Defense of most of the countries in the free world.

**Mike:** What do you like so much about DASH7?

**Raj:** It provides a foundation architecture for a huge need: robust communications over a meaningful operating distance with significant tag throughput, a lightweight protocol supporting low power consumption, and inherently low-cost implementation with off-the-shelf chipsets. In fact we are now working on extensions to the standard that would further reduce power consumption and enhance throughput, and this will also make it an excellent platform for sensors.

**Mike:** So you think DASH7 is here to stay.

**Raj:** It's a done deal because any manufacturer can now submit an ISO18000-7 compliant product for DASH7 certification and interoperability testing as they would for a product designed to be IEEE 802.11 compliant to the Wi-Fi Alliance for certification. I think DASH7 has the right technological framework and the right combination of provider and end-user organization support to become an enduring standard.

**Mike:** What about other active RFID standards initiatives?

**Raj:** I do see other notable opportunities for standards development and adoption. I think we'll see products based on the IEEE 802.15.4 standard flourish in various settings, both in businesses and in homes. For example, the ZigBee® Alliance promotes products and applications suited to the IEEE 802.15.4 standard. Its mesh characteristic provides several attributes for a platform capable of propagating intelligence within a personal area network, or on a more massive scale. Another is UWB. The jury is still out on UWB, but my guess is that we're just early and UWB will eventually become part of a very popular, standards-based platform.

**Mike:** So, EPC is providing a tremendous foundation for passive RFID, while DASH7 and ZigBee are on their way for active RFID and sensors. How long until we see a bridge between passive and active RFID?

**Raj:** The bridge is already here and it's probably just a revision or two away from being upgraded to become a significant bridge between passive and active RFID. That bridge is the Smartphone. It could be an Android, or an iPhone, or a Blackberry, or any other popular Smartphone. We've already heard the announcement that Android is coming to market with the ability to support Near Field Communications. Simply put, NFC is just another form of RFID. With NFC in phones we are going to see a major bridge between consumer applications and enterprise applications. NFC has the potential to make almost every Smartphone both an RFID reader and an RFID tag. The applications for NFC in phones will be endless: contactless payments, shopping, automated Point-of-Sale checkouts, personal

RTLS systems where the consumer can find things and associated information throughout stores. It's also the beginning of that proverbial bridge between the physical world and the digital/virtual world.

**Mike:** So how does this lead to the bridge between passive RFID and active RFID?

**Raj:** Chipsets. We are going to see chipsets – that support the major standards – such as EPC and DASH7 appear on the market. This will make it possible for Smartphones to further consolidate their position as “the Bridge”. The Bridge will be the intersection of various passive and active RFID technologies, and the intersection of the physical and digital realms, and it will also be a major bridge between consumer and enterprise applications.

**Mike:** That sounds like a Mother of All Bridge's – technologically speaking.

**Raj:** Yes, it is – and it is going to stimulate more RFID technology development and many new applications for RFID.

**Mike:** So RFID, the ability to use RF technology to wirelessly ID things isn't going away any time soon.

**Raj:** Not in our lifetime. Our challenge and our opportunity is to figure out how to harness the technology in its many variations so that we can not only make markets for new products and services – which any economic system dependent on growth generally enjoys – but in addition, we need to figure out how to use RFID and related technologies in a way that makes our growth and development sustainable.

**Mike:** Have any ideas on how the world can do that?

**Raj:** As a matter of fact – let's talk about that in our next article.

**Mike:** Ok, Thanks Raj.

**Raj:** Thanks Mike.

In Article 2, Mike and Raj will discuss a new frontier for RFID, Sensors, and related technologies: How the World is Going to Make Smarter Roads and Smarter Vehicles.

### **About Mike Shiff and RFID Recruiters**

Michael S. Shiff is the founder and General Manager of RFID Recruiters, LLC. RFID Recruiters specializes in providing recruiting services for companies and individuals involved with Radio Frequency Identification technologies, products, applications, and services – including passive and active RFID, RTLS, and sensors. RFID Recruiters serves clients and candidates throughout the United States, Europe, Asia, and other regions around the world.

RFID Recruiters is committed to contributing to the development of the RFID industry in a way that makes businesses more productive and people happier. RFID Recruiters mission is to help the best companies and the best individuals find one another in a manner that brings into being the best RFID technologies, products, applications, and services.

RFID Recruiters is highly confident that RFID has the potential to become a key building block for “Pervasive Computing”. For a more detailed look at our perspective on RFID, please see: [www.rfidrecruiters.com/Moving\\_into\\_RFID.htm](http://www.rfidrecruiters.com/Moving_into_RFID.htm)

Mr. Shiff's background included over 25 years of experience with advanced information (computing and networking) technologies. Mr. Shiff began his business career at IBM and gained his first professional experience with Radio Frequency technologies at Satellite Business Systems (partially owned by IBM). SBS was the first private enterprise to contract for cargo space on the Space Shuttle. SBS launched 5 geosynchronous communications satellites from NASA's Kennedy Space Center. Mr. Shiff's work with 48 Mbps demand assigned TDMA digital baseband and RF technology at SBS and later work with systems operating wirelessly at speeds up to 120 Mbps laid the foundation for his knowledge of multiplexing, modulation, error detection and correction, and other fundamental analog and digital techniques that are the basis for many of today's applications of RF and related information technologies. Following Mr. Shiff's career in satellite communications which included management positions at M/A-COM DCC, M/A-COM Telecommunications, and Hughes Network Systems he went on to help build three early stage information technology companies - two of which achieved successful IPOs and one which was acquired by a Fortune 100 company. During this period, Mr. Shiff served for three years as the Chairman of the DICOM (Digital Imaging and COmmunications in Medicine) Demonstration Committee; DICOM has become the most prominent worldwide standard for medical applications of digital imaging.

While Mr. Shiff considers RF and networking technologies to be essential elements of information technology he believes that networking is inherently lower on the stack than computing infrastructure and that applications software and the automation of business processes offer the opportunity to unleash relatively greater value and therefore belong higher on the stack. Mr. Shiff is passionate about the development and introduction of new technology that provides value for customers and their end users, vendor employees, partners and suppliers, and investors. Mr. Shiff believes that most successful investors bet on jockeys (people) more than horses (business plans).

Mr. Shiff can be reached via [www.rfidrecruiters.com](http://www.rfidrecruiters.com) or through the main telephone number at RFID Recruiters: 800-982-RFID (7343).

## **About Raj Bridgelall and the Advanced Traffic Analysis Center**

At the [Upper Great Plains Transportation Institute](#) (UGPTI) of North Dakota State University (NDSU), Raj leads the [Advanced Traffic Analysis Center](#) (ATAC) in activities that enhance transportation systems in small to medium-size cities through the use of computer simulations, theoretical modeling, and intelligent transportation systems (ITS). Goals are to enhance safety and improve mobility-efficiency. In addition, Raj is the principal investigator for the Institute's Surface Mobility Application Real-Time Simulation environment ([SMARTSe<sup>SM</sup>](#)) program. Raj also represents the Institute on the technical advisory board of the DASH7 Alliance. He is a technology executive and product innovator with more than 135 [patents](#) issued or pending. His research activities led to dozens of technical publications and several chapters in engineering text books.

Prior to joining NDSU, Raj Bridgelall was Vice President of Engineering at Axxess International, Inc. There he advanced the state-of-the-art of Radio Frequency Identification (RFID) and Real Time Location Systems (RTLs). He led the company's product development and roadmap from high performance ActiveTag™ solutions through wireless sensor networks. Prior to joining Axxess, Raj served as Vice President of Research and Development at Alien Technology. He was responsible for advanced product development related to the company's future wireless systems, enterprise networking platforms, and architectural extensions to the electronic product code (EPC) standards. Raj was also Chief Technologist for RFID at Symbol Technologies (now Motorola Solutions), where he held a series of positions in engineering and R&D over a 14 year period. He led Symbol's activities at the MIT Auto-ID Center and EPCglobal® Hardware Action Group, and was the architect of Symbol's approach for integrating RFID data capture into wireless networks. His innovations and inventions at Symbol led to numerous successful commercial products. He may be reached via <http://bridgelall.com>