The New RFID Value Proposition

Market Analysis By:

VDC

ALIEN

RFID Goes Mainstream

Thanks To Affordability, Flexibility

Since emerging in 2005, RFID (ultra high frequency [UHF], Gen 2) has matured and, in many cases, has started living up to the hype surrounding its debut. The industry has right-sized expectations and focused on delivering real business value. This is in stark contrast to the 'just do it' mentality of three years ago.

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RFID customers now have a choice of vendors for hardware, tags, and services. In 2007, large customers started reaching out to solutions integrators to support sizable installations, moving projects from pilots to production. With industry standardization efforts (ISO and electronic product code [EPC] Gen 2), RFID became affordable. Tag prices dropped by 70%. Reader prices decreased by 50%, and today, reader/antenna solutions are available for less than $900. In two years, UHF RFID reliability has increased by 300%, and manufacturing quality has improved from 80% to 99.5%. Additionally, RFID now enjoys industry support from such large Fortune 100 businesses as IBM, Microsoft, Oracle, and SAP.

EMERGING APPLICATIONS FEATURE REDUCED-LOSS SOLUTIONS

RFID technology has matured to deliver solutions to businesses while also overcoming tagging obstacles such as those presented by metals and liquids, opening access to new segments and applications. In addition, increased sensitivity and read range of RFID integrated circuits, coupled with improved software and functionality of the readers to control read zones, are paving the way for the entry of UHF RFID into airline baggage handling and item-level solutions for the pharmaceutical industry. Beyond its expected entry into the airline and pharmaceutical industries, this year RFID will start providing a realistic solution to fight counterfeit products on a global scale.

In five years, a 75% increase in the number of mishandled bags has plagued airlines. According to the International Air Transport Association, 80 airports are planning to install RFID equipment in the next few years. Hong Kong and Las Vegas McCarran international airports already have operating RFID systems. Considering the current cost per lost bag is $90, RFID could save airports and airlines an estimated billions each year. With RFID implemented, the potential exists for the yearly volume of RFID UHF tags to exceed 1 billion by 2012.

COUNTERFEIT BATTLE NEXT FRONTIER FOR RFID

Global trade and e-commerce create a wealth of business opportunities, but they also create increased risk of product liabilities and brand challenges. These challenges include counterfeit products, grey-market sales, and other issues. In the United States, counterfeits account for $200 to $250 billion per year in lost business revenue while the global counterfeit trade is estimated at a staggering annual volume of $600 billion. Whether it is counterfeit medications, knockoff designer jeans, or substandard automotive parts, counterfeiting is a serious issue that stretches across a broad range of industries.

RFID can establish a protected identity with a permanent, unique serial identification useful for both product ID and counterfeit resistance. Access to user data can be restricted for security, and RFID can be embedded within packages since it doesn't require line of sight to be read. UHF Gen 2 RFID is ideal for product integrity applications. With UHF RFID, authenticity can be ensured with a UTID (unique tag ID), creating a permanent, factory-programmed, unique serial number, along with the EPC data and user data on the tag. UTID can't be altered, and with certain security features, the EPC and user data can be locked.

PASSIVE RFID BRINGS AFFORDABILITY TO ASSET TRACKING

Passive RFID has become a viable solution for asset tracking, once considered the domain of costly active tags and readers. With passive RFID, data about assets can be captured automatically without labor or compliance. Passive tags are used for inventory management of tools and equipment at far lower costs and with less ongoing maintenance as compared to active tag solutions. Passive RFID is now being used to control access to valuable assets — such as legal documents, laptops, servers, and printers — as well as to maintain chain of custody.

The ecosystem for Gen 2 RFID is ready to deliver products and solutions. Industry standards like EPC Gen 2 and ISO 18000-6c deliver a high level of interoperability, which has created a broad ecosystem of vendors that supply labels, encapsulated tags, readers, handhelds, software, printers, and other related products. So, while 10 readers and a few million tags were considered a large order last year, in 2008, customers may need hundreds of readers and millions of tags annually as the worldwide market size for RFID products and services expands to an estimated $5.3 billion. ❑

Q&A With Analyst Andrew Nathanson

VDC Analyst Andrew Nathanson discusses the impact of RFID as the technology's reach continues to expand.

What applications within the supply chain are gaining the most mindshare and traction with respect to RFID?

The applications capturing the most mindshare — or attention — are those, typically, with the most powerful stories. Among these: item-level tracking, RFID-enabled sense/ monitor solutions, and RTLS (real-time location system). However, these are not necessarily the applications gaining the most traction. If we define traction as end user community investment in RFID pilots and rollouts with significant off-the-shelf content, then we would cite a somewhat different list of applications. Among these: security/access control, high-value asset tracking, and higher-echelon supply chain management in closed-loop environments.

Andrew Nathanson, director – AIDC Technologies, Venture Development Corp.

Why the difference(s)? The first set speaks to the imagination of technologies and visionaries. Their value propositions are rooted in the ability of RFID to drive or enable massive changes in the ways that business is organized and conducted. The second set currently represents the latest variation on a theme that has been well — perhaps too often — covered. For quite some time, many people have been forecasting the multibillion dollar opportunity in RFID supply change management.

How have end user RFID expectations changed (or been realized) in the past 12 months?

The past 12 months have been among the most productive for end users — and market developers in the supplier community. Users have largely recovered from the hype cycles that, quite honestly, delayed RFID market development. They are developing clearer pictures of the fragmented technical environment, but most importantly, they are focusing more of their attention on the hard requirements for successful RFID deployment. In addition, they are developing much more conservative, and informed, estimates of the impact of RFID on a number of operational and financial metrics.

How aware should North American companies be of the adoption of RFID in China?

North American companies need to keep on top of this — particularly if their supply chain originates there. We believe that RFID will continue to penetrate further down the supply chain (i.e. source tagging) in certain product categories. Source tagging will not be rooted solely in item-level tagging, although that could be an attractive business in five years and a significant market in 10. If you consider source tagging to include tagging at AND above the item level — cases, cartons, and other intermediary packaging and conveyances — then you must consider China within the epicenter of that market. Since China is the origin of approximately 50% of the CPG (consumer packaged goods) imports to the U.S. alone, the onset of source tagging could have a significant impact on North American supply chains.

What should North American companies focus on?

- Harmonization between China standards and global or other regional standards
- Identifying strong global logistics partners with the capability to support RFID earlier versus later — as their impact on competitiveness will be material
- Defining a China market participation road map — one's 2008 strategy may need to be very different from 2010, or 2012.

Will RFID become pervasive in the North American supply chain? If so, what is your best guess at a time frame?

Well, that depends on your definition of pervasive. Let's start with vertical markets. We believe that RFID will be a critical part of the supply chains of a number of supply market segments with high-value items that carry significant overhead in terms of market value, counterfeit potential, and perishability. This may likely be the case for products that may not fit the description above intrinsically, but when you place them in less controlled environments, RFID can offer powerful value propositions to help manage risk in those supply chains. Examples might include pharmaceuticals, electronic components, aerospace parts, apparel, and luxury goods.

Now let's consider pervasive within the context of the tracking echelons with the supply chain. We believe that RFID will be a pervasive technology at the pallet level across a wide range of vertical market supply chains. However, we think that its penetration at the carton or case level will be less broad, and likely rooted in, but expand beyond, the list of verticals cited above. Our position is that the issues, forces, and trends driving adoption of RFID in the supply chains with high-value/high-risk items, and/or complex logistics systems and environments, will also drive demand for carton, case, and other secondary packaging echelons. ●

The Supply Chain And RFID Adoption

RFID continues to gain traction in the supply chain, but its biggest impact is still on the horizon.

The marketing folks have done their job well. EPC (electronic product code) UHF is synonymous with RFID in the supply chain. In fact, EPC UHF is the premiere RFID solution within the supply chain, dominating tracking echelons ranging from cases and cartons to pallets and containers; but all that powerful evangelism has potentially clouded the market's real status and evolution. It's tempting to think that with all the announcements of EPC UHF pilots and deployments, account wins, case studies, and articles published that the EPC UHF market represents a significant portion of the total global RFID industry. The truth is that the EPC UHF market is still small, with future potential far outpacing current deployments.

EPC UHF: State Of The Segment

The total global EPC UHF market (including all hardware, software, and services) was approximately $250 million in 2007 — about 8% of the total global RFID market. It is expected to grow nearly 40% annually (CAGR) through 2011. Although expected to outpace the overall market by nearly ten percentage points over the next four to five years, the global EPC UHF opportunity will still only account for approximately 10% of the total global RFID market by 2011.

Hardware (transponders, readers, and printer/encoders) represented approximately 70% of the EPC UHF market segment and is expected to grow by nearly 39% over the next five years. Hardware unit shipments in 2007 were:

- 225 million transponders
- 76,000 readers
- 4,800 printer/encoders

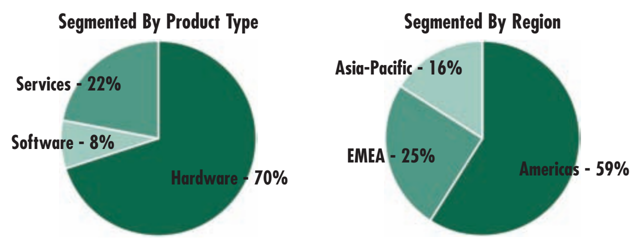
Software revenues, although only accounting for less than 8% of all EPC UHF RFID revenues, are expected to grow in excess of 60% annually (CAGR) over the next four to five years, nearly doubling its share of the total EPC UHF market.

Professional services in support of EPC UHF approached $55 million in 2007 and are anticipated to grow nearly 33% annually through 2011, with the vast majority of activity centered on installation/integration services.

The Americas region, primarily the United States, accounted for approximately 60% of the total global EPC UHF market in 2007 and will remain the dominant region through 2011; however, the Asia-Pacific region, fueled by supply chain-based activity in China, is expected to grow the fastest.

Three vertical markets accounted for nearly 75% of the total global EPC UHF market in 2007: consumer packaged goods (CPG), government, and transportation. Most of the activity driving these markets is supply chain related, with the transportation market being driven by airline baggage handling applications. The domination of these verticals, even as supply chain applications continue to evolve and grow within them, will become less prominent over the next five years, as emerging markets such as pharmaceuticals and healthcare begin to integrate the technology within their supply chains. Moreover, the emergence of a host of new applications (e.g. point of sale) within other verticals will account for another significant source of demand.

2007 Global Shipments Of EPC UHF RFID Solutions



Source: VDC Research, 2007

These estimates and forecasts are based on original, direct-contact primary research gathered via structured interviews between experienced, trained VDC analysts and EPC UHF suppliers, integrators, and users. This data was collected under strict usage rules that protect the study participants, thus enabling them to share detailed information about their current and near-term levels of investment in EPC UHF. This information is validated via follow-up interviews across the EPC UHF commercial value chains.

VDC has no equity position in any company participating in the EPC UHF market segment. Most of our clients are suppliers or integrators of these technologies. On occasion, we work for investors with current positions in the market and those looking to place capital in this segment.

Our agenda is simple: Provide the most detailed, accurate, and actionable market intelligence possible on these markets.

Our goal for this piece: Provide readers with an alternative description of the EPC UHF opportunity, one that is rooted less in evangelism, placed in context of the overall RFID market, and more reliable for important decision making.

The EPC UHF market will live up to its potential as a broadly deployed, mission-critical supply chain management tool — in time. As with most emerging technologies, those that weather the storm during the introduction/innovation stage typically reap the rewards during the growth phase (remember those "S-Curves" on Technology Adoption?). VDC predicts that the real growth phase for EPC UHF solutions will begin around 2012/2013.

Technology Maturation And Commercialization

EPC UHF solution suppliers and integrators continue to work on a number of technical and commercial barriers, such as:

- Performance in a harsh RF environment
- Read rates and accuracy
- System design/configuration
- Total solution price and the related costs of ownership
- Integration/compatibility with existing infrastructure

Real progress is being made on all of these issues — and others. Every improvement is an accurate indicator that EPC UHF solutions are capable of moving ahead on the market adoption curve. Penetration rates are rising in certain market segments, but the high-volume applications that everyone in the EPC UHF supplier community is waiting for (i.e. item-level tracking) will not materialize in volume in the near term.

There have been several live demonstrations and pilot evaluations that provide proof of concept for EPC UHF as a viable item-level technology; however, in-field data — the real 'meat and potatoes' for proving a technology can work in the actual installation environment(s) — is still lacking, thus providing uncertainty and hesitation.

In our telephone interviews and web surveys of the user communities evaluating, testing, and operating RFID solutions, we are constantly reminded of the 'show me' requirements of RFID adopters. User requirements for reliable field trial reports are ahead of the industry's ability to deliver objective, detailed information on the technical performance, integration requirements, and real costs of deploying EPC UHF.

And where accurate data is available, those reports reveal technical, commercial, and operational data that is positive, progressing, but not completely supporting user requirements for item-level tracking deployment.

EPC UHF is slowly becoming a viable item-level solution, but until then, it will be remised to the higher tracking echelons, thus not attaining the high volumes expected by most. "Give it some time," cites Louis Bianchin, senior RFID analyst at VDC. "The supply community is doing a phenomenal job at resolving the technical and commercial issues."

Improved Comprehension Of Technology And Value Propositions

End user perceptions and expectations of RFID have 'returned to earth,' becoming more realistic and reasonable — a direct result of a greater understanding of the technology and its value propositions.

Primary Growth Drivers Of EPC UHF Technology
Technology **maturation** and commercialization
Improved comprehension of **value propositions** and technological limitations
Increased penetration of the technology across **multiple segments** of certain value chains

Remember some of the theories and expectations that were driving early interest: RFID will replace bar codes within a few years; nearly every CPG and pharmaceutical product will be tagged within 10 years. And, who can forget the rivers of ink spilled over the impending availability of a five-cent tag?

Even the technology's opposition — those who perceive(d) it as a new tool for 'big brother' — has toned it down as their experience with the technology has improved their understanding of its potential value. In fact, recently gathered end user data indicates that nearly 60% of all respondents who are evaluating and/or installing the technology within the next two years feel the technology is commercially viable today — in the right application.

The improved understanding is not remised to just end users of the technology; it also includes the supply and service communities. In the early days of RFID, it could be fairly said that typical RFID supplier strategies were not based on partnerships enabling total solutions, but waging frequency wars. And in focusing on proving the superiority of their technical solutions, suppliers forgot that they were in the business of solving their customers' operational requirements.

"It was like putting a square peg in a round hole," quipped Bianchin. "They were trying to force off-the-shelf product into markets that needed a high level of customization, resulting in failures or poor performance, as well as a bitter taste in a lot of end users' mouths." The supply community quickly realized that the 'if you build it, they will come' strategy was not going to fly in this market and that success would be based on managing expectations, partnerships, and making the technology work in the target environment.

Although still falling short of customer expectations — rooted as they are in real-time experience with their other technology suppliers — the increased comprehension among the supplier and integrator communities of RFID's value propositions for users is driving investment, particularly in the core EPC UHF markets. This can be clearly seen in the increasing perception that EPC UHF is the 'standard' when using RFID to track product within the higher echelons of a supply chain, continued growth within supply chain applications (even without item level), and the enforcement of mandates favorable to EPC UHF adoption by end users.

Increased Penetration Of RFID Further Down The Value Chain

As with any automatic identification and data capture (AIDC) technology, the value proposition and the benefits obtained increase the further down the value chain the technology is used. In today's market, most EPC UHF tagging occurs at a point of distribution (sometimes several steps removed from the point of manufacture), thus adding complexity and limiting visibility to where the infrastructure is installed. As the technology continues to penetrate the value chain, more infrastructures will be installed throughout the supply chain participants, providing economies of scale, reducing complexity, and increasing visibility.

Probably the most influential aspect of this concept can be seen in China's RFID efforts. Though most RFID activity in China is based on LF (low frequency) or HF (high frequency) technologies, the Chinese government recognizes the importance of UHF, its development/evolution, and the necessity for more globally accepted standards. China already represents a significant portion of the global CPG manufacturing industry, and as more tier-one manufacturers continue to shift their manufacturing to the country in pursuit of lower operational costs, China will become the 'starting point' for even more global supply chains, which means that Chinese suppliers will eventually be able to apply RFID transponders at the point of manufacture.

Source tagging will not only provide deeper operational efficiencies to global supply chain participants, but will also help to minimize technology investment risks (since 'tagging' roles become more defined) and reduce the overall complexity related to tagging and reading in a diversity of value chain environments.

EPC UHF Analysis Wrap-Up

EPC UHF RFID is, without question, a viable solution to a wide range of supply chain management requirements, issues, and opportunities. Positioning it as the current solution for item-level tracking today has garnered it significant — too much — attention. This attention has not been all positive — especially recently. Yet, in the same way that the hype could not convince users to invest, the dramatic coverage does not eliminate EPC UHF as a viable supply chain management solution option for experienced managers.

In fact, the technology appears to be positioned for success, although it may take a few more years to reach the scale of some initial forecasts. And if it does, it may not be as an item-level tracking solution for lower-value, nonperishable, consumer goods.

This is truly an exciting — and critical — time for the technology, its suppliers, and solution development and deployment partners:

- The first signs of maturation — both technically and commercially are beginning to appear. Cost profiles and resultant pricing tables are becoming both more predictable and reliable.
- Comprehensions of value propositions (and limitations) are permeating into end user perceptions and expectations, and the voice of the customer has leverage across the EPC UHF technology development and solution deployment value chains.
- The technology is being viewed, correctly, as an enabler, not a complete answer. As such, investments are appropriately being distributed across a number of 'nuts and bolts' industry and market development requirements: training curriculum, back end integration capabilities, and third-party test beds.

So, if all the ducks are in a row, when will we see this market take off? Well … the market will continue to grow within the upper tracking echelons, but item-level applications (and the significant volumes that accompany it) and the ubiquitous end-to-end solution that most envisioned is still some years away.

It is likely to happen, but it will take some time. ●