

The Global Markets and Applications for RFID: VDC Market Research Findings

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Prepared for:

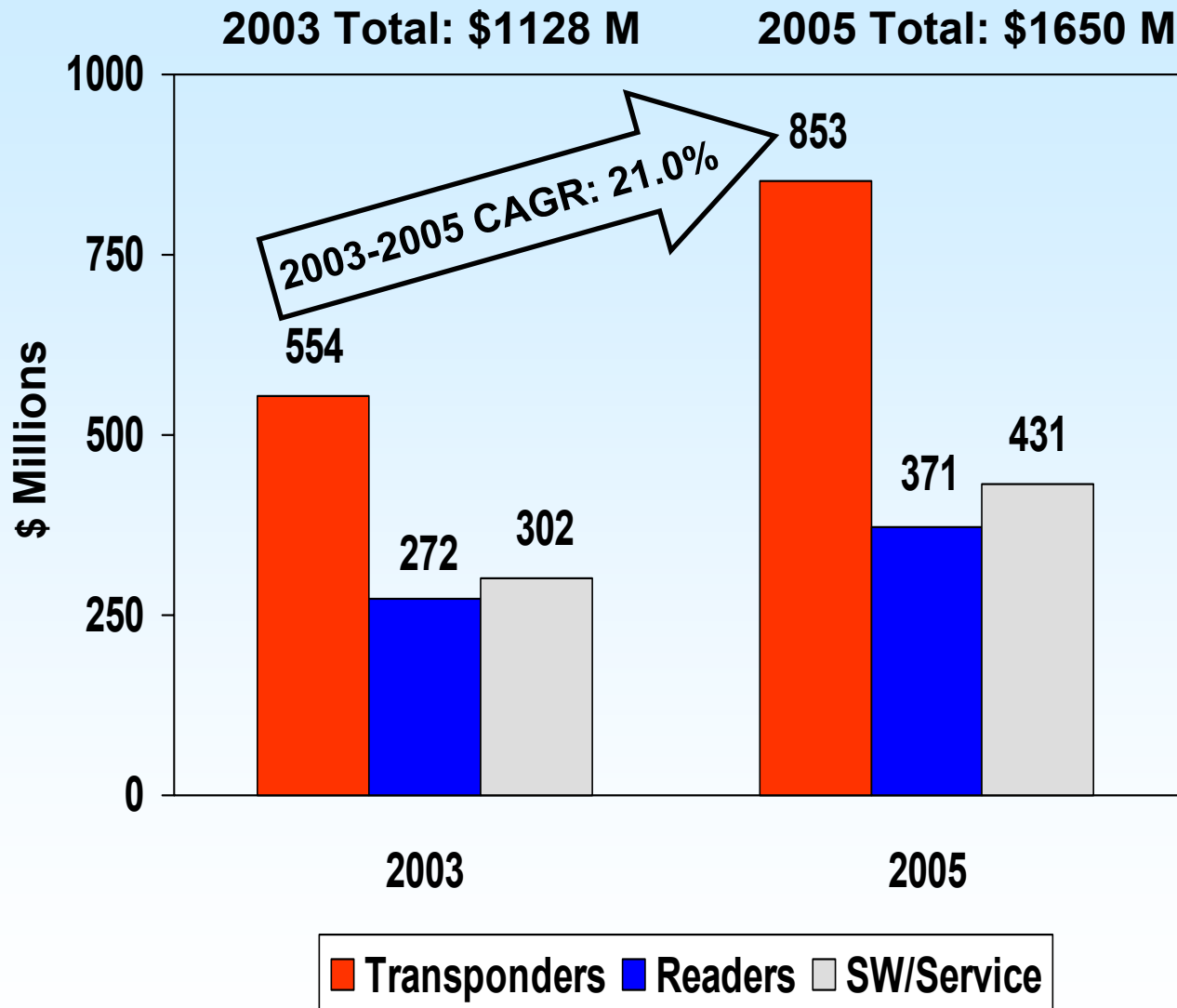
Mid-Hudson Valley Chapter of APICS

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RFID Near-Term Outlook Offers Promise

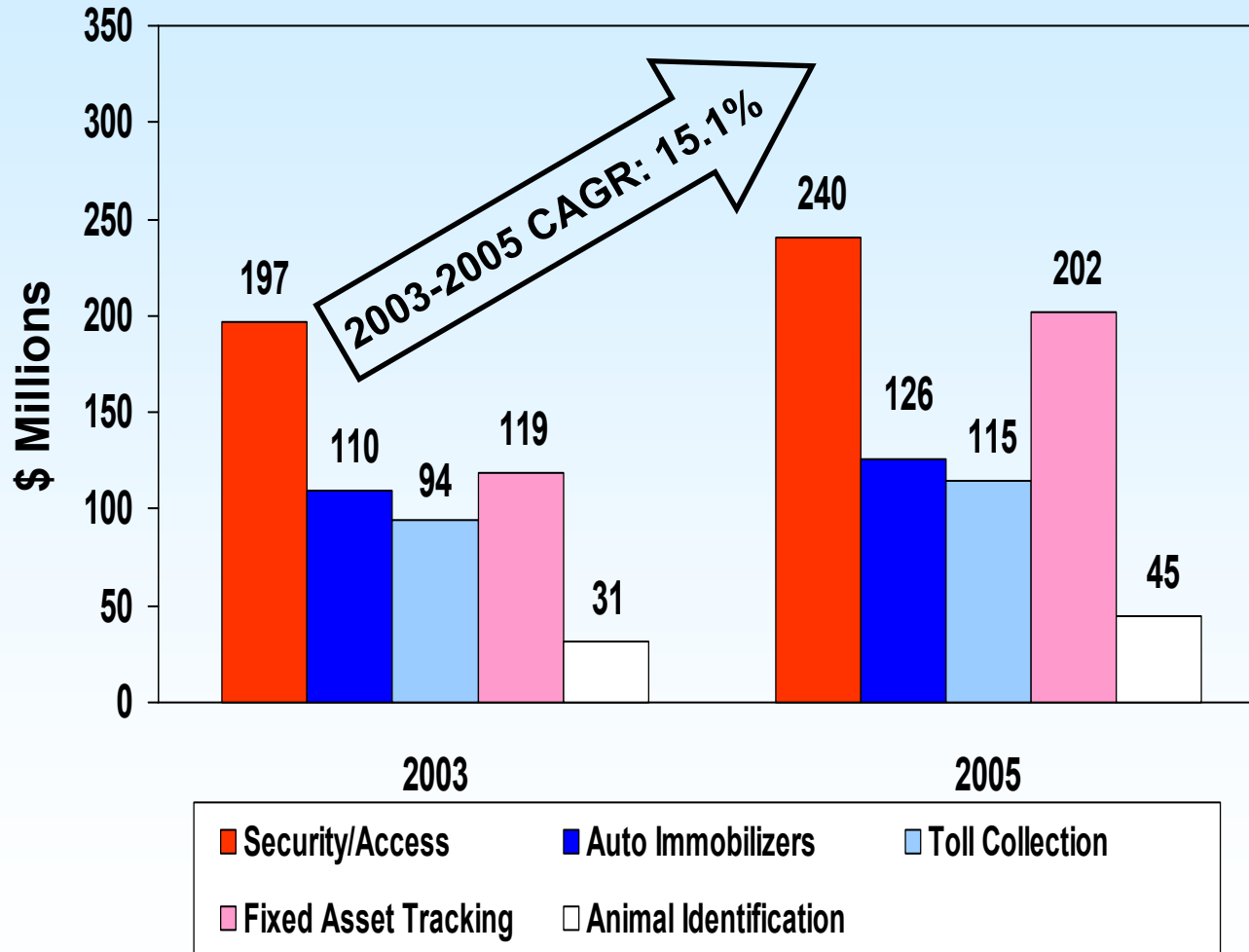


- Near-term compound annual growth rate (CAGR) 2003-2005
 - Transponders = 23.7%
 - Readers = 16.8%
 - SW/Service = 19.5%
- Retailers, consumer goods companies, and DoD leading near-term market development and growth

Historical Applications Drive Near-term RFID Market

2003 Total: \$551 M

2005 Total: \$728 M

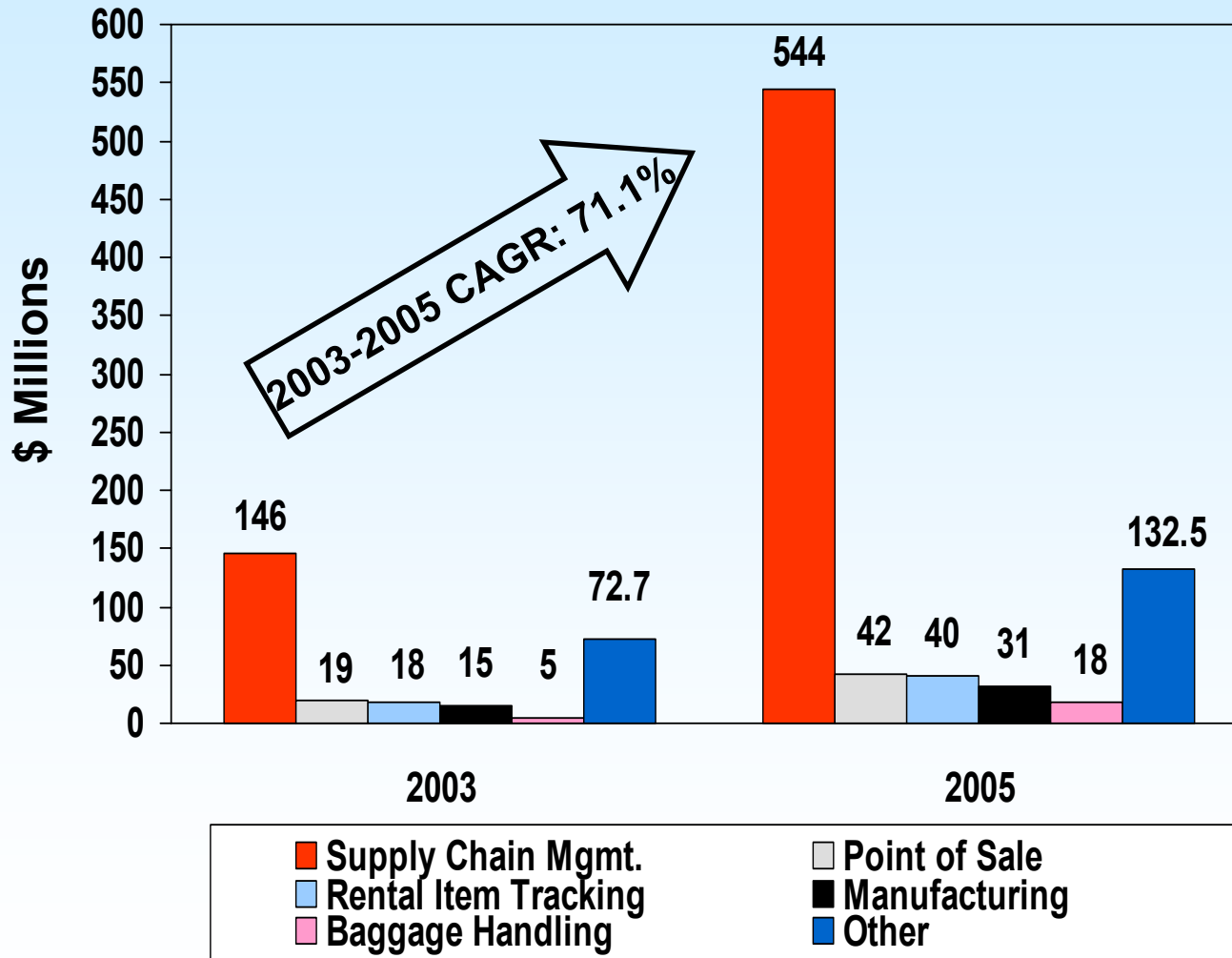


- Established standards support many of these apps
- Predominantly closed-loop systems
- Strong potential for continuous tag volume in certain apps depending on lifespan of tags and expediency of saturation

Emerging RFID Applications Providing Strong Growth Opportunities

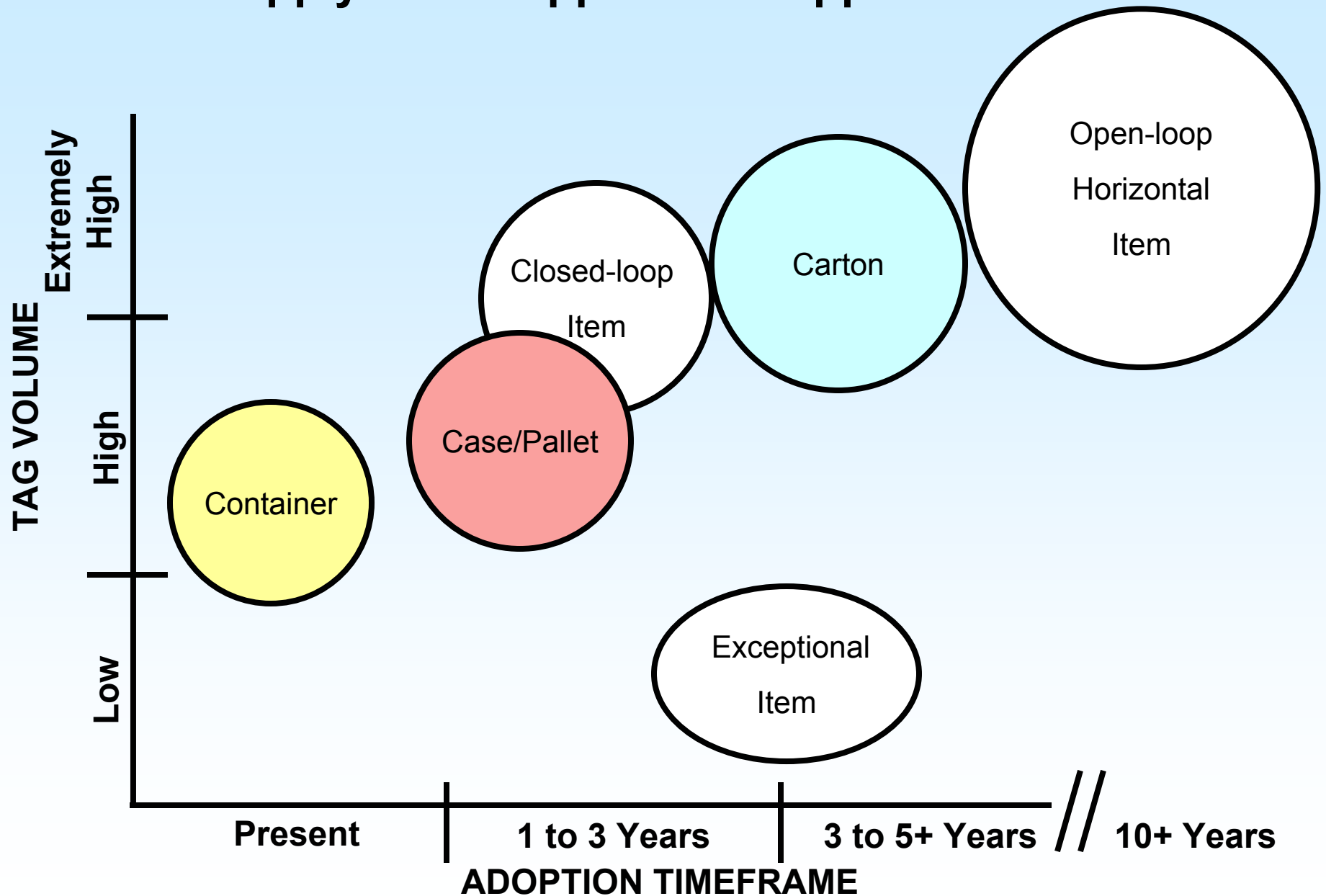
2003 Total: \$276 M

2005 Total: \$808 M



- RFID smart labels proliferating
- SCM predominantly supported by container and crate/pallet tracking
- Alternative POS payment, tire tracking, and other developing apps. continue to drive RFID innovation and deployment

Retail Supply Chain Application Opportunities



Competing for Share in a Highly Fragmented Market

RFID Product Category	Examples of Companies Competing in Each Product Category*
Transponders/ ICs	Alien, EM Marin, Intermec, Matrics, Philips, ST Micro, Texas Instruments, etc.
Readers	Alien, AWID, Intermec, Matrics, Siemens, Sirit, ThingMagic, etc.
Printers/ Encoders	Datamax, Intermec, Printronix, SATO, Zebra, Toshiba TEC, etc.
Middleware	Cathexis, ConnecTerra, Globberanger, IDMicro, OatSystems, etc.
Software/ Service/Support	Accenture, Cap Gemini, Descartes, Highjump, Intellident, Manhattan Associates, Microlise, Provia, RedPrairie, Xterprise, etc.

* List is non-exhaustive

The Good News

- ✓ Trials, Pilots, and Rollouts: RFID Technology Gaining Traction
 - Wal-mart and the US Department of Defense - demonstrating commitment to RFID with pallet/carton tracking initiatives
 - many Fortune 500 companies are developing RFID supply chain strategies
 - trials and announcements by: Metro, Carrefour, Tesco, Ahold, International Paper, Unilever, Procter & Gamble, Lowes, Gillette, CHEP, Sainsbury, Marks & Spencer, GAP, Prada, Woolworths UK, Benetton, and many more

- ✓ UCC and EAN Join Forces with MIT Auto-ID Center:
 - UCC and EAN – under the name EPCglobal Inc. – aim to lead the drive for adoption of EPC
 - new joint-venture will license EPC technology and develop standards
 - EPC now taken out of the realm of academic research and a step closer to commercialization

The Good News, continued

- ✓ Hardware, Software, and Integration Providers Combining Efforts
 - a bevy of partnerships and solutions capability announcements from WMS, ERP, and integration players such IBM, Manhattan Associates, Microsoft, Odin, Provia, SAP, Sun Microsystems, V3, Xterprise, etc.
 - the inclusion of these companies aids in removing barriers by creating cohesive, compatible enterprise solutions, reducing costs, and developing standards

- ✓ Standards Development Moving Along Steadily
 - great deal of activity and progress over the last two years
 - ISO 18000 standard for item management is nearing completion
 - UCC and EAN have become more entrenched in RFID standards and market development

The Not-So-Good News

✓ RFID System Infrastructure Issues

- forget tag price - infrastructure costs providing “sticker shock”
- concerns over integration with legacy data collection and ERP/CRM/MRP systems
- evaluation and development of RFID software and middleware solutions are critical

✓ Data Management Issues

- data synchronization must be addressed – issue is not so much where data resides, but the need for a common nomenclature
- multiple databases may provide significant obstacles to data integrity, data accuracy, and common data sharing among enterprise systems

The Not-So-Good News, continued

✓ Technical Challenges

- overcoming the performance obstacles including failure rates and reading through metal, water, etc.

✓ Limited RFID Education

- there is a general lack of people who actually understand RFID and are able to communicate, design, implement, sell, and deploy RFID solutions

✓ Lingering End-user Transponder Price Expectations

- the 5-cent myth

✓ Consumer Privacy

- finding the “kill switch” and easing concerns

Prepare the Channel!

- ✓ Ultimately, how will RFID solutions be delivered to end users? Who will deliver them? What is the appropriate model?
- ✓ Wal-mart's Top 100 suppliers and the US DoD's supply chain partners seeking "bar code-and-RFID" solutions
- ✓ The overwhelming majority of channel organizations lack the required skills and knowledge to effectively deliver, sell, market, and support solutions
- ✓ Suppliers should consider executing RFID system installations side-by-side with their partners to provide integration experience
- ✓ Most RFID systems are customized today – little product is available for sale/demo to smaller-volume, non-Tier I accounts

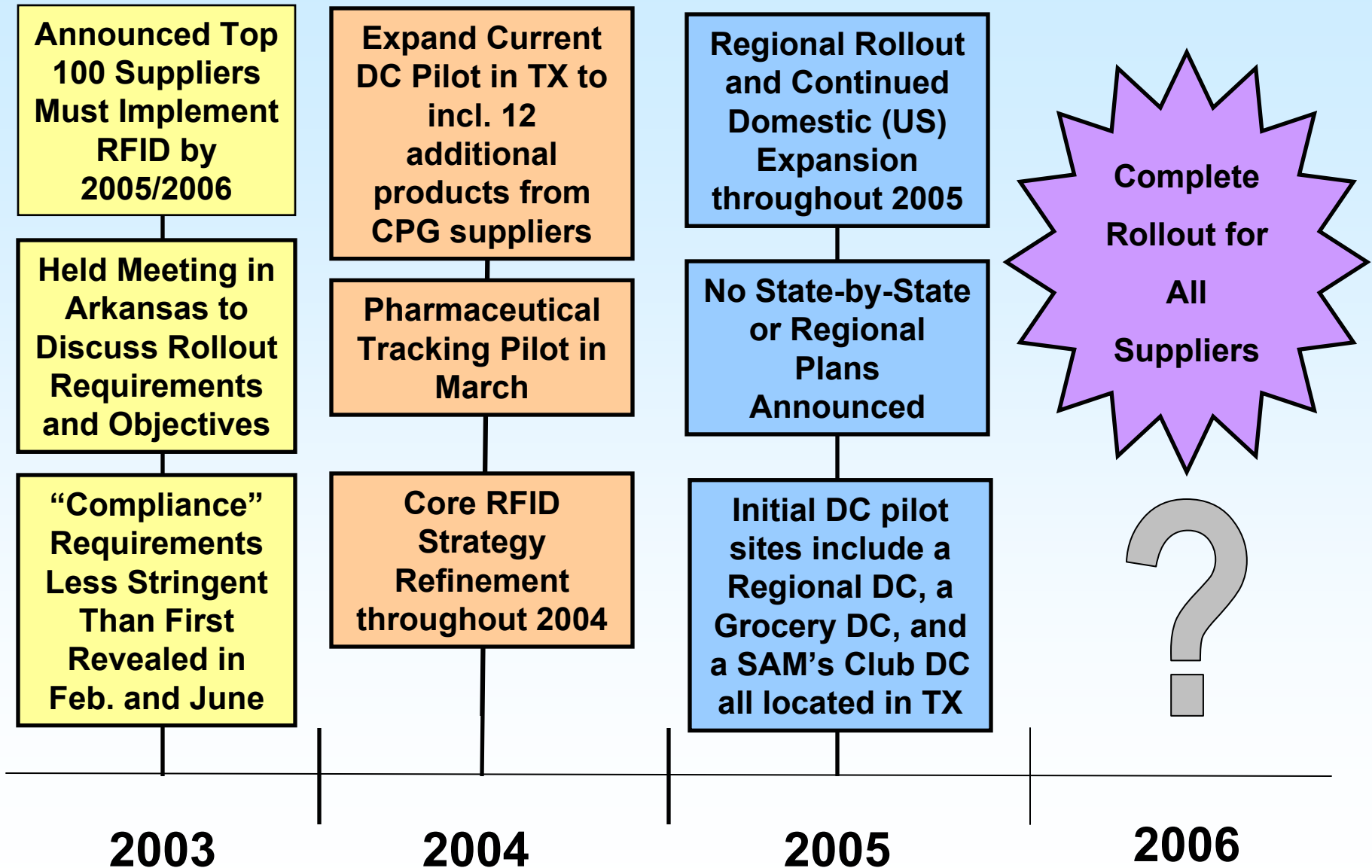
Wal-Mart's RFID Game Plan: The Requirements

- **Transponders (Tags):**
 - ✓ Durable, temporary, or permanent Class 0 (read-only, factory programmable), Class 0+ (read-write), or Class 1 Generation 1 (write-once, read-many)
 - ✓ 96-bit EPC compliant tags (existing 64-bit EPC tags are not compliant)
 - ✓ Migration to Class 1 Generation 2 (C1G2) tags once specifications are written (expected to be released Summer 2004)

- **Readers (Interrogators):**
 - ✓ Agile readers should be adopted to facilitate migration to C1G2 transponders that allow for one common protocol
 - ✓ Have flexible output options, RF environment awareness, security, power over Ethernet, and ability to disable unused features such as Web servers
 - ✓ Hand held devices will be required to support implementations

- **Antennas:**
 - ✓ 1 antenna required on each side of dock door/portal
 - ✓ 1 antenna above dock door
 - ✓ 1 antenna on each side or underneath a conveyor moving up to 600ft/min for case tagging

Wal-Mart's RFID Game Plan: The Timeline



Wal-Mart's RFID Game Plan: The Impact

- **Wal-Mart's approach is sensible** - starting in a direct fashion using EPC with no read-write or security requirements
- **Wal-Mart left little to no room for error** - 100% read accuracy and supplier business processes cannot be slowed down
- **Few RFID vendors market full RFID systems** - AIDC, RFID, ERP, WMS, etc. vendors need to collaborate to deliver complete solutions
- **Technological hurdles need to be overcome** – UHF performance in metallic or watery environments, data synchronization, multi-protocol/multi-frequency readers, system infrastructure concerns, etc.
- **Avoid the “tag and ship compliance” mentality** – assist end users in determining the value proposition, business case, and ROI for RFID
- **Pressure has been placed on standards bodies** - international standards are critical to fostering greater EPC adoption

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