



EPC Primer

*Erik Sundermann
HUG Meeting - Paris
20th Sept 2006*



The Fundamentals of RFID

The Internet of Things

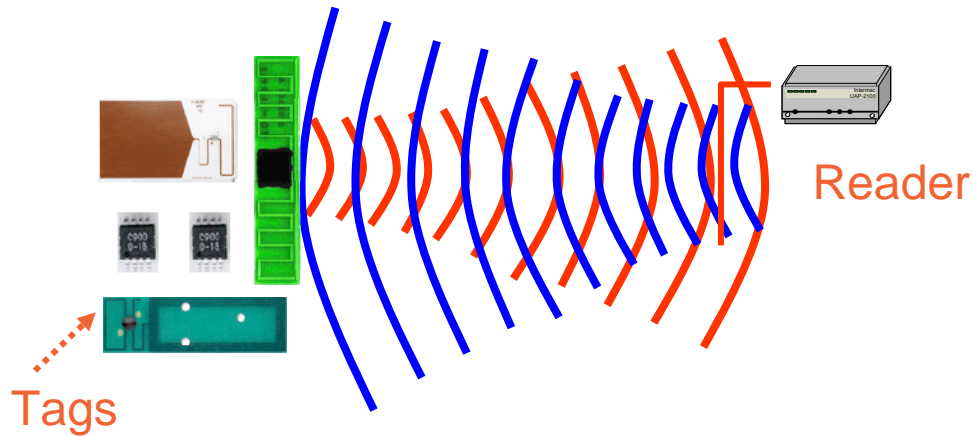
The EPCglobal Organization

EPCglobal Network Standards

- Physical Object Exchange Standards
- Data Exchange Standards
- Infrastructure Standards

Benefits of the EPC Network

Resources: Cookbook



What is RFID?

- A means of identifying a unique object or person using a radio frequency transmission
- Tags (or transponders) that store information, which can be transmitted wirelessly in an automated fashion
- Readers (or interrogators) both stationary and hand-held read/write information from/to tags

How does it operate?

- RFID tags are affixed to objects and stored information may be written and rewritten to an embedded chip in the tag
- Tags can be read remotely when they detect a radio frequency signal from a reader over a range of distances
- Readers then either send tag information over the enterprise network to back-end systems for processing or display it to the end user

The Electronic Product Code (EPC)

- Gives a unique identity to individual physical objects: items, cases, pallets, locations, loads, assets, etc

Radio Frequency Identification (RFID)

- Cheap sensing of object EPC codes

The Yin and the Yang

- EPC enables new, value-creating business processes
- RFID makes those processes practical



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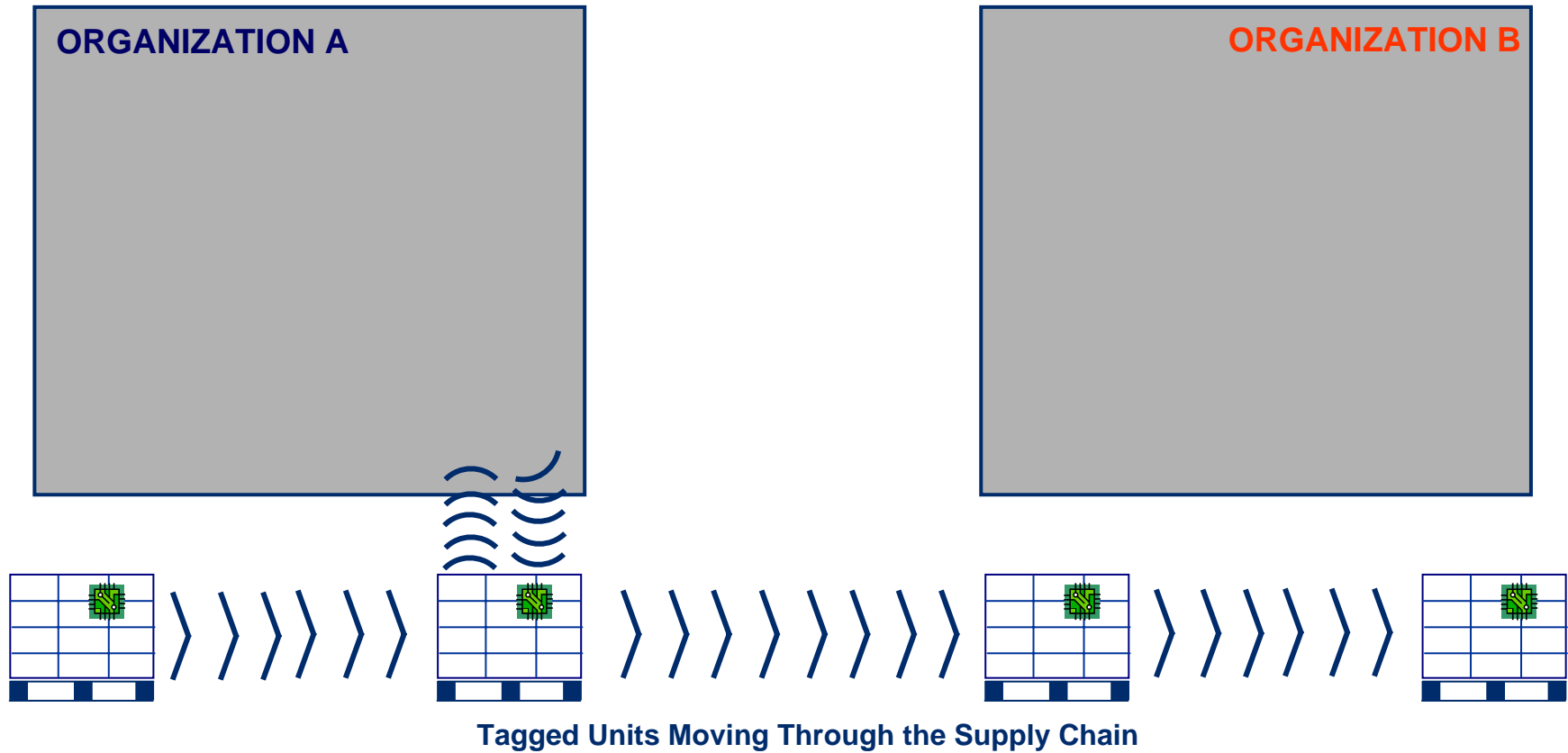
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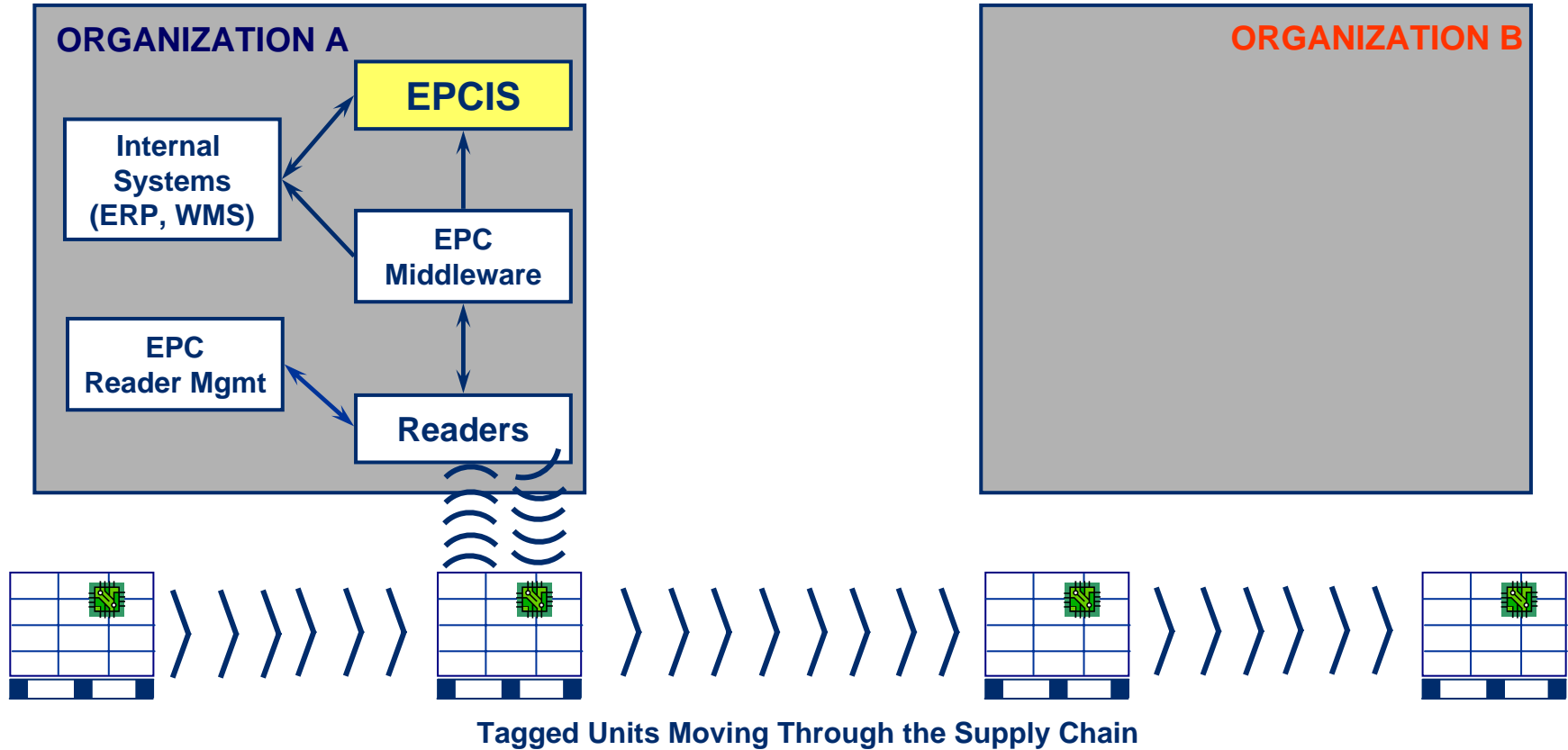
Benefits of the EPC Network

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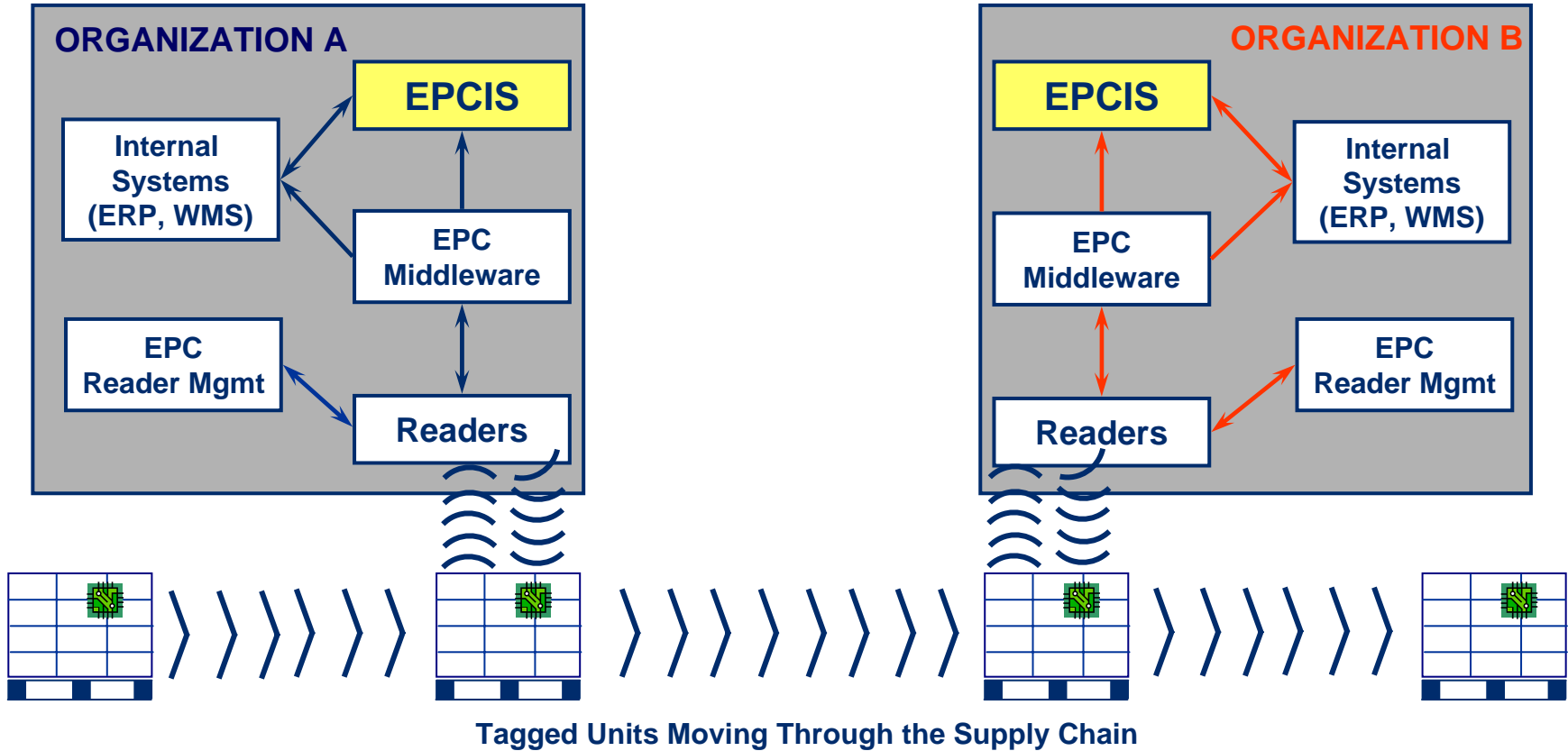
The EPCglobal Network



The EPCglobal Network

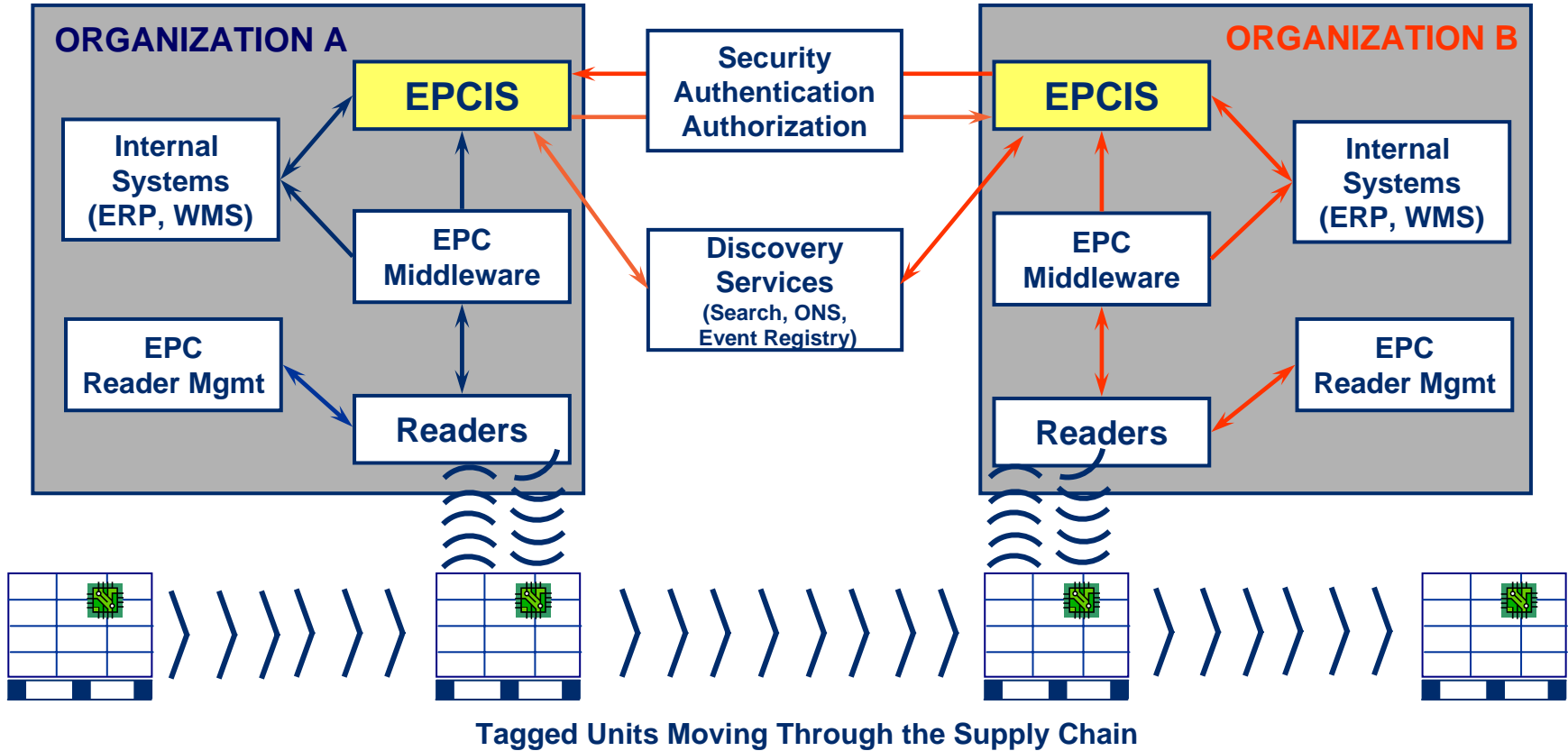


The EPCglobal Network



The EPCglobal Network

Supply Chain Visibility *Event Related Information*



Tagged Units Moving Through the Supply Chain

The power of event related information

- Improved consumer availability
- Demand driven supply chain
- Reduced inventory
- Increased productivity
- Reduced claims and resolution costs
- Reduced shrinkage
- Improved promotional effectiveness
- Reduced counterfeit
- Improved ability to track and trace
-etc

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From Auto-ID Centre to EPCglobal



Partnership between 100 global firms, including founders:

- Uniform Code Council
- EAN International
- Procter and Gamble
- Gillette



Global:

- Standards Development
- Adoption
- Brand management and marketing
- Policies (Privacy, Intellectual Property)



Local: Member Organizations

- 101 countries worldwide
- Member communication
- Member Support
- Training and Education



Continued Research





The Global Language of Business

OVERALL BENEFITS:
Improving efficiency & visibility in supply and demand chains

GS1 BarCodes

Global standards for automatic identification

RAPID AND ACCURATE ITEM, ASSET OR LOCATION IDENTIFICATION

GS1 eCom

Global standards for electronic business Messaging

RAPID, EFFICIENT & ACCURATE BUSINESS DATA EXCHANGE

GS1 GDSN

The environment for global data Synchronisation

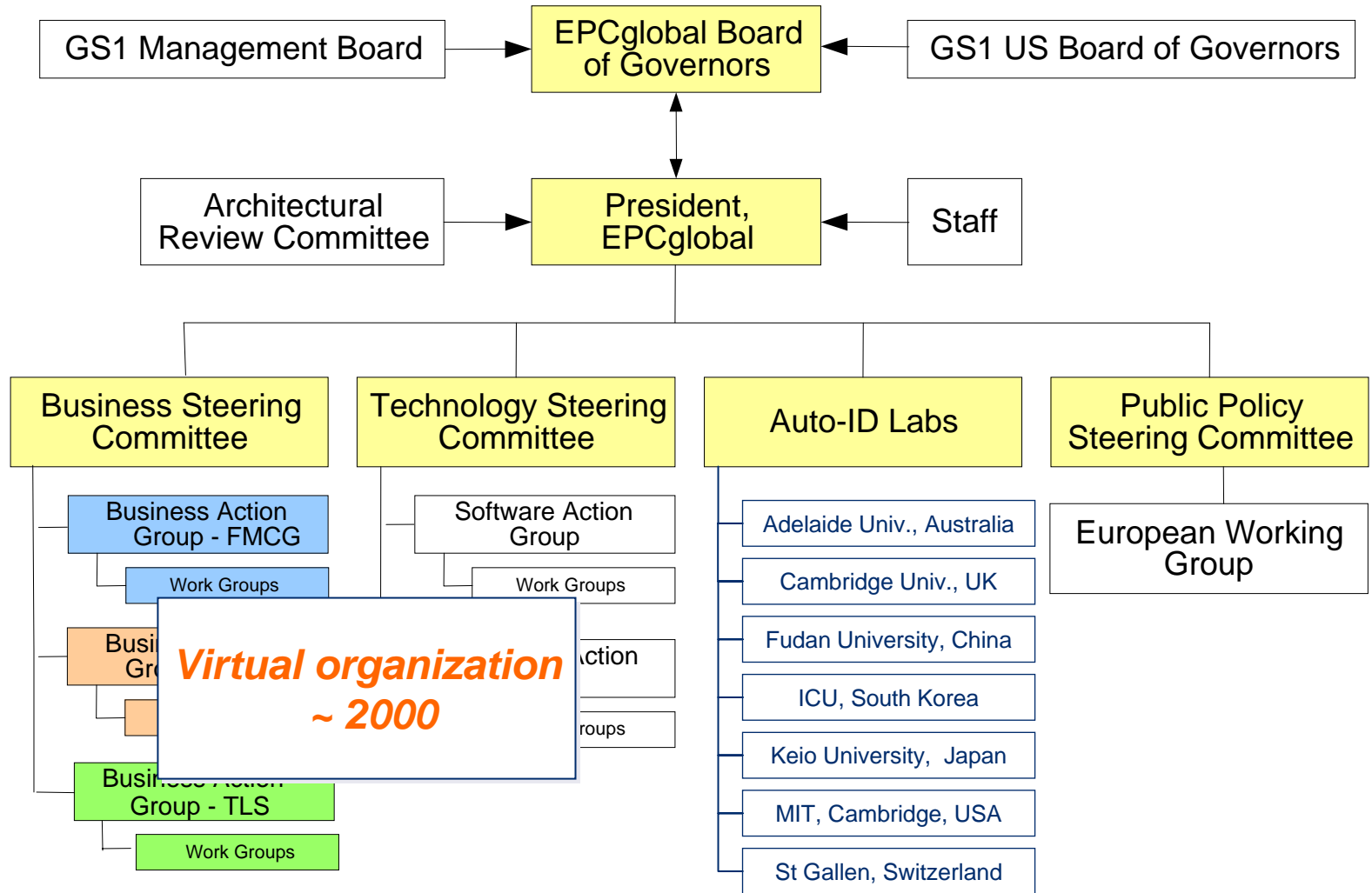
STANDARDISED, RELIABLE DATA FOR EFFECTIVE BUSINESS TRANSACTIONS

EPCglobal
Powered by GS1

Global Standards for RFID-based Identification

MORE ACCURATE, IMMEDIATE AND COST EFFICIENT VISIBILITY OF INFORMATION

EPCglobal Inc Organisation Chart



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Facilitate the exchange of information between trading partners

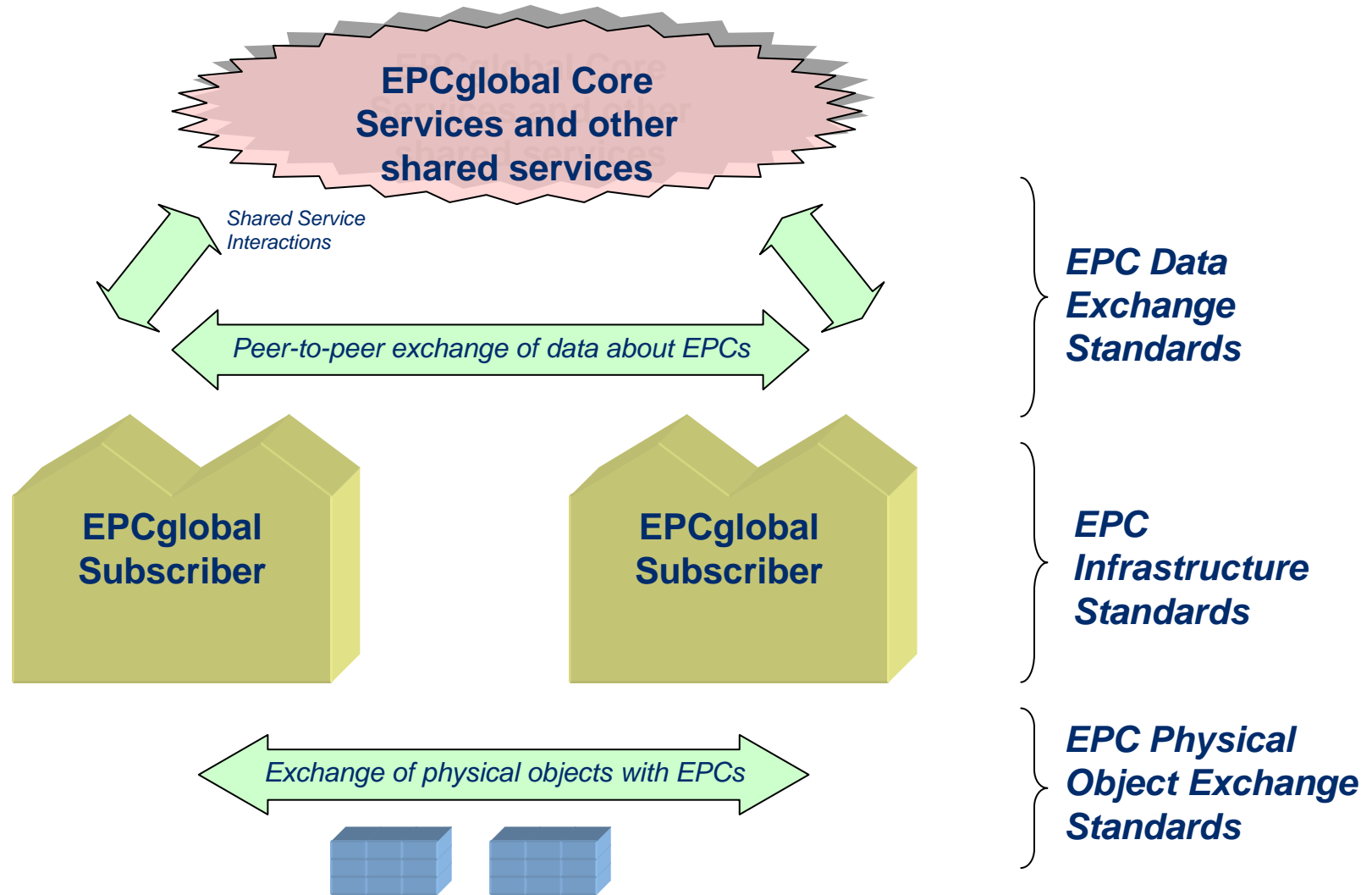
- *cross-enterprise standards*

Create a marketplace for system components

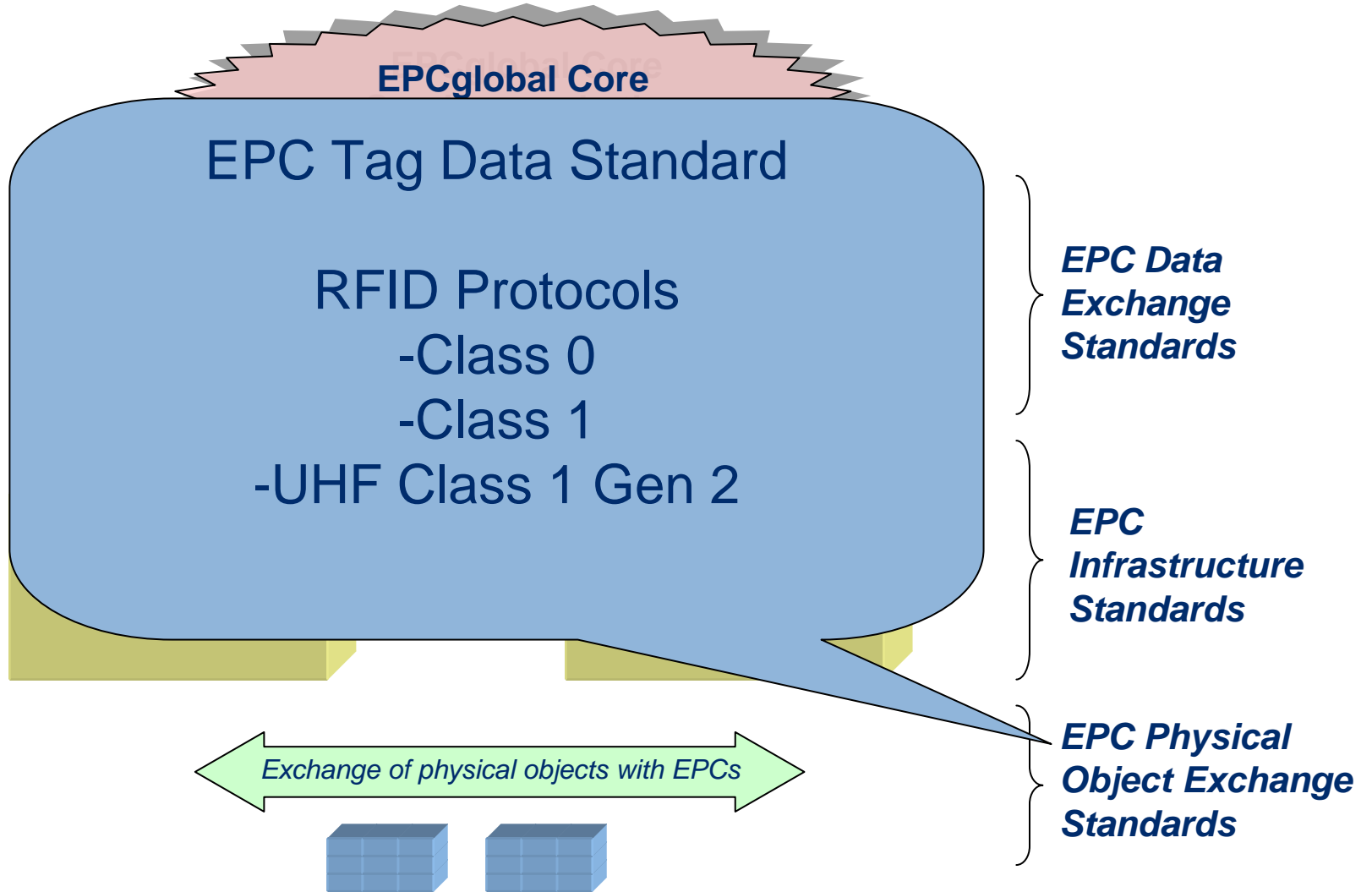
- *intra- and cross-enterprise standards*

Standards govern *interfaces*, not *implementations*

EPCglobal Standards Overview



EPCglobal Standards Overview

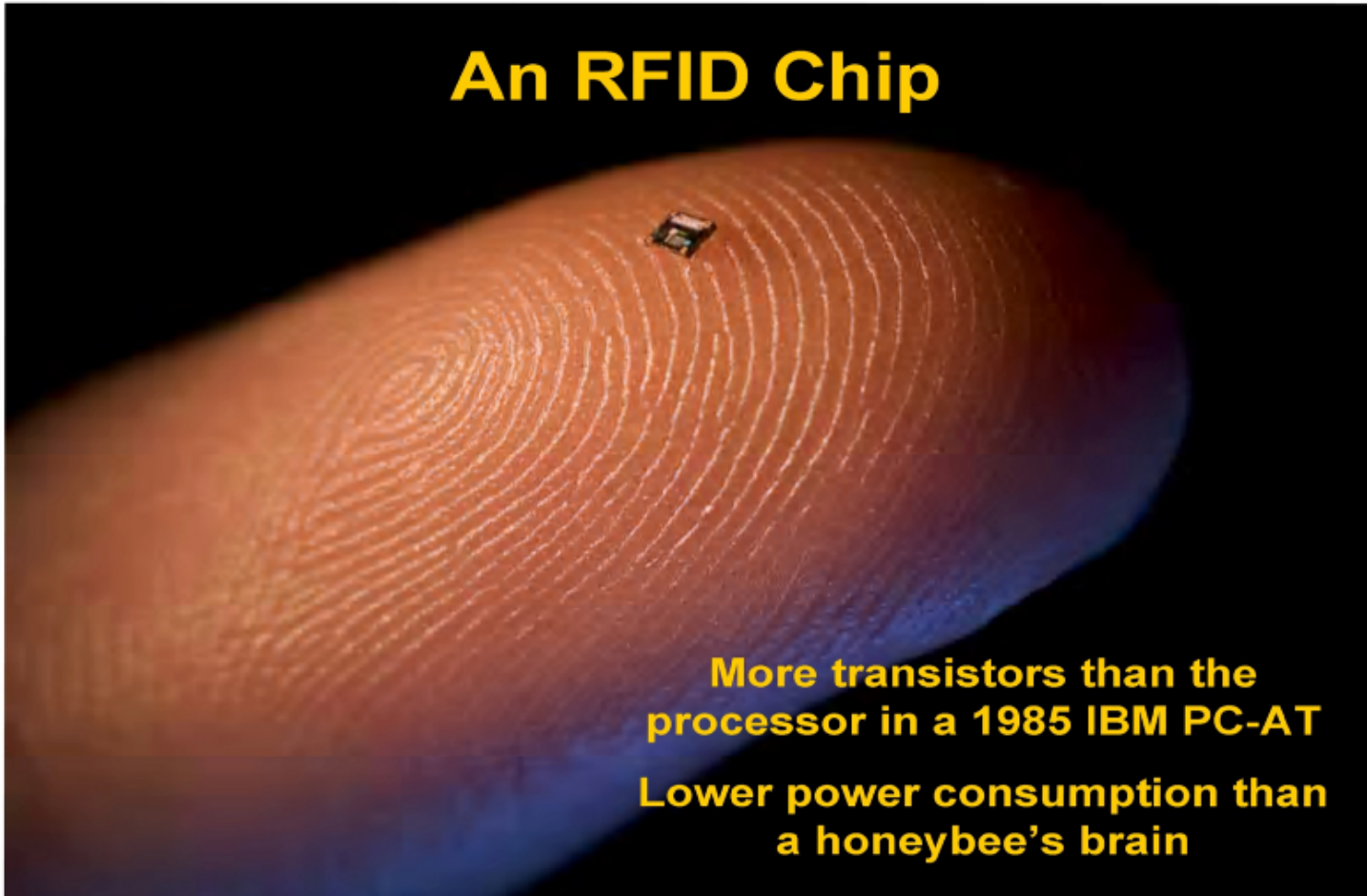


UHF Class 1 Gen 2 Features

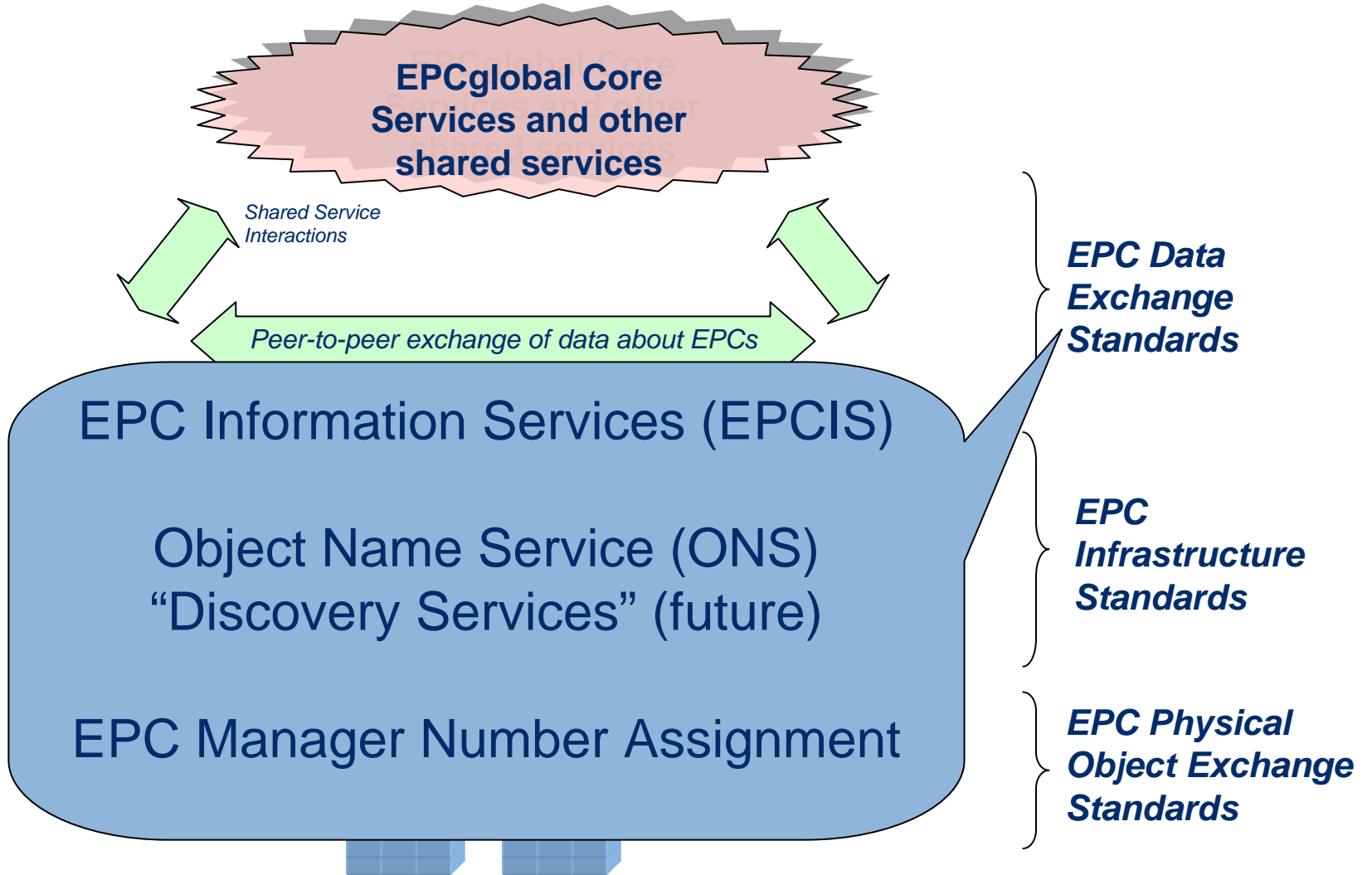
Requirement / Feature	Gen2 Capability
Global regulatory compliance	Europe, North America, others
Memory access control	32-bit access password, memory locking
Fast read speed	> 1000 tags/sec
Dense-reader operation	Dense-reader operating mode
Kill security	32-bit kill password
Memory write capability	> 7 tag/second write rate
Bit masked filtering	Flexible <i>Select</i> command
Optional user memory	Vendor option
Low cost	Multi-vendor availability
Industry certification plan	EPCglobal™ certification
Certified products	Q3 2005



An RFID Chip



**More transistors than the
processor in a 1985 IBM PC-AT**
**Lower power consumption than
a honeybee's brain**



EPC Information Services

Exchange of business-level EPC data:

- “What, where, when, and why”
- At business process level
- Within enterprise and across enterprises

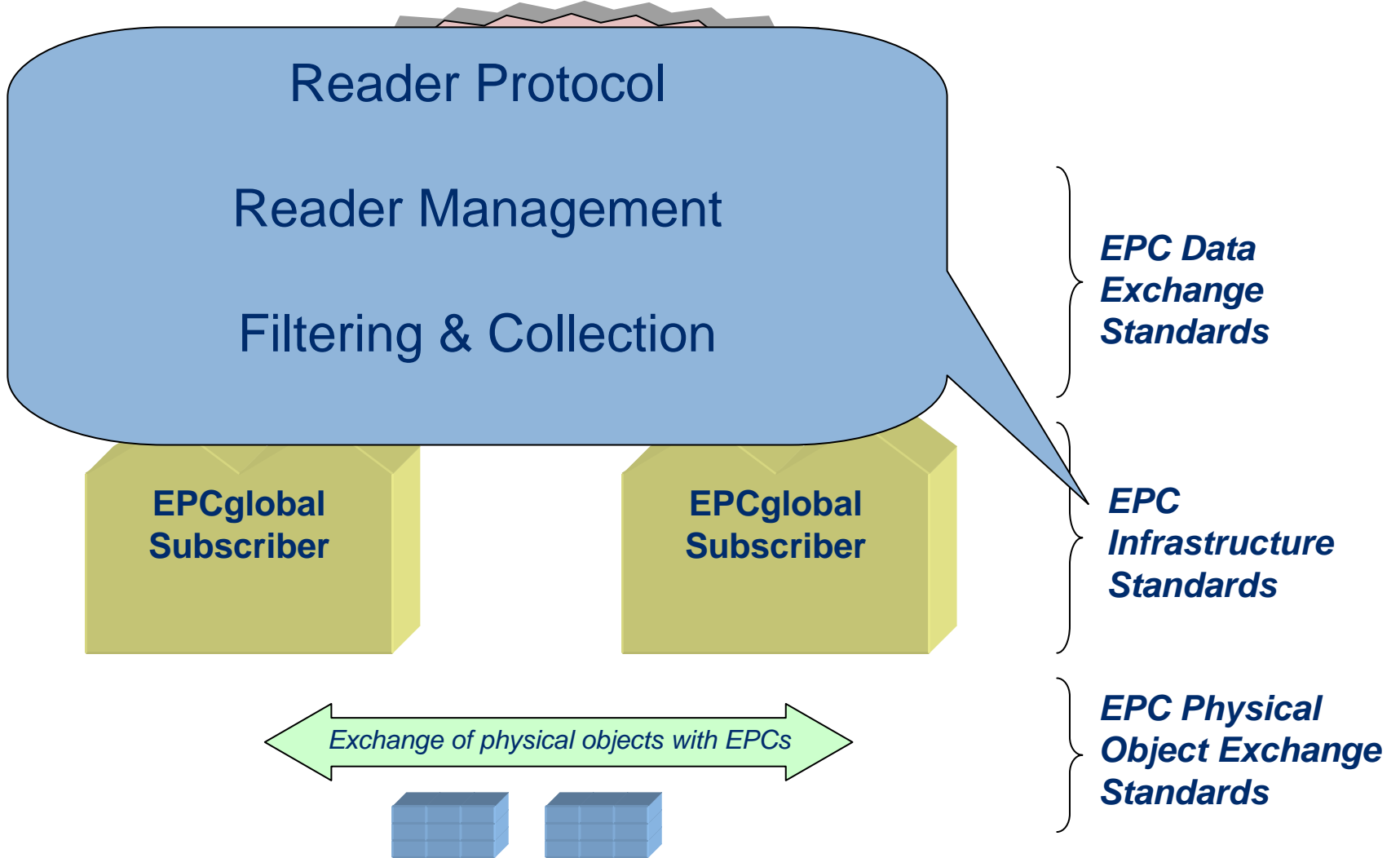
Defined in layers:

- Abstract data model (generic)
- Data definitions (industry-specific)
- Services (how to create & access)
- Binding (to specific transport & protocols)

Given an EPC, how do I locate EPCIS and other services providing data about that EPC?

- Pre-arrangement (e.g., retailer knows its suppliers)
- Object Name Service (ONS) – locates EPCIS of issuing authority for EPC (usually a manufacturer)
- “Discovery Services” – TBD service for identifying multi-party supply chain participants for a given EPC

EPCglobal Standards Overview



Reader Protocol

- Defines a standard “wire” protocol for reader to host communication
- Flexible, extensible command set
- Variety of transport bindings

Reader Management

- Defines standard interface for managing readers
- At early stage in development

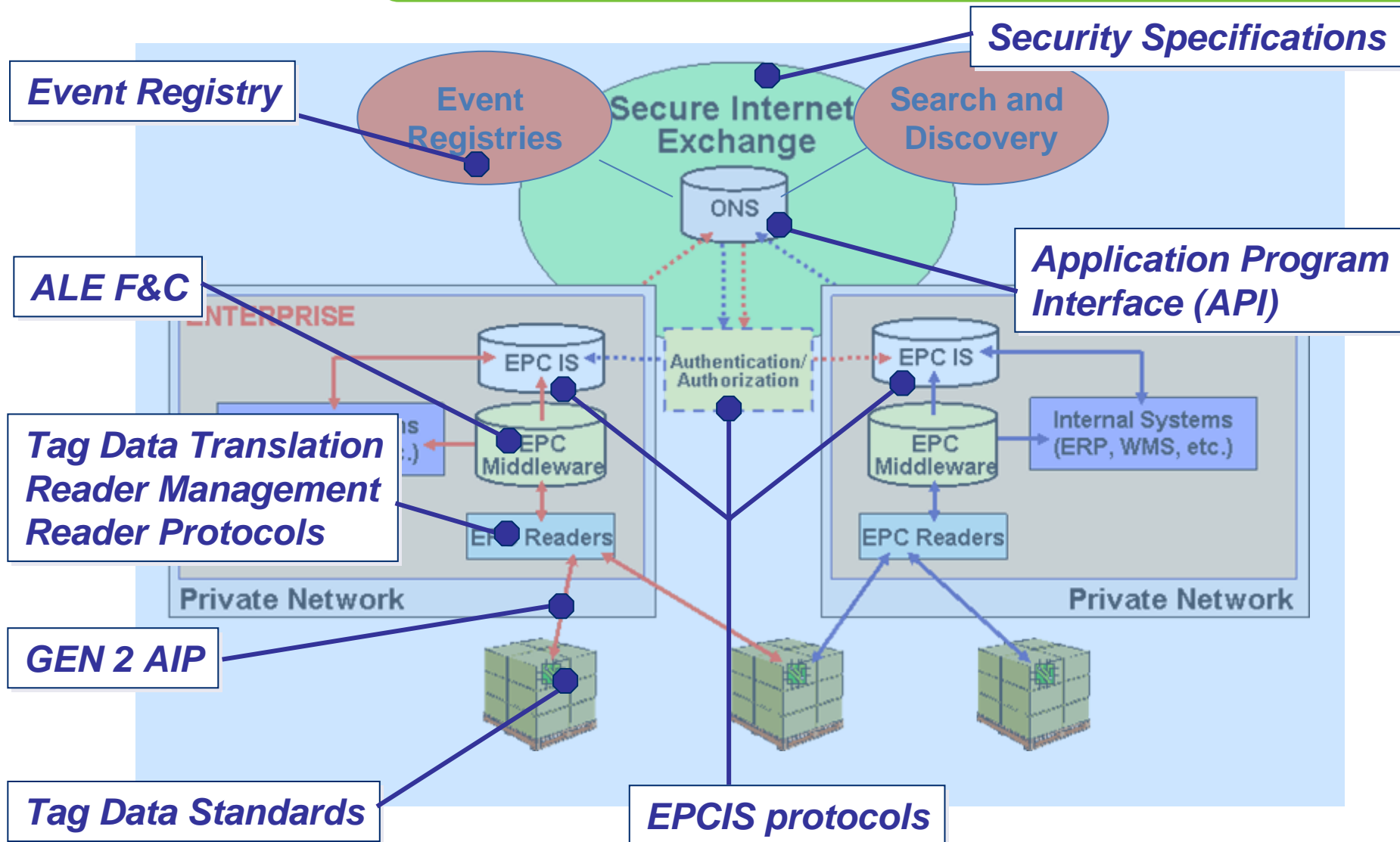
Application Level Events (ALE)

Provides applications with

- Filtered, aggregated EPC data from multiple real-time sources
- Declarative query language
- Synchronous (“pull”) and asynchronous (“push”) data flow
- Insulation from reader configuration and naming

Supersedes Auto-ID Center “Savant” specification

EPCglobal Standards Overview



EPCglobal Standards Overview

Tag Data Standards	How to encode EPC tags information based on various numbering system standards?
G2 Air Interface Protocol	How does a reader communicate with tags?
Reader Protocol	How does middleware communicate with a reader?
Reader Management	How to manage a multiple EPC reader environment?
Tag Data Translation	How a reader converts tag data standards to an Internet compatible format?
Filter and Collection ALE	How to count the number of EPC's from multiple readers based on specific criteria?
ONS Application Layer Interface	Where to find more information about an EPC?
EPC IS Protocols	How to store and retrieve information about an EPC?
Security Specification	How to keep EPC information secure?
Network Architecture	How to find where is an EPC and where it has been?

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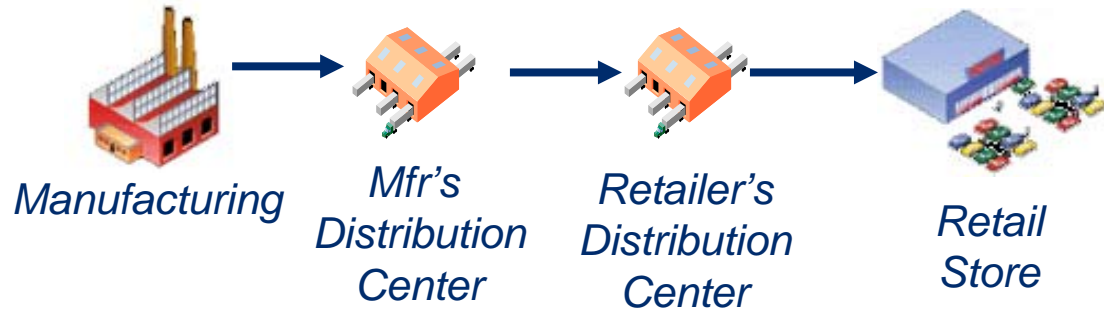
Resources: Cookbook

DoD RFID Business Case...



Visibility is Critical to Effective Logistics Support

Application: Retail Promotions



Give unique EPC to each case of promotion-packaged item, on RFID tag

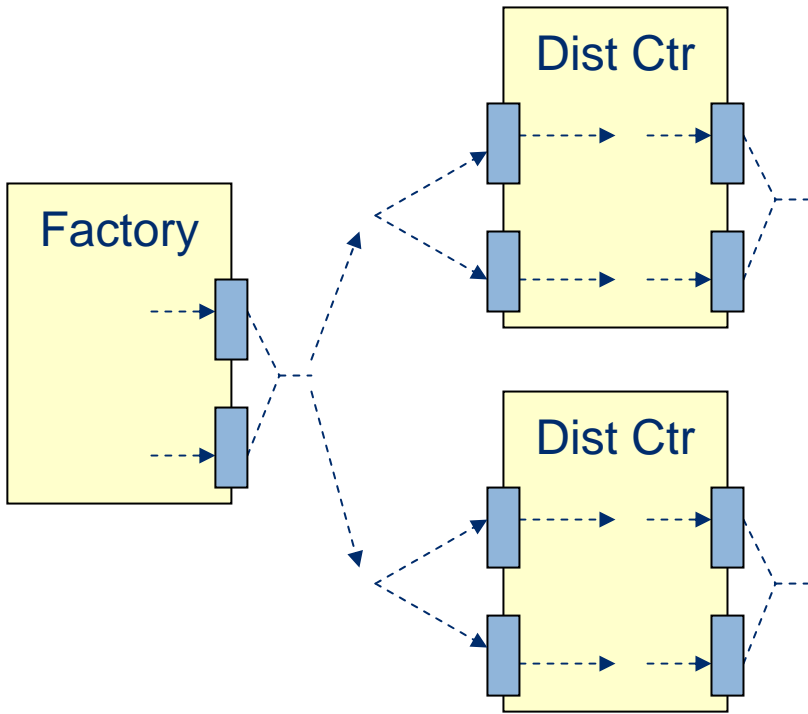
Equip facilities with RFID readers: loading dock doors, trucks, retail back-room door, dumpster

Can now measure & drive promotion:

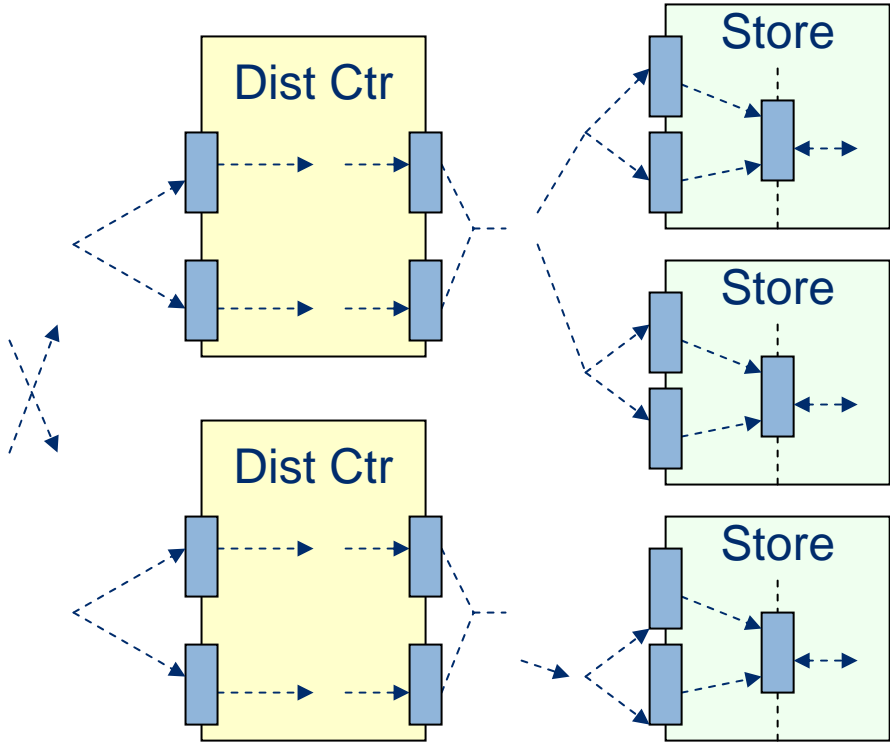
- Timeliness: is promotional packaging reaching consumer in time?
- Effectiveness: is promotional item selling better?

Typical CPG Use Case

Manufacturer



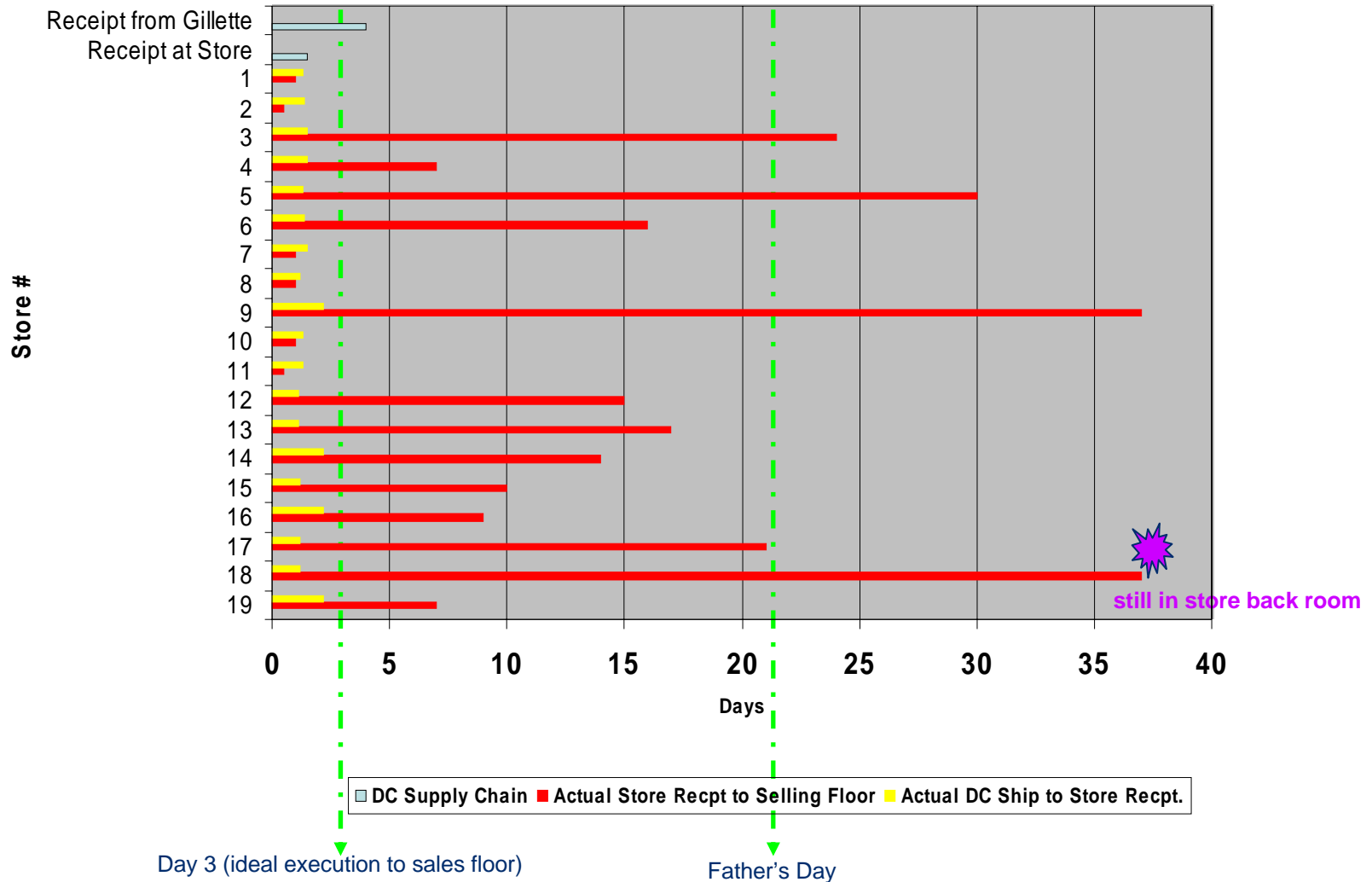
Retailer



Q: when does product reach sales floor?

Q: when was missing product shipped?

Case Example: Speed to Store Floor - Braun Father's Day Displays



Identifying the Real Benefits of EPC Requires Hand-on Approach

If you can't see it, you can't measure it

If you can't measure it, you can't control it

If you can't control it, it's probably costing you too much money

And you probably don't even know how much

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EPCglobal leads the development of industry-driven standards for the Electronic Product Code (EPC) to support the use of Radio Frequency Identification (RFID) in today's fast-moving, information rich, trading networks.

EPCglobal News

EPCglobal Publishes New Report Detailing the Framework for the EPCglobal Network

09 May 2006 :

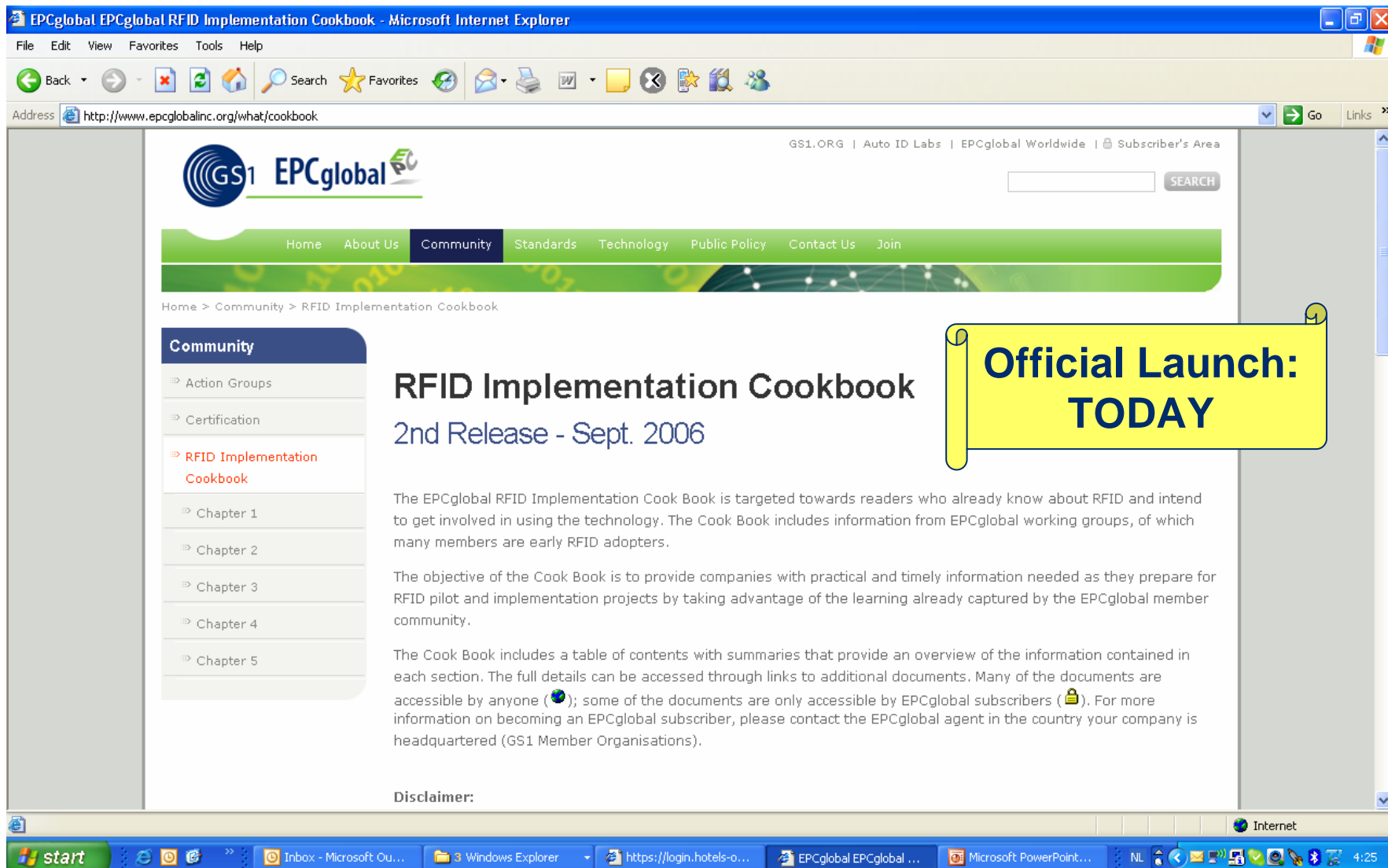
EPCglobal Inc today announced the release of a report entitled *The EPCglobal Architecture Framework*, which broadly defines the principles, standards, and components necessary to successfully develop and implement the EPCglobal Network, upon which trading partners will be able to rely to more efficiently manage their supply chain and operate their businesses.

- [View the press release](#)
- [Find out more about the EPCglobal Network](#)

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- **RFID Implementation Cookbook**
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RFID Implementation Cookbook

2nd Release - Sept. 2006

The EPCglobal RFID Implementation Cook Book is targeted towards readers who already know about RFID and intend to get involved in using the technology. The Cook Book includes information from EPCglobal working groups, of which many members are early RFID adopters.

The objective of the Cook Book is to provide companies with practical and timely information needed as they prepare for RFID pilot and implementation projects by taking advantage of the learning already captured by the EPCglobal member community.

The Cook Book includes a table of contents with summaries that provide an overview of the information contained in each section. The full details can be accessed through links to additional documents. Many of the documents are accessible by anyone (🌐); some of the documents are only accessible by EPCglobal subscribers (🔒). For more information on becoming an EPCglobal subscriber, please contact the EPCglobal agent in the country your company is headquartered (GS1 Member Organisations).

Disclaimer:

Official Launch:
TODAY

Internet

start | Inboxes - Microsoft Outlook | Windows Explorer | <https://login.hotels-o...> | EPCglobal EPCglobal ... | Microsoft PowerPoint... | NL | 4:25



1. GETTING STARTED

1. RFID/ EPC Essentials
2. RFID/ EPC Implementation Guidelines
3. Working with EPCglobal
4. Public Policy Overview
5. Importance of Data Synchronization

2. TOOLS

3. MEASURING PERFORMANCE

4. PRACTICE BRIEFINGS

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- 3.5. Validation of EPC Results

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 - 4.1.2. Reader Interference
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9. Overview of European UHF Radio Standards & Regulations

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World beating strategy.....

***“I don’t skate to where the puck is
but to where it’s going to be”***

Wayne Gretzky





QUESTIONS?

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(Erik.Sundermann@gs1.org)