MODEX 2018
GEORGIA WORLD CONGRESS CENTER
ATLANTA | APRIL 9-12
www.MODEXShow.com
powered by MHI

The Role of RFID in the IDENTIFICATION of Things

Presented by:

Mike Hetrick

VP Global Sales

MAKE YOUR BUSINESS
FUTUREPROOF.

ALIEN®

Agenda

- What is RFID?
- Is this a big market yet?
- The Internet of Things vs Identification of Things
- What are the benefits RFID bring to IoT?
- Garbage-in, garbage-out
- Summary

The Role of Alien Technology in RFID

- Mike Hetrick
  - Vice President Global Sales, Alien Technology, previously Inlay GM, Alien Technology
  - 20 years within the printing industry with Checkpoint Systems, NCR Systemedia and RR Donnelley/Wallace Computer Services
  - Bachelor of Business Administration, Western Michigan University

- Alien
  - Author of the founding RFID standards
  - Top 3 of all our markets: Readers, Inlays, IC's, Services
  - Based in San Jose, CA
  - 1,500+ customers
  - Has shipped BILLIONS of RFID tags and IC's

IDENTIFICATION Of Things™ IoT

Alien provides technology that enable the Internet of Things. **We specialize in the IDENTIFICATION of Things.** RFID – the source of quality big data at the heart of successful IoT implementations.

History of RFID (Radio Frequency IDentification)

- RFID technology developed during World War II to identify aircraft
- Transmitter sends signal to transponder which reflects a signal back
- IBM developed UHF RFID system in early 1990s
- The term Internet of Things coined in 1999 referring to objects connected to RFID
- Electronic Product Code (EPC) standard developed in 2002
- Shortly after, Alien Technology Authored the Gen 1 Protocol
- In 2004 Alien had leadership role in the Gen 2 standards definition with EPC Global
- In 2003 Walmart mandated that suppliers use RFID by 2005
  - Accelerated the introduction of RFID to replace barcodes
  - But in early 2009 it dropped the mandate and RFID stagnated
- In 2009 there were < 500 million RFID units sold, in 2015 there were > 4.7 **billion**
- Global RFID market expected to grow at a CAGR of ~40% from 2016-2019

Survey found that most believe more than 1 trillion objects will be connected to the internet by 2022, using RFID and other tech

RFID is a "Super Bar-Code"

- RFID uniquely identifies an item, not just the SKU
- Line of sight not required e.g. read tags inside boxes/containers
- Read at much greater distances e.g. 30 feet
- Read much faster e.g. forty or more tags per second
- You can write or update information on a tag e.g. maintenance count
- Can be embedded inside the product itself (more rugged)

Bar Codes

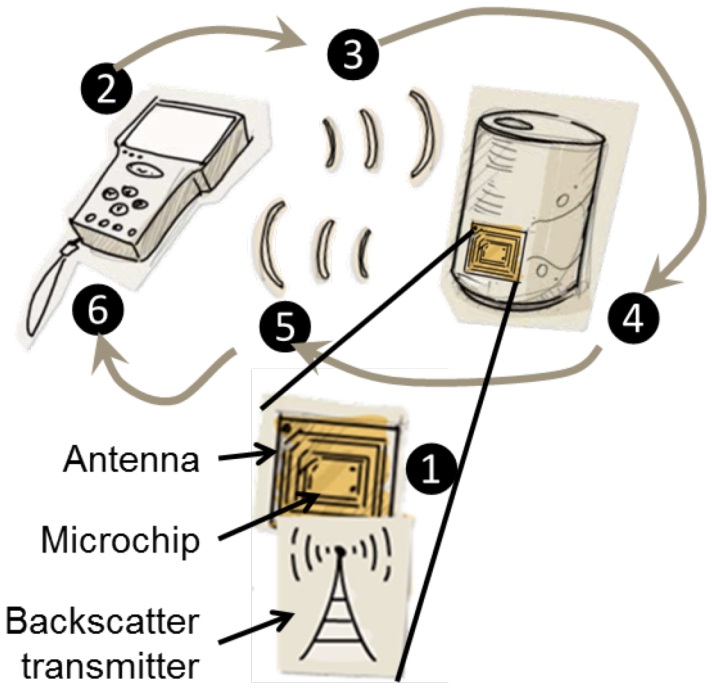
Define the product (a product SKU)
(but not the instance of that product)

RFID

Defines BOTH the product and the specific instance of that product

Radio Frequency IDentification

RFID is the use of a device applied to an object for the purpose of **identification** and tracking using radio waves



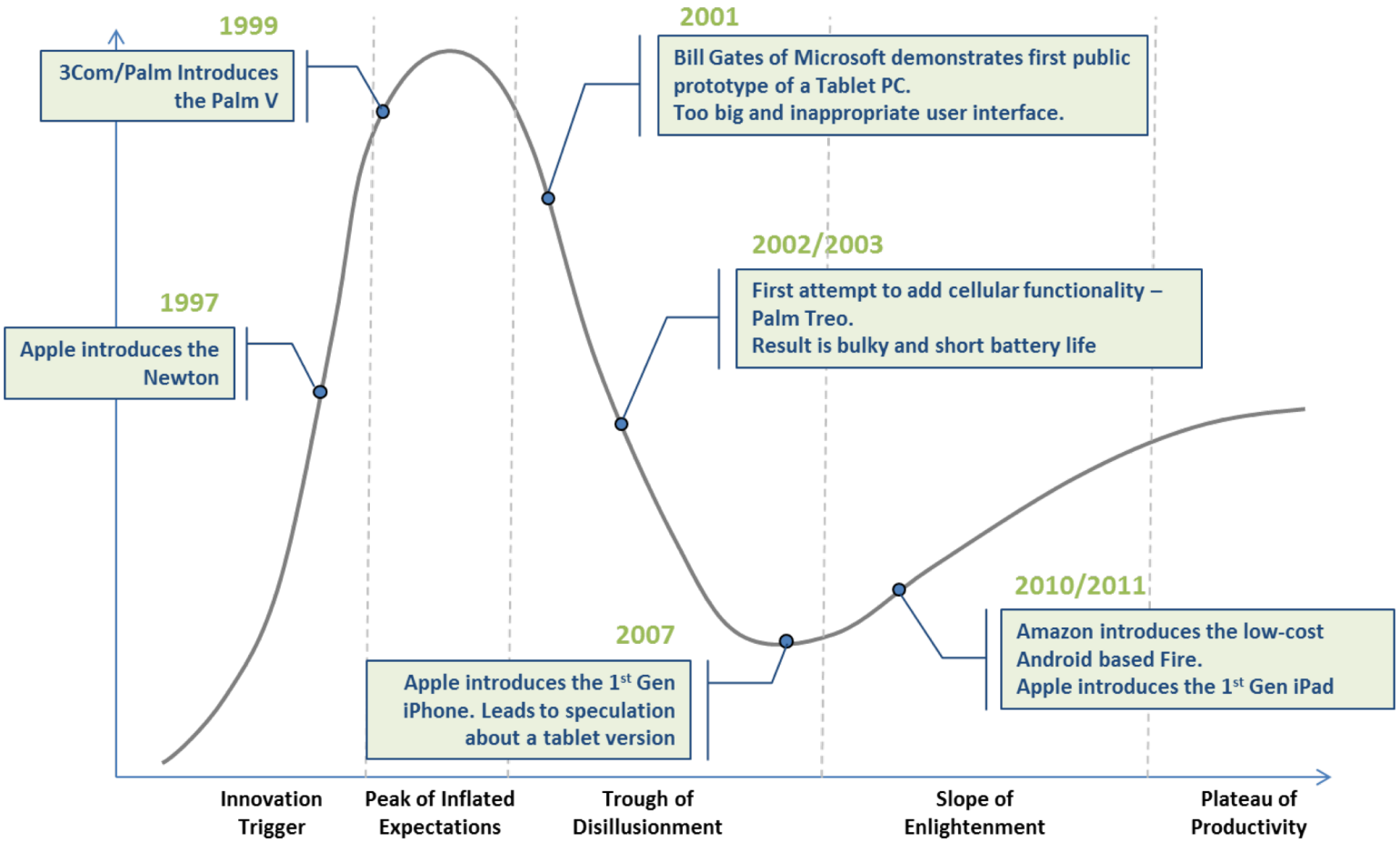
1. A **passive** RFID "tag" combines:
   a) An antenna for receiving both POWER and a REQUEST
   b) A microchip for accessing stored identification information
   c) A backscatter transmitter for sending back the information

   It does NOT have a battery.
2. An RFID "Reader" enables:
   a) Sending power to the tag
   b) Sending a request to "interrogate" the tag
   c) Receiving and interpreting the information sent back from the tag
3. The "Reader" sends **power** and a **request** to the tag.
4. The tag validates the reader is genuine and is "allowed" to read the tag
5. The tag transmits back the information
6. The reader displays the tag data/status

Types of RFID

	Passive	Battery Assisted Passive "BAP"	Active
Power Source	From the reader at read time	Internal battery	Internal battery
Power Availability	Only on reading	On reading (continuous for sensors)	Continuous transmit
Read distance	Short (up to 10m)	Medium (10m+)	Very Long (100m+)
Data Storage	Small (100's of bits)	Medium (K bits)	Huge (Mb's or MB's)
Life time	Indefinite	1-4 years	1-12 Months
Sensor support	None	Some	Many large sensors
Cost	A few pennies	Dollars	Tens/Hundreds $'s
Size	Very small and thin	Large	Huge

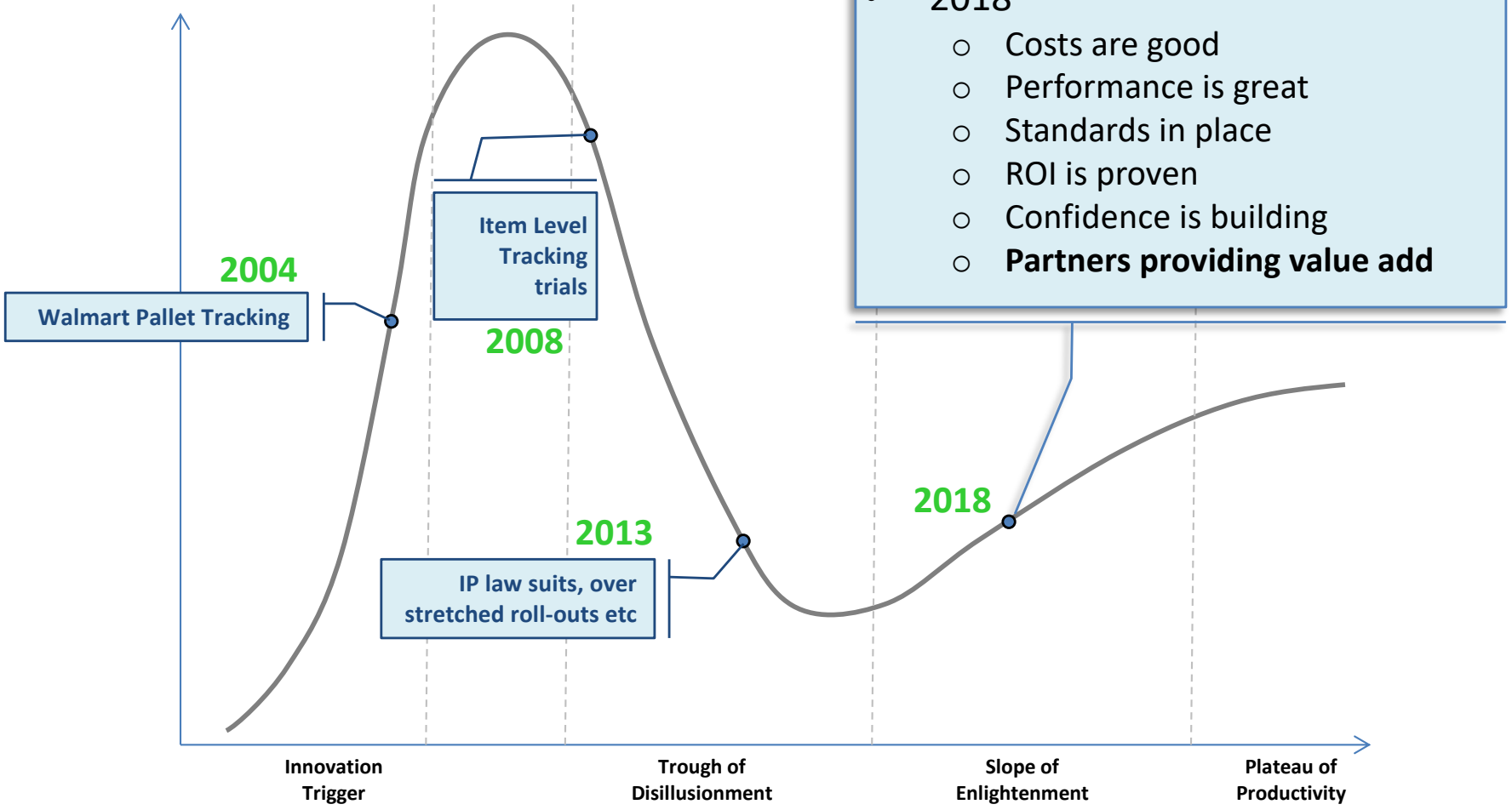
Jumping from the Trough of Disillusionment to Slope of Enlightenment – Historical Example: Tablets



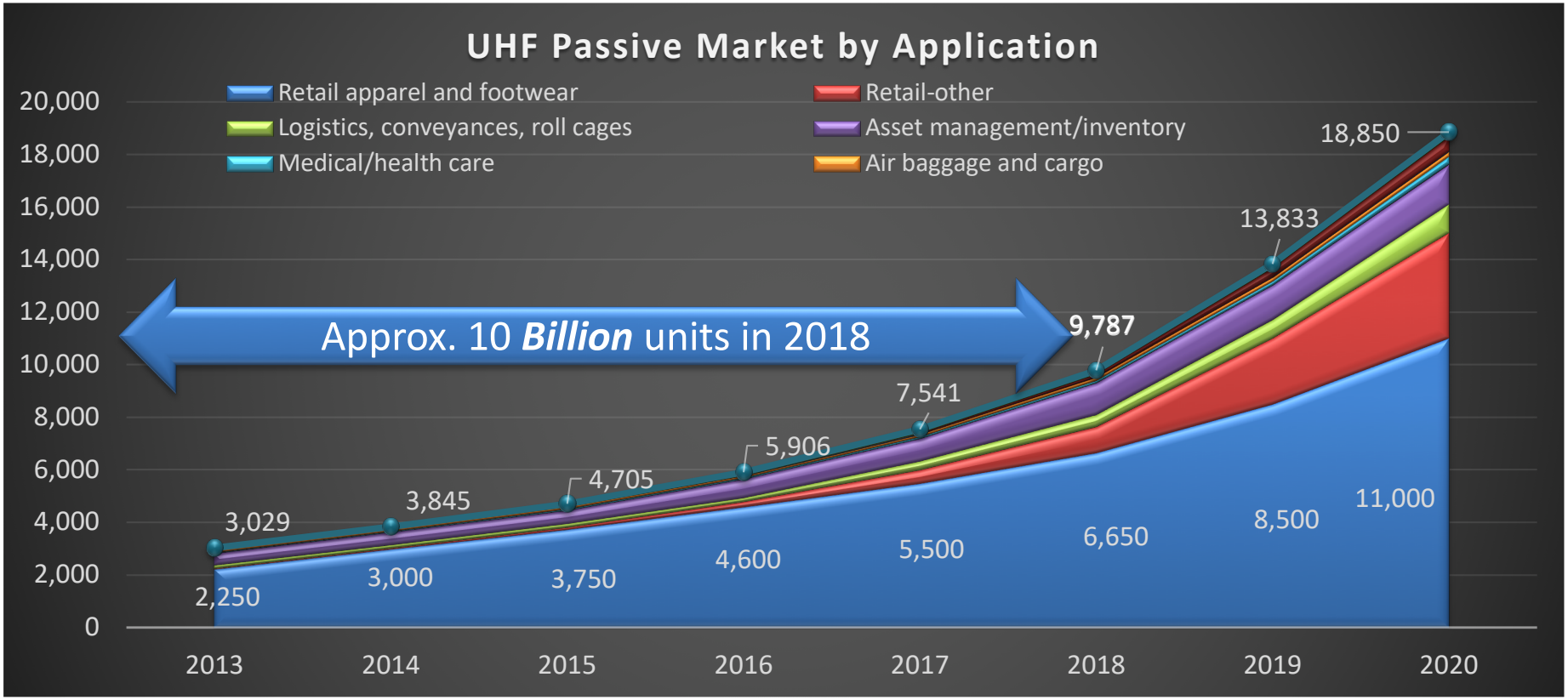
Source: Gartner and Alien

Jumping from the Trough of Disillusionment to Slope of Enlightenment - RFID

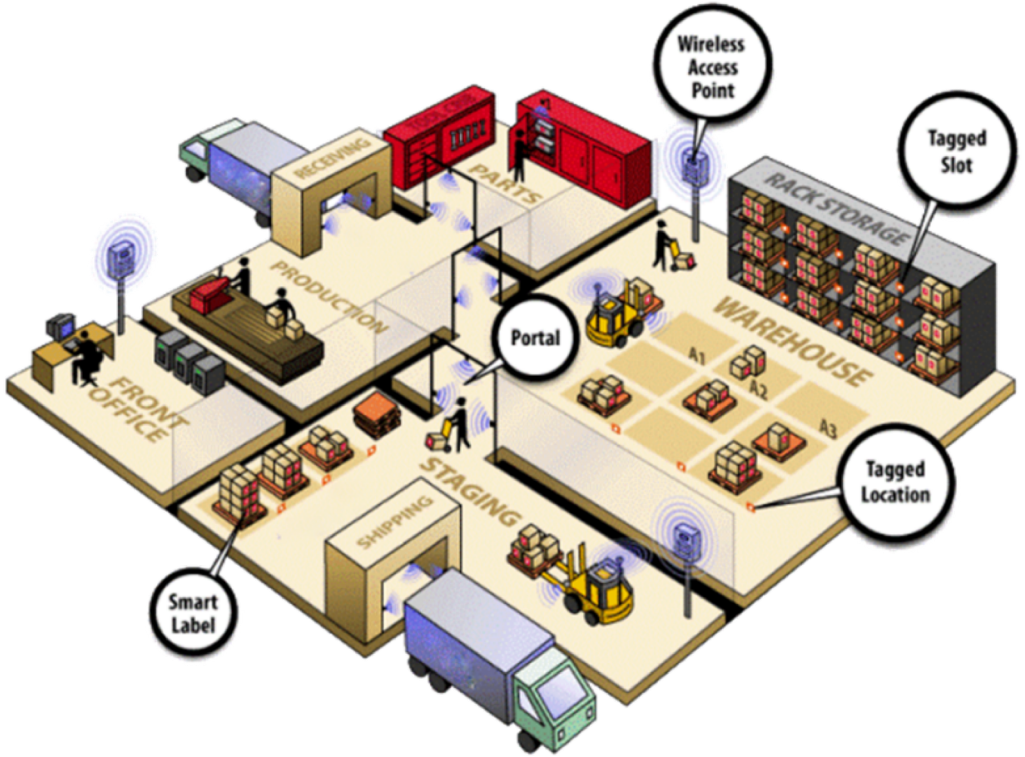
- 2018
  - Costs are good
  - Performance is great
  - Standards in place
  - ROI is proven
  - Confidence is building
  - **Partners providing value add**



UHF Passive IC/Inlay Growth (Millions of Units)



Supply Chain Tagging Example



- RFID "Smart" labels are placed on products, cases, pallets and other aggregated containers.
  - No line of sight required
- RFID readers are positioned at stations and choke points.
- As products/pallets pass by readers, the reader antenna sends out RF energy and the tag data is read by the antenna.
- Data is sent to a database for business analytics, visibility, decision tools, etc.

The Moving RFID Markets

Apparel

- Jeans
- Intimates

200 billion items @5-10% penetration. 95-90% to grow!

VDC [1]

Other Retail

- Electronics
- Boxed goods
- Batteries
- Cosmetics

2 billion units, a 60% CAGR

VDC [2]

High Value Item Level

- Wine
- Tobacco

5.5 trillion cigarettes a year

BAT Group [3]

Manufacturing / Industrial

- Construction
- Automotive
- Other "JIT" industries

>60 million cars[4] each with up to 30,000 parts[5] – which is 1.8 Trillion parts

Worldometers [4]
Toyota [5]

Transportation

- Ticketing
- Tracking

500 million RFID transit tickets

IDTechEx [6]

Healthcare

- Pharma
- Medical Records

$70.5 billion from 2012-2017

ABI [7]

[1] http://blog.vdcresearch.com/autoid/2012/01/vdc-researchs-rfid-takeaways-from-nrf-big-show-2012.html
[2] http://blog.vdcresearch.com/autoid/2010/06/rfid-growth-in-retail-i-believe.html
[3] http://www.bat.com/group/sites/uk__3mnfen.nsf/vwPagesWebLive/DO6Z2EUD?opendocument&SKN=1
[4] http://www.worldometers.info/cars/
[5] http://www2.toyota.co.jp/en/kids/faq/entry/6203.php
[6] http://www.idtechex.com/research/reports/rfid-forecasts-players-and-opportunities-2012-2022-000322.asp
[7] http://www.rfidjournal.com/article/articleview/9452/1/1/

The Benefits of RFID

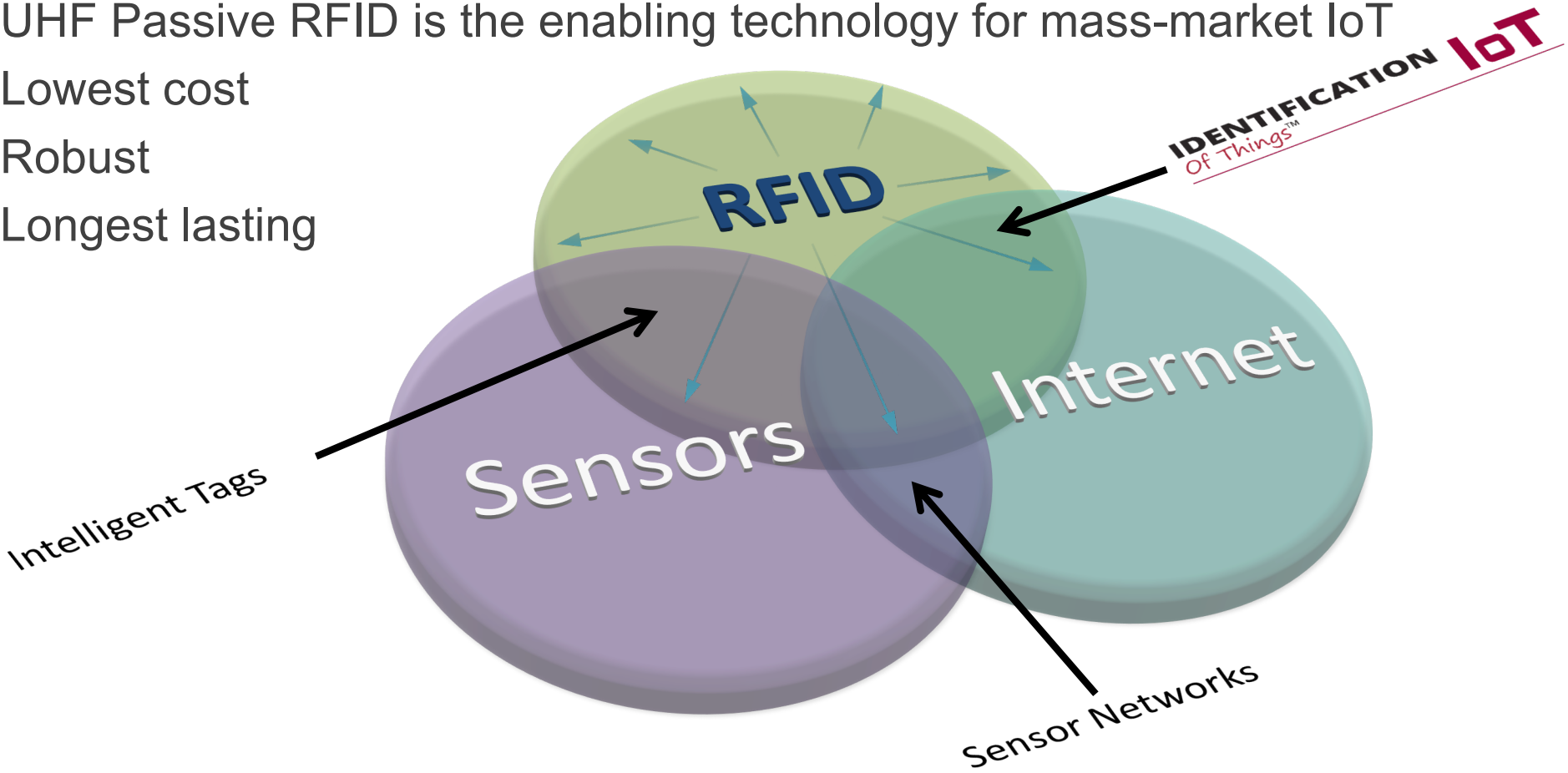
	Barcode 	
Stock Count Speed	300 items/hour	7,000 items/hour *
Stock Counting	1 to 4 times/year	1 time / week
Accuracy Level	55 to 80%	97 to 99%

- Less Manual Work
- Less Costs
- Improved Visibility
- Improved Planning
- Visibility of Accurate Real-Time Information
- Fast Locating of Products
- Possibility to Record Losses
- Ability to Plan Product Locations Strategically
- Offers Visibility of Real-Time Stock Movement
- Improves Efficiency
- Increase Accuracy
- Accelerates the Speed of Delivery
- Improves Efficiency
- Increases Accuracy
- Reduces Distribution Costs
- Object authentication

* From Macy's actual store data

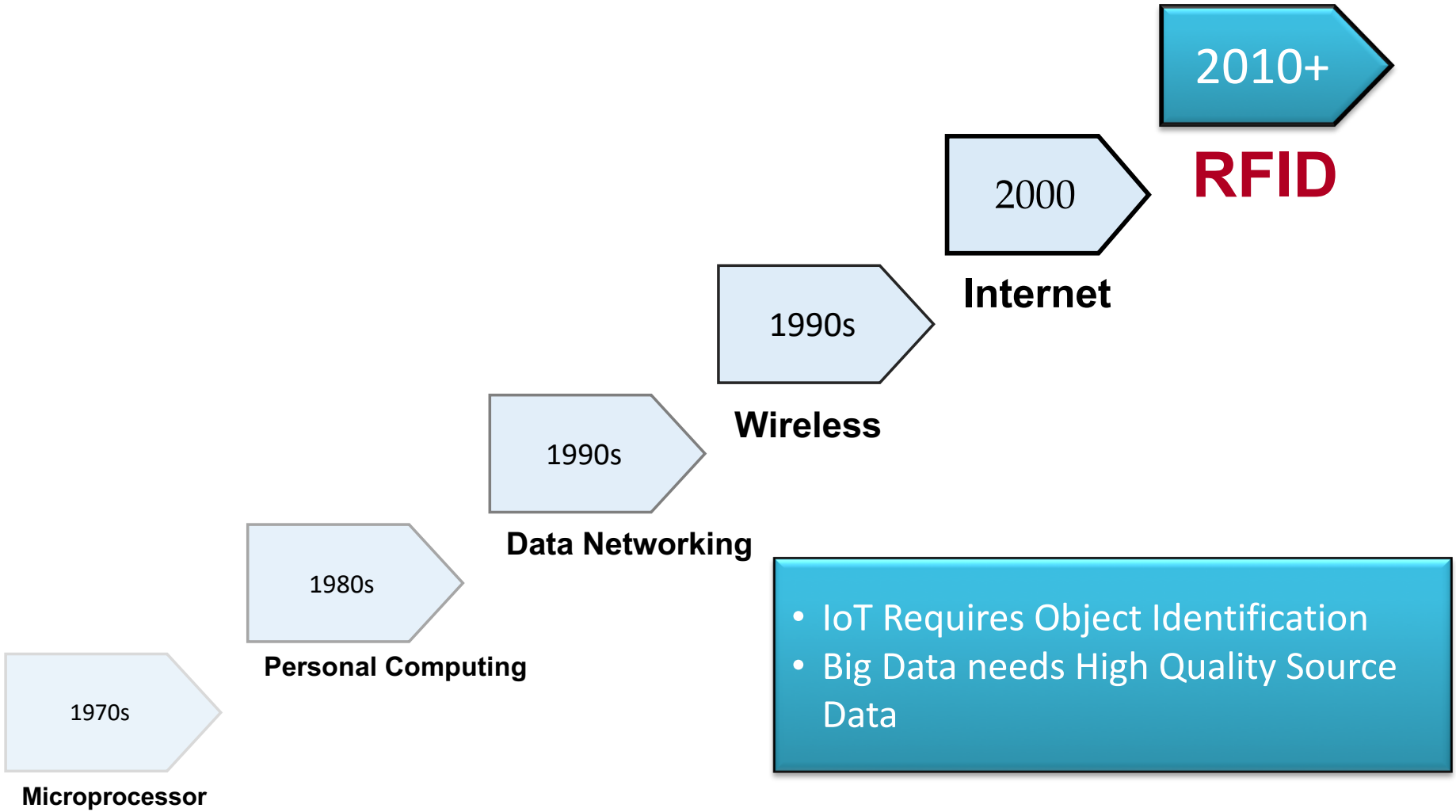
RFID and IoT Overlap

- Explosive RFID growth is a cornerstone to IoT success
- UHF Passive RFID is the enabling technology for mass-market IoT
- Lowest cost
- Robust
- Longest lasting



Source: Technology Strategy Board, UK and Alien Technology

Technologies at the Foundation of IoT



Technologies at the Foundation of IoT

RFID — **Identify an object**

Internet — Exchange data about the object to/from distributed data resources

Wireless — Communicate wirelessly relevant information about the object

Data Networking — Transfer information about the object to those that need to know

Personal Computing — Process the data into us information inexpensive

Microprocessor

1970s → 1980s → 1990s → 2000 → 2010+

Without RFID – the **Internet of Every Thing** is not possible

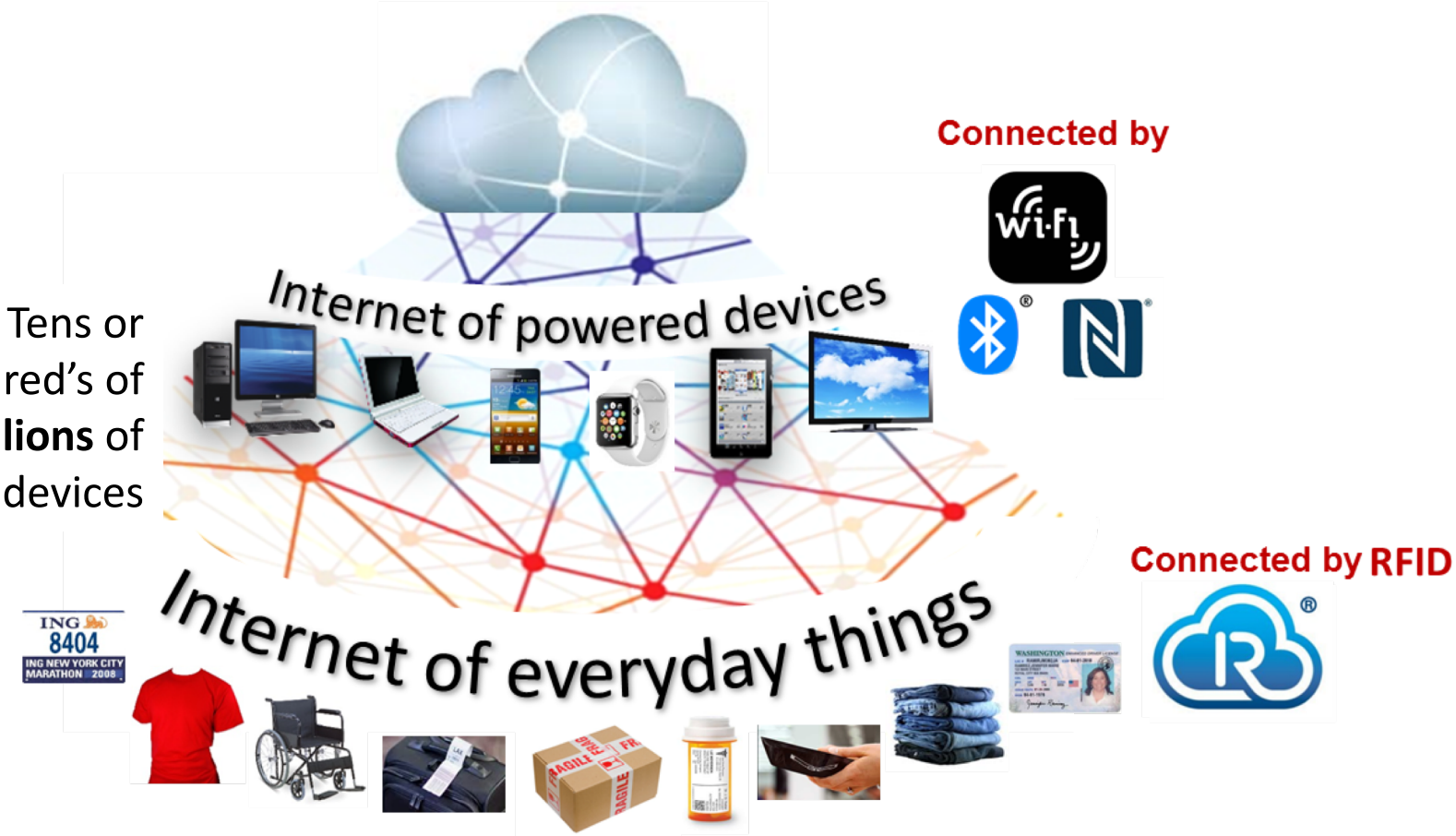
IDENTIFICATION Of Things™ IoT

- IoT Requires Object Identification
- Big Data needs High Quality Source Data

The IDENTIFICATION of THINGS (IoT)

Tens or Hundred's of **Millions** of devices

Tens or Hundred's of **Billions** of devices

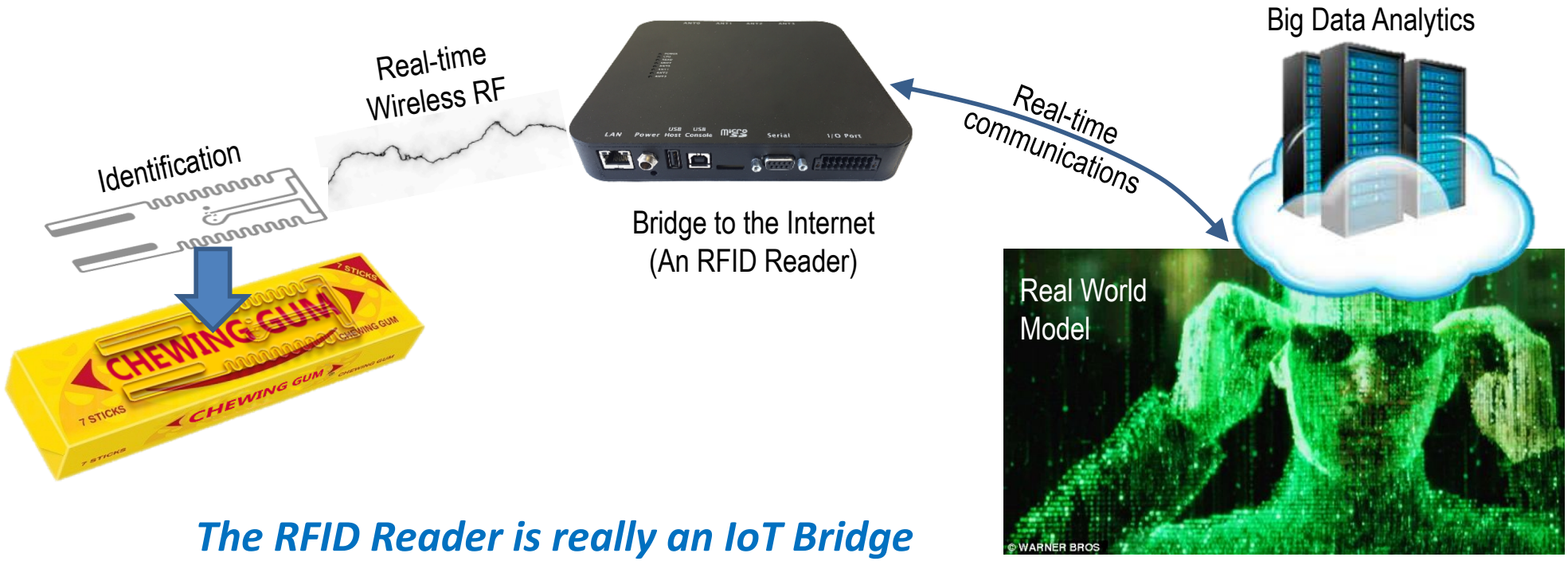


The IDENTIFICATION of THINGS (IoT)

- Internet of “everything” isn’t complete unless you include both “smart”/electronic and “dumb”/non-electronic objects

- Problems:
  - How do you IDENTIFY these objects?
  - How do you CONNECT “dumb” objects to the internet?
  - How do you AUTOMATICALLY model REAL-WORLD “dumb” objects?
  - How do you keep this accurate in REAL-TIME?
  - What happens when you turn off your “smart” device?

The Solution



The RFID Reader is really an IoT Bridge

Only RFID can autonomously and seamlessly identify non-electronic devices (or unpowered smart devices)

Garbage-in, Garbage out…

- An incorrect identification number would confuse the computer
  - An object of type X (shirt?) is actually of type Y (pencil)!
- A duplication of an ID number would cause the same object to be sold to two people

- Quality of data at all stage is critical
  - RFID tag IC source
  - RFID inlay source
  - High quality RFID reader
  - Managing of huge volumes of quality data

The Fusion of Retail RFID and IoT

- **Todays** business ROI needs are driving the identification of individual items in **retail** and other markets
- IoT infrastructure will leverage this
  - Passive RFID gets you 80% of what is needed for a virtual representation
  - Passive RFID is 50x-1,000x less-expensive than BAPs and active technology
- Now IoT applications become a reality
  - Virtual warehouse and retail show floor
  - Know **what** is **where** and **when** *without GPS* (and inside buildings)
  - Status can be stored in each tag (no battery required)
  - Electronic devices do NOT need to be turned on (conserving battery) to enable this functionality

An object identification infrastructure is part of the store or the stores supply chain … IoT can leverage from this infrastructure enabling IoT to be brought to market more efficiently and quickly

Summary

- RFID is a mature proven technology
  - With a proven ROI & proven benefits
- Adoption in the BILLIONS today (and growing at 40%+)
- IoT will leverage this infrastructure
- RFID enables the Identification of “dumb” objects
  - Non-electronic objects
  - Very low cost objects
  - Smart electronic when in the “off mode”

For More Information:

mhetrick@alientechnology.com

www.alientechnology.com

Or visit ALIEN at **Booth C2273**

IDENTIFICATION *Of Things™* IoT