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DIGITAL LIFE FOR EVERYDAY ITEMS

Register Your Twins

Chris Diorio, CEO

June 12, 2019

Imagine a Truly Connected World

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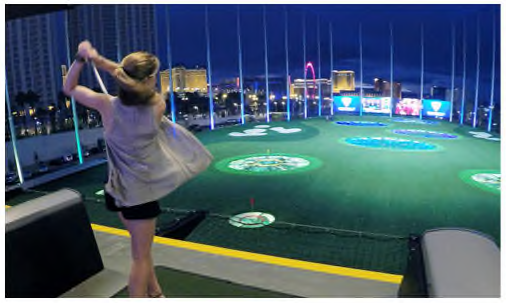
Internet Connectivity for Trillions of Items Every Year



We Have the Technology

- Small & low cost
- Unique identifier per item
- Uses **RA**dio **I**dentificatio**N**
- No batteries
- Lasts forever
- Fast & long range

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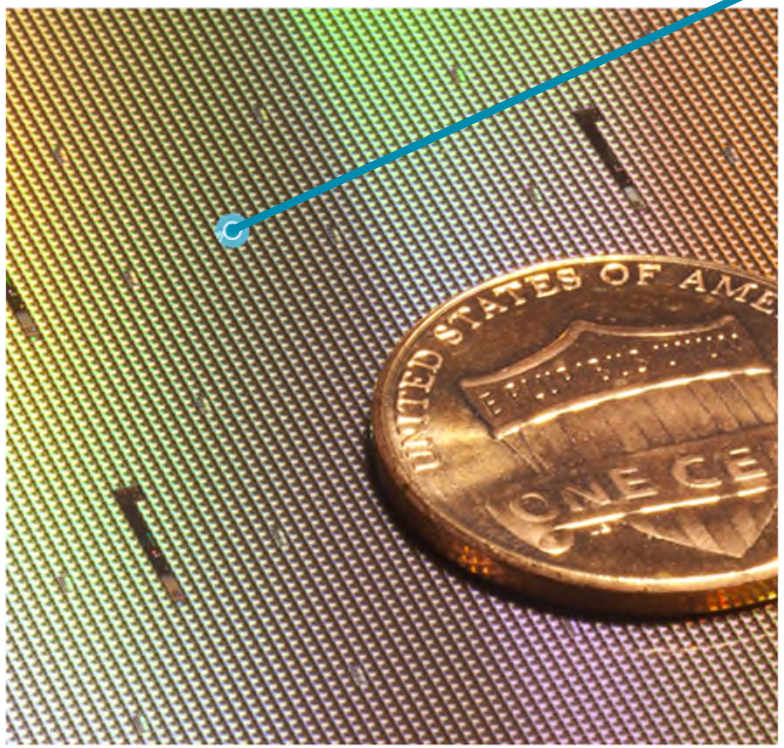
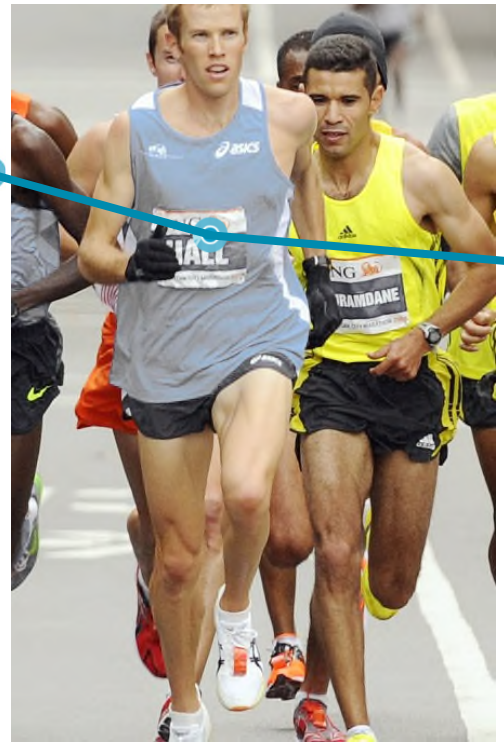
It Can Connect Everything

Little RAIN IC

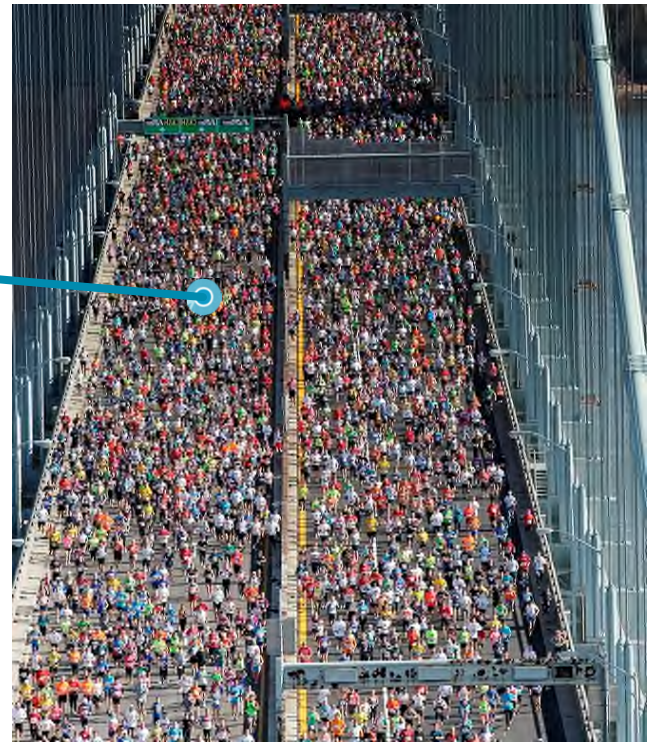


RAIN ICs on a silicon wafer

Big Opportunity



RAIN-enabled race tag



NYC marathon

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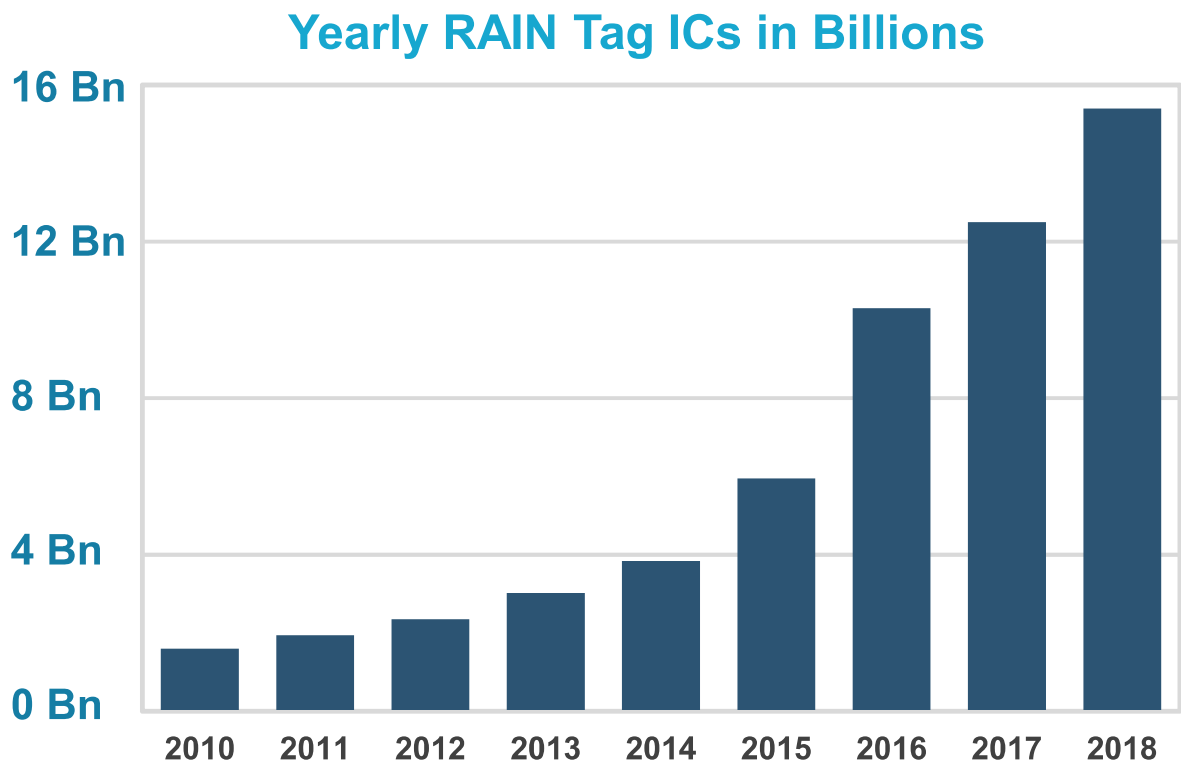
Volumes are Growing Rapidly

RAIN is Established

- Worldwide Spectrum
- RAIN Industry Alliance
- GS1/ISO Numbering/Standards
- Established Tagging Ecosystem

Industry Unit-Volume Growth[1]



1. Industry-wide volumes (a) for 2010 & 2011 are based on VDC Research: “Strategic Insights 2013: RFID, Contactless & RTLS Technology," for 2012 is based on IDTechEx: "RFID Forecasts, Players and Opportunities 2014—2024,” 2013, (c) for 2013 and 2014 are based on IDTechEx: "RFID Forecasts, Players and Opportunities 2016—2026,” 2015, (d) for 2015-2018 are based on data compiled by the RAIN RFID Alliance.

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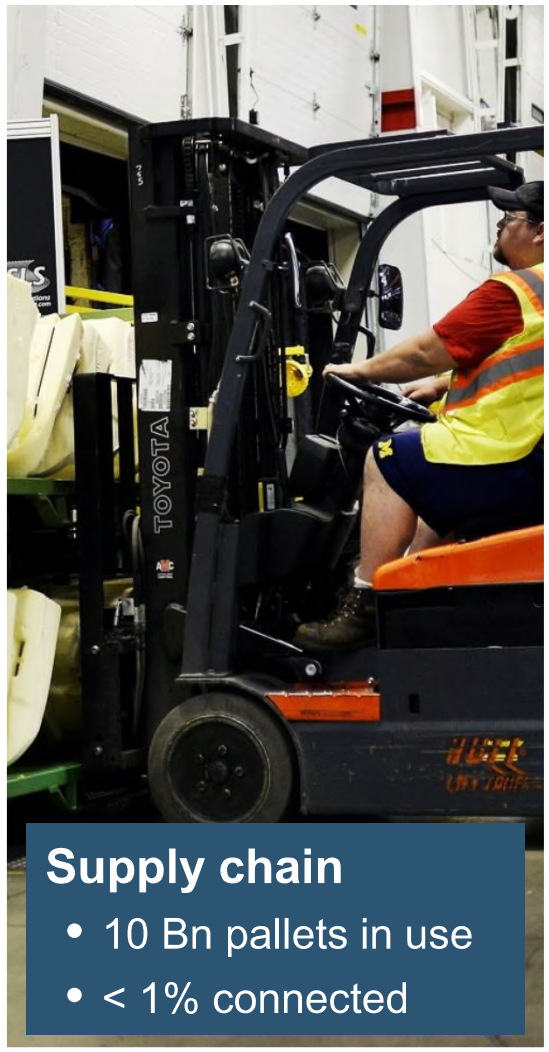
Adoption is Broad-Based

Retail apparel

- 80 Bn/yr opportunity
- ~10% connected



Supply chain

- 10 Bn pallets in use
- < 1% connected

Airline baggage

- 283 IATA airlines
- 1 fully deployed

Convenience stores

- 100 Bn/yr (Japan)
- 2025 METI plan

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Envision Virtualizing the Physical World

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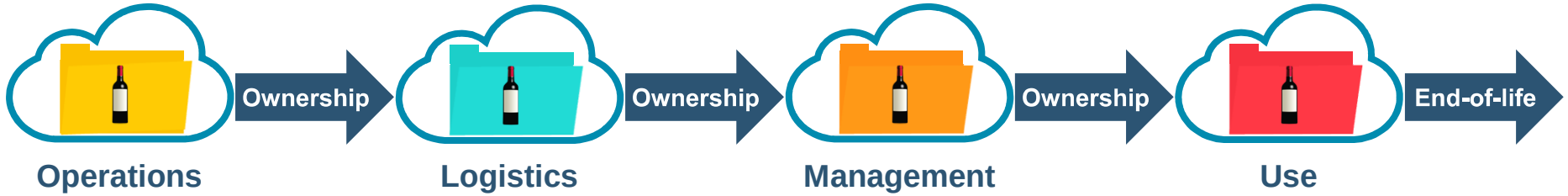
Digital Twins
- Ownership*
- History
- Links



* Ownership can be temporary, such as for item custody

Physical Items
- Identity
- Location
- Authenticity

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Imagine the Opportunity

Commerce

- Drive efficiencies
- Reduce loss/waste
- Inhibit counterfeiting
- Automate contract fulfillment

Businesses

- Increase sales
- Improve customer satisfaction
- Virtualize and optimize operations
- Engage consumers via connected items

People

- Virtualize my possessions
- Automate data collection/retention
- Instant visibility to items in my world

This architectural view is item-owner-centric

- An owner owns an item
- An owner owns their item's twin
- An owner benefits from the item's digital life

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So What's Holding Us Back?

Opportunity

1. Digital life for physical items
2. People engaging connected items
3. Developers building an IoT ecosystem

Impediments

1. Multiple numbering systems
2. No number-to-cloud resolution
3. Item ownership isn't an internet concept

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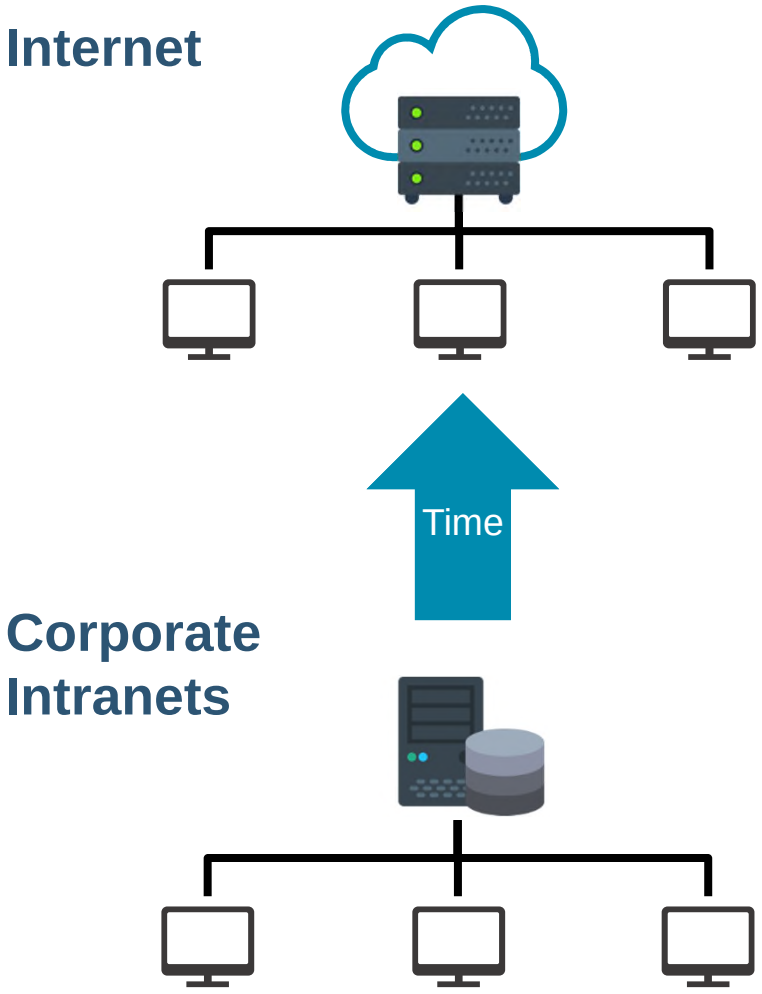
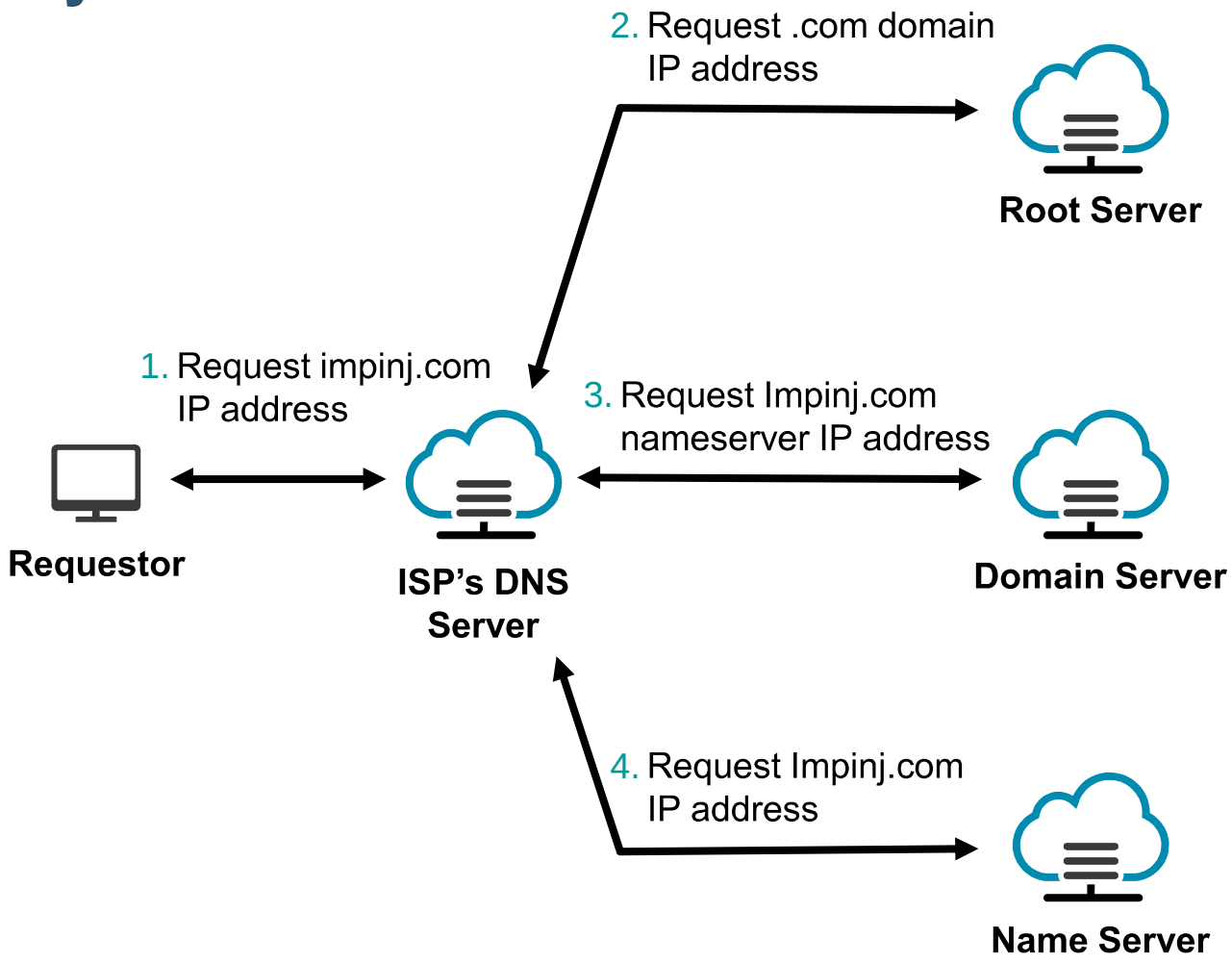
History: Internet Evolution



Key Element: DNS



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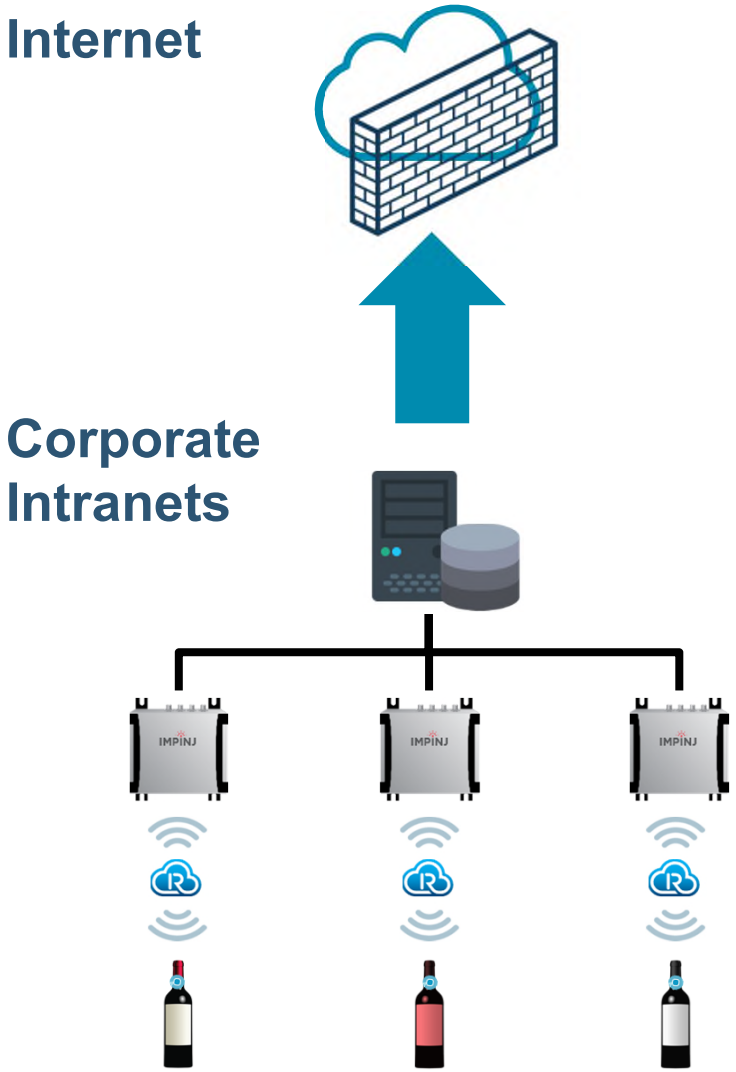
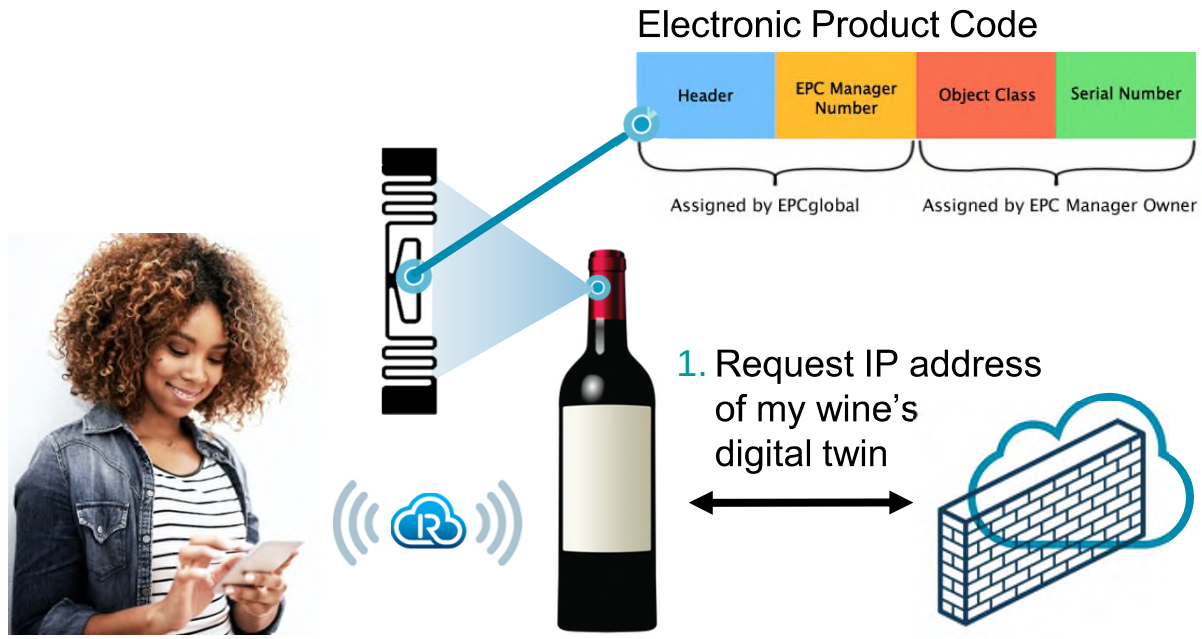
IoT Today: Intranet Connectivity





What people expect from the IoT

- I am an IoT driver, not a passenger
- I want direct access to my items & data
- I expect democratized access to my digital world

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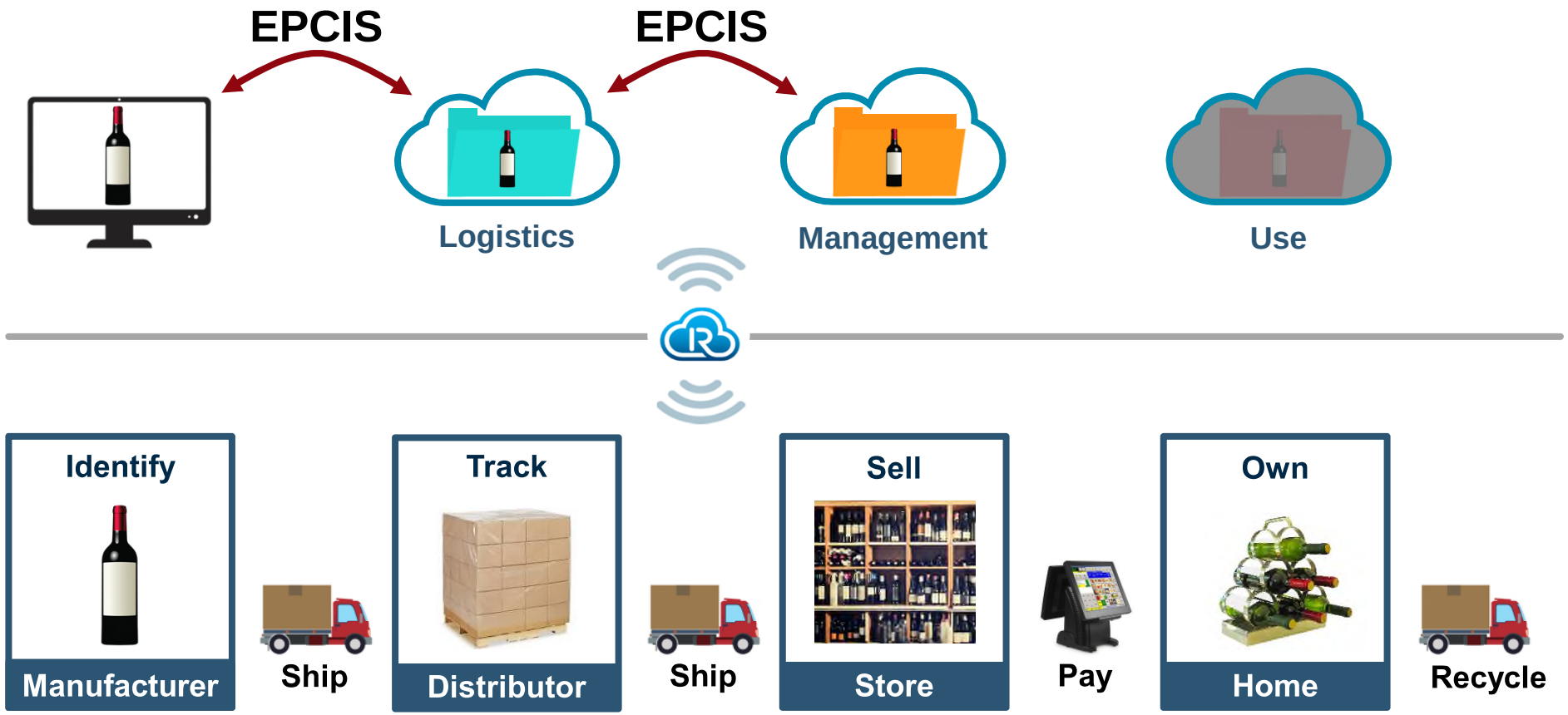
GS1 Digital Link: A Step Forward



This view is manufacturer-centric, NOT item-owner-centric

- GSI Digital Link resolves a GTIN to a manufacturer's URL
- EPCIS enables data sharing among trading partners

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IoT Future: Registration & Ownership

Identifier registration

- Ensure number uniqueness*
- Resolve identifier to twin (IP address)
- Link item-relevant services to twin
- Retain the ownership-transfer chain

Item ownership

- I own an item and its twin
- My item resolves to my twin
- I store my twin where I want to
- I determine the security for my twin
- I choose what data to share with others

* Registration is the only effective way to support multiple numbering systems and ensure EPC uniqueness

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Key IoT Needs

Digital twins for physical items

- Location agnostic
- Owned by the item owner
- Protected by owner rights/privileges
- Resolved (to IP address) by item's identifier

Key aspects of digital twins

- Each successive item owner creates a new twin
- Owner rights gate access to twin data, including by prior/future item owners
- Owner rights gate identifier resolution to prior twins' IP address

Identifier resolution for the IoT

- Distributed, decentralized
- Identifier-to-twin resolution
- Twin-to-item-services resolution
- Application resolution to twins/services

Key aspects of a resolution service

- Registers item identifiers to digital twins
- Resolves identifier-based access requests to IP addresses
- Leverages blockchained item-ownership transfer to resolve item identifier to new owner's digital twin

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The Time is Now

Our opportunity

- RAIN-enabled item-to-cloud connectivity
- Business and people engaging connected items

Our responsibility

- We are enabling item connectivity
- We have the vision of connected items

A critical need

- We are key to delivering the IoT vision

Proposal: Form a consortium of industry bodies to

- Define standards for digital twins
- Architect identifier resolution for the IoT

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Thank You