

RFID
JOURNAL
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20 **YRS**
2003 - 2022

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MANDALAY BAY | LAS VEGAS, NV

Current State of the Internet of Things

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What is the Internet of Things?

- “An infrastructure of interconnected objects, people, systems and information resources together with intelligent services to allow them to process information of the physical and the virtual world and react.”
 - ISO/IEC JTC 1/SWG 05 – November 2014



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Where did it come from?

- The phrase was first mentioned in 1999 in papers published by the MIT Auto-ID Center.
- RFID was part of the IoT vision from the start...the Auto-ID Center and its project partner, EAN-UCC (now GS1), considered best suited technology to support and enable IoT as defined.
- IoT meant to “create a universal environment in which computers understand the world without human beings.”

Remember

- The IoT is NOT a Technology or an Industry
- The IoT and smart systems are driven by a combination of:
 - Sensors and actuators
 - Connectivity
 - People and processes



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So, What is It?

- A means to improve business
- A way to identify and track everything
- The first step to awareness of everything
- Connectivity for everyday items, not just powered items



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What is It NOT?

- The easy answer to everything
- The solution to bad business practices
- A quick, cheap way to make everything right
- Being able to turn on your house lights from your phone



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What does IoT mean to you?

- IoT means something different depending on who you talk to:
 - Network carriers
 - Data aggregators
 - Device manufacturers
 - Solution providers
 - Data collection providers
 - End users



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What Does IoT need?

- Front End Technology (Identify the Thing)



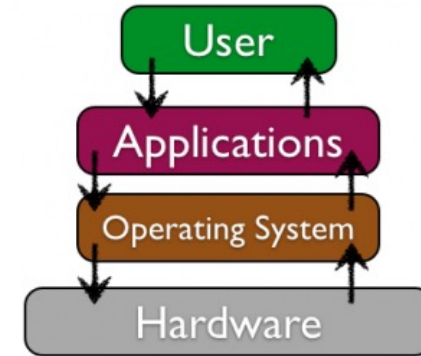
- RAIN RFID
- Zigbee
- Bluetooth
- Wi-Fi
- LoRa
- NFC
- Barcode (2D)

Think about:

- **Form factor**
- **Power**
- **Communications speed/ capability**
- **Visibility**
- **Compatibility with infrastructure**
- **Cost**

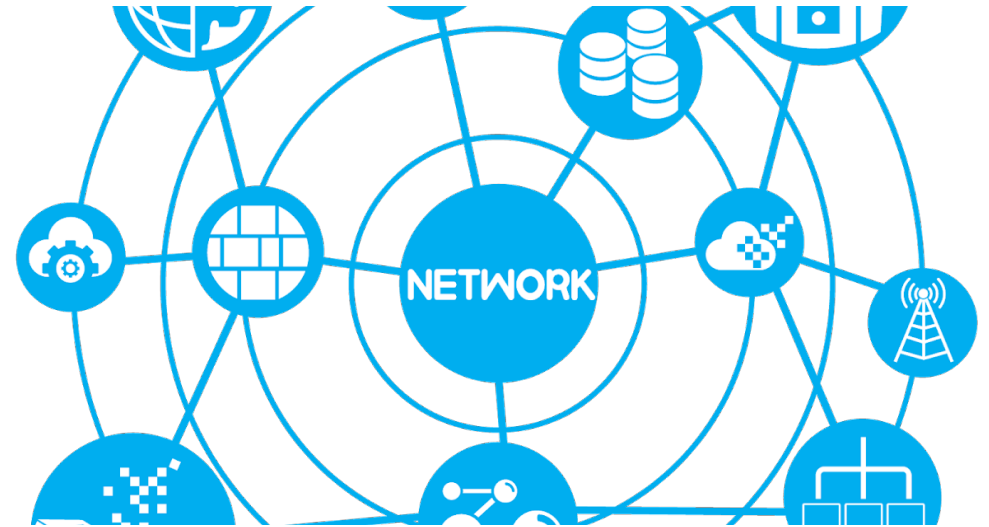
What Does IoT need?

- Software/System
 - This will make or break the IoT
 - The cloud is important
 - Communications are king
 - Architecture defines interoperability – or is it just an obstruction to development?
 - Blockchain?



What Does IoT need?

- Connectivity
 - 5G
 - Low Power Wide Area networks
 - Sigfox
 - LoRa
- Etc.



Who are the Players?

- Amazon Web Services, Google Cloud Platform, Oracle, Salesforce.com, SAP
- AT&T, Verizon
- Ayla Networks, ThingWorx
- Bosch Software Innovations, Flexera Software, Microsoft Azure Suite
- Many More!!!



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IoT Startup Landscape 2021 – 1,200+ companies

IoT Software



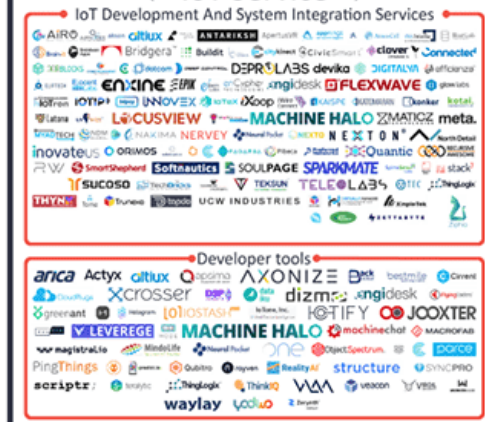
IoT Hardware



IoT Connectivity



IoT Service



Note: For companies to be included in IoT Analytics IoT startups database they must be founded in or after January 2013, focus on building solutions for the Internet of Things and provide part of a solution focused on at least one area of the IoT technology stacks layers. Companies can offer more than one technology. This list represents a best effort to capture the entire landscape; however, it does not claim to be exhaustive, as some start-ups will have inevitably been missed

Source: IoT Analytics Research 2021, IoT Startups Report and Database 2021

Three “types” of data collectors (Front End)

- Zigbee, Bluetooth, Wi-Fi, LoRa
 - Powered connectivity, \$\$\$, long distance
- Barcode (2D)
 - Printed, read only, line of sight, \$, one at a time
- RAIN RFID
 - No batteries, hidden things, \$-\$\$, medium distance, fast (1000 items/second)



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What is RAIN RFID?

RAIN RFID is a wireless technology that connects billions of everyday items to the internet, enabling businesses and consumers to **identify**, **locate**, **authenticate**, and **engage** each item



Just the facts?

- 20.4 billion devices connected to the internet by 2020, up from 8 billion in 2017
- Consumer use will be mostly smart TVs and digital set-top boxes with 5.2 billion
- Traditional computing devices (e.g. smartphones, tablets, smartwatches, etc.) will comprise more than half
- BUT these are DEVICES not things

Gartner Jan 2017

<https://goo.gl/TSxsiV>



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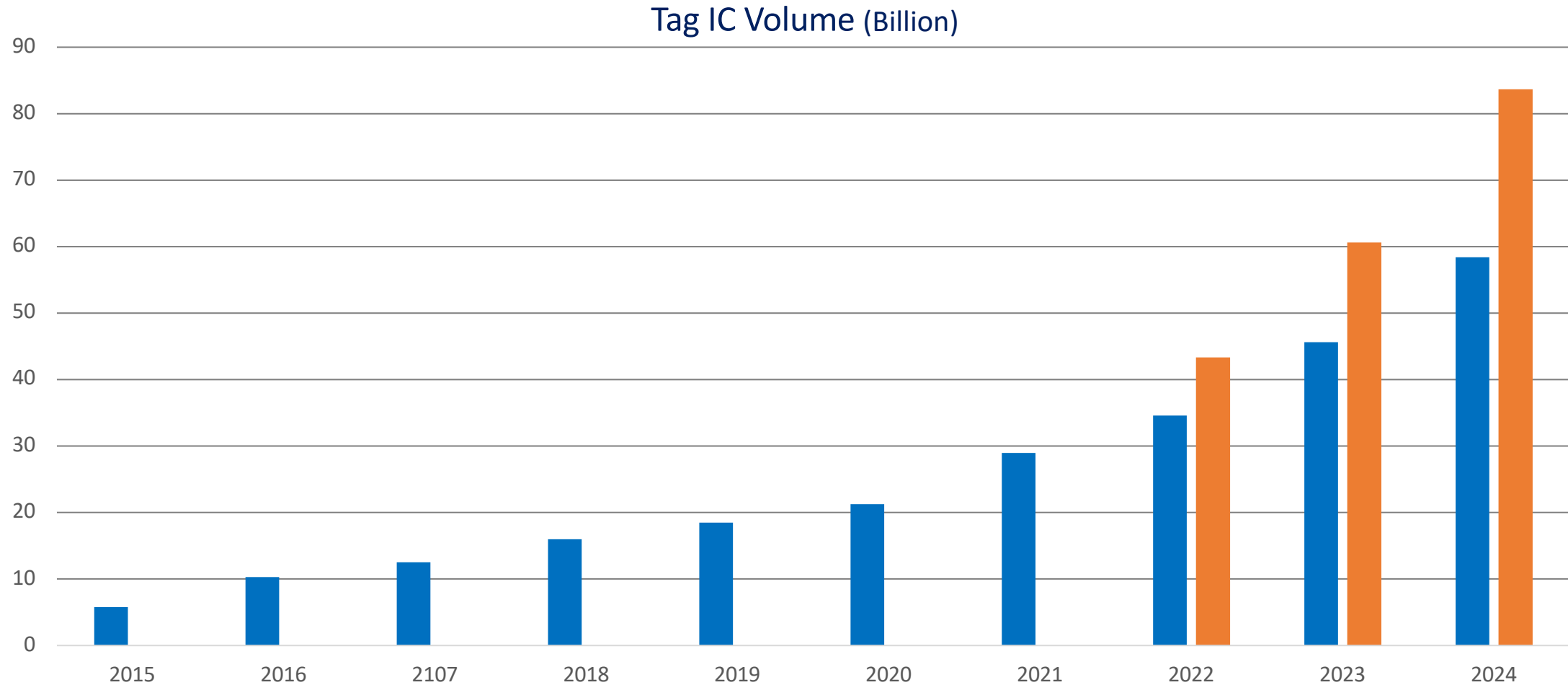
Why RAIN?

- In 2022 there are over **100 Billion RAIN RFID tags** in use, feeding information back into the Internet of Things



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Data Collected by RAIN 2015-2021:
Forecast 2022-2024 – RAIN Market Research Report 2020
Base Line and Best-Case Scenarios

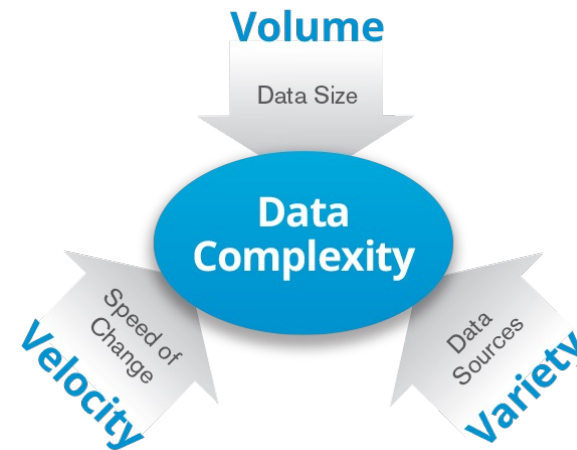
Technical Challenges

- Need to Identify the everyday “Things”
 - Not IP based
 - Tablets, phones, Nest Thermostats, Fitbits
 - Devices
 - Shoes, jeans, widgets
 - Things with no inherent connectivity
- Need to understand the business process
 - No full-time connectivity
 - Need for “spot” checks

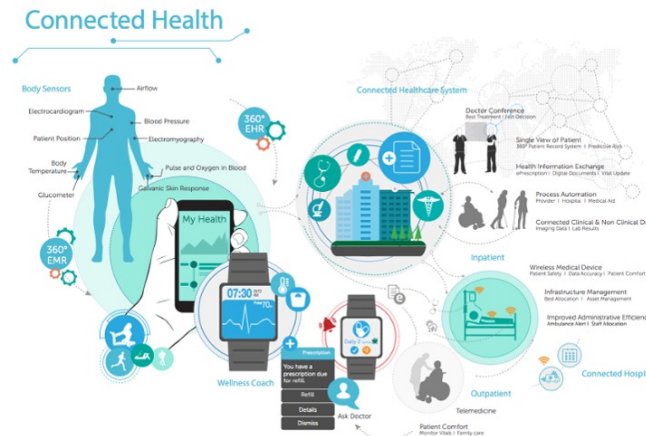
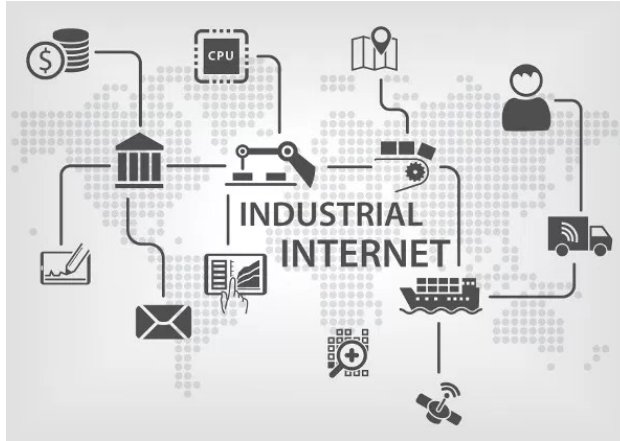


Technical Challenges

- Identifying the “Things”
 - Sensors
 - What are sensors?
 - Storing data
 - How much data?
 - Type of data?
 - Format?
 - Segmented?
 - Security



Applications



Top IoT Applications today

- Smart Cities
- Smart Environment
- Smart Water
- Smart Metering
- Security & Emergencies
- Retail
- Logistics
- Industrial Control
- Smart Agriculture
- Smart Animal Farming
- Domestic and Home Automation
- Healthcare



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Smart City

- Smart city covers a wide variety of use cases:
 - traffic management
 - water distribution
 - waste management
 - urban security
 - environmental monitoring



Smart Environment

- Forest Fire Detection
- Air Pollution
- Snow Level Monitoring
- Landslide and Avalanche Prevention
- Earthquake Early Detection



Retail

- Supply Chain Control
- NFC Payment
- Intelligent Shopping Applications
- Smart Product Management
- Big savings in inventory management
- Increases in sales
- Reduction in Losses
- Growing at a fantastic rate
- Over 100 retailers currently using RAIN

RAIN in Retail



Over 100 retailers use RAIN RFID worldwide.



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Industrial Control

- The Industrial Internet is talked about a lot (IIoT, Industry 4.0)
- Market researches such as Gartner or Cisco see the IIoT with the highest overall potential
- Potential to change the way we do business
- Uses, RFID, barcodes (labels and direct part marked), and view tags (e-paper)
- Asset tracking, picking, replenishment, smart containers etc.
- Real time information and analytics



Healthcare

- Digital Health/Telehealth/Telemedicine
- Smart asset tracking
- Pharmaceuticals/blood bags/cold chain
- Smart pill bottles
- Smart operating theaters
- Smart watch/fitness band/body monitoring
- Integrated Clothing
- Patient compliance monitoring

RAIN in Healthcare

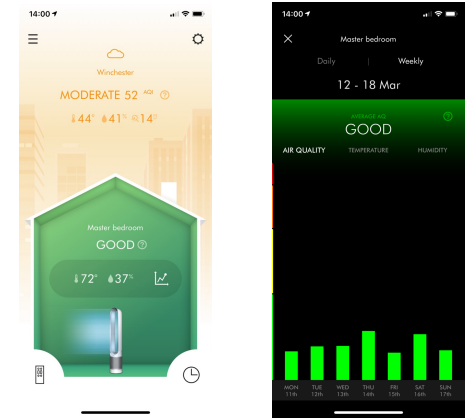
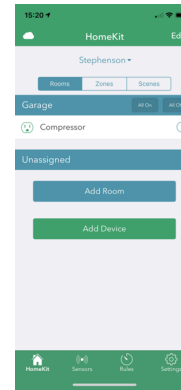
Over 50 healthcare providers are using RAIN RFID technology.

Hover and click on the companies in the cloud below, and you can learn more about them using RAIN RFID technology.

Domestic & Home Automation

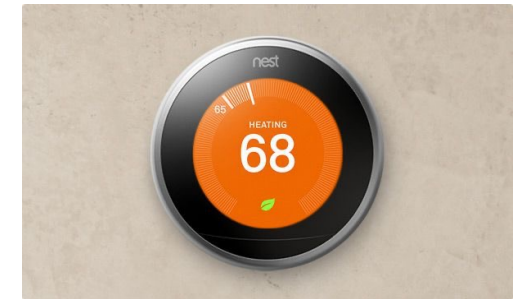
- Energy and Water Use
- Air Quality Monitoring
- Remote Control Appliances
- Intrusion Detection Systems

Homekit
remote
control



Dyson Air Quality monitor

The Nest Thermostat



Img. Credit-Nest.com

Philips Hue-Smart lighting provides
lighting to suit the environment



Img. Credit-www2.meethue.com

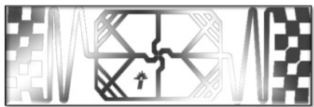
Sports

Marathon Bibs are IoT



- Improved Runner Tracking
- Social Media Integration
- Real-Time Race Updates

RAIN Tag



Courtesy of  IMPINJ



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Food

Smart Agriculture & Smart Animal Farming

- Farm to Fork initiatives
- Freshness tracking
- Refrigerated transport and storage
- Vending machines



Courtesy of IMPINJ™



RAIN – Enabling the IoT

- Unique item identification
- Low cost
- Batteries not required
- Line-of-sight not needed
- Long or short range
- Security availability
- Connects to sensors

RAIN
IS EVERYWHERE

JOIN NOW
TO GROW THE TECHNOLOGY
IN YOUR MARKET

HEALTHCARE

RETAIL

LOGISTICS

PHARMACEUTICAL

INDUSTRIAL
MANUFACTURING

CONSUMER
SERVICE

IoT

PACKAGING

ELECTRONICS



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RAIN is an Industry Alliance



RAIN RFID Alliance

Membership: **160+** companies worldwide

Representing: passive UHF RFID

Similar to:

WiFi Alliance



Bluetooth SIG

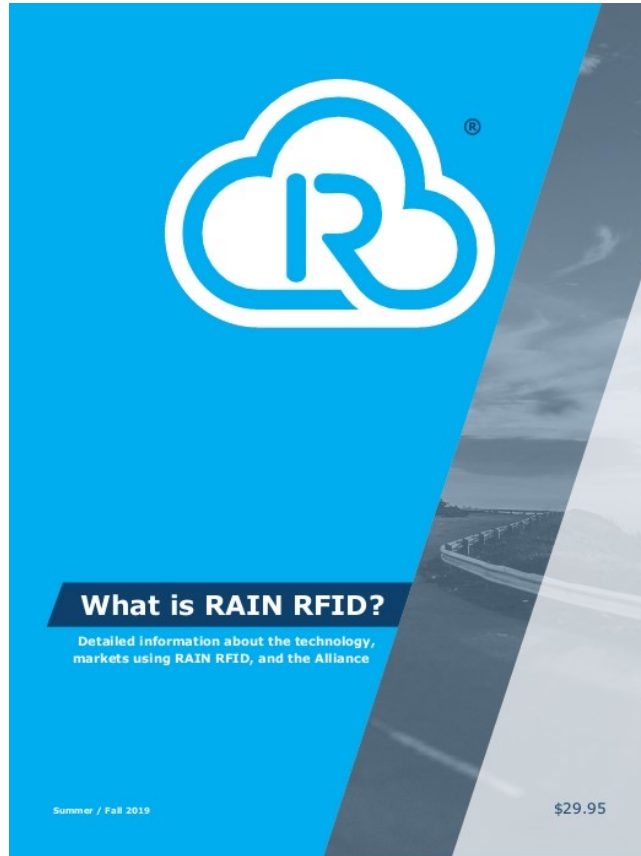


NFC Forum



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Download the eBook



Get it Now



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RAIN Connections Summit in cooperation with GS1 and IEEE CRFID



CONNECTIONS SUMMIT HELSINKI 2022

14-16 June 2022

Wanha Satama • Helsinki, Finland



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Summary

- The IoT is about **THINGS** not Devices
- Things will mostly not have IP addresses
- Passive UHF RFID “**RAIN**” will have a major part to play
- We need to better vocalize the importance of the IoT to industry



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The RAIN RFID Alliance

- How to Join RAIN
 - www.RAINRFID.org has the details
 - Dues are based on company revenue for providers
 - Manufacturers, System Integrators, Users, Academic Establishments, Test Houses
- Sign up for latest news
 - www.RAINRFID.org
- Email – info@rainrfid.org for Alliance questions
- Steve@rainrfid.org



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THANK YOU

