



**How RAINFC Enables Holistic Omnichannel Sales...**

**...Through Full Product Lifecycle Traceability**



We are embracing challenges through time

A COMPANY OF THE  SWATCH GROUP

  
SWATCH GROUP

Swatchgroup is:  
20 Brands  
35,360 Employees  
USD 8.5 Billion Net Sales

2019 Figures

*Breguet*  
Depuis 1775

  
HARRY WINSTON

  
BLANCPAIN

*Glashütte*  
ORIGINAL

J\*D  
JAQUET DROZ

LÉON HATOT

  
OMEGA

LONGINES

RADO  
SWITZERLAND

UNION  
GLASHÜTTE/SA.

  
TISSOT

ck  
Calvin Klein

BALMAIN  
swiss watches

CERTINA

MIDO

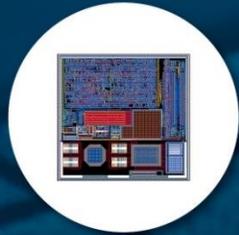
 HAMILTON

swatch

flik flak

# 30 Years of RFID

Swatch Group's **EM Microelectronic** serves the RFID market since 1989 with premium ICs, standard and customized, for LF, HF, UHF and multi-frequency/multi-protocol applications



1992

EM4021 First UHF IP-X chip



2000

EM4036 first EM 13.56MHz Vicinity chip



2015

World's first RAINFC dual-frequency chip

em|echo  
NFC-RAIN DUAL FREQUENCY



2018

100M RAINFC tags in the market



1989

EM4001 First EM LF chip



1996

ISO 11784/11785 standard for animal identification, EM4005



2000

EM4095 High Performance LF Reader AFE



2003-2008

World's first mass UHF RFID retail deployment, EM delivers 90% of worlds UHF chips



2017

The new benchmark for RAIN RFID crypto transponders

em|aura-C  
Crypto-Enhanced RAIN RFID



2020

The holistic omnichannel solution powering circular brand-consumer engagement models

em|echu  
RAINFC AUTHENTICITY

# Retail footprint



More than 3000 stores and kiosks globally plus many distributors

# Our own omnichannel challenges



- Same experience at all touch points
- Same services everywhere
- Seamless consumer experience: “white gloves” at home
- Fusion of marketing and sales
- Channel management
- Grey market
- Counterfeits

To provide a consistent retail experience when consumer A engages with product Y, A and Y need to be uniquely identified

→ A and Y need Digital Twins

# Same Experience Anytime, Anywhere



- Wikipedia:  
A digital twin is a digital replica of a living or non-living physical entity...
- Every physical entity can have different digital twins for different purposes
  - Drivers license, ID, passport(s)
  - Social media accounts
  - Credit card & online shopping accounts/identities
  - Design drawings, business plans,...
  - ERP item inventory data in retail and smart industries
- A number of technologies create the link between the entity and its digital twin
  - Barcodes, 2D codes, magstripes, low frequency RFID, NFC, RAIN RFID/EPC Gen2 tags



# RAIN RFID (Radio Frequency Identification)



- Advantages

- Fully passive tags, energy harvested from reader signal
- Transmits data by backscattering the reader signal
- No battery → virtually unlimited lifetime, no maintenance
- Inventories 100s of items at once
- Reads >10m

- Prime technology for inventory and supply chain management applications

- Technology

- GS1 EPC Gen2v2 / ISO/IEC 18000-63 Air Interface Protocol
- Operates in the UHF 860-960MHz Spectrum
- Supports GS1 global trade item codes (GTIN) or proprietary closed-loop code schemes



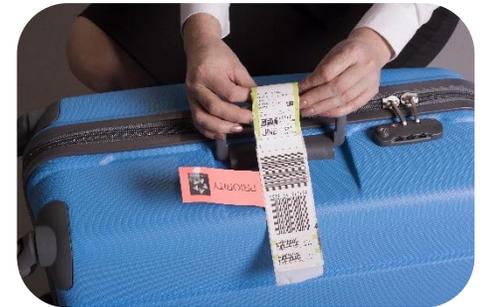
Retail



Electronic Vehicle Identification



Logistics



Baggage Tags

# Near Field Communication (NFC)



- Advantages

- Fully passive tags, energy harvested from reader signal
- No battery → virtually unlimited lifetime, no maintenance
- 1-to-1 communication between consumer and item
- Directional short-distance read (< 8cm) → no risk of stray reading
- Supports secure communication out of the box

- Prime technology for contactless payment, eID, ticketing, consumer engagement, brand protection

- Technology

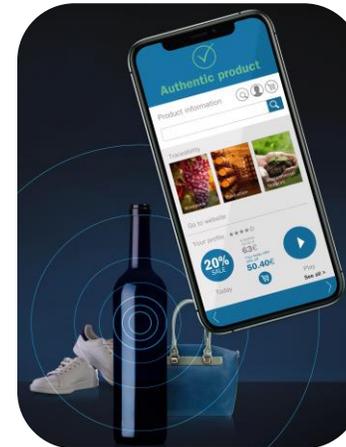
- Operates in the HF 13.56MHz spectrum
- GS1 Digital Link Standard with underlying NFC Forum standards
- Natively supported by any smartphone thanks to standardized NFC Data Exchange Format (NDEF) messages



Contactless Payment



Electronic Passport



Consumer Engagement & Brand Protection



Ticketing

# RAIN RFID and NFC are complementary



**em** | **echo**  
RAINFC Dual Frequency



Product Cloud

# How Does RAINFC Technology Work – RAIN RFID Use Cases



## 1. Production Site

- a. Raw Materials Management
- b. Birth of product
- c. Goods Dispatch

## 2. DC / Warehouse

- a. Goods Receiving
- b. Picked and Packed Items
- c. Goods Dispatch

## 3. Store

- a. Goods Receiving
- b. Inventory Counting
- c. Loss Prevention & Automated Checkout

Supply Chain Management

Inventory & Stock Management

In-store Operations



# How Does RAINFC Technology Work – NFC Use Cases



## 1. In Store

- a. Product information, story telling, product associations
- b. Virtual sales assistant
- c. Enables store analytics on layout, consumer engagement patterns, etc.

## 2. In Store

- a. Virtual sales assistant with up-sell and cross-sell
- b. Smartphone-enabled self-checkout (“Tap & Go”)

## 3. At Home

- a. Assembly instructions & videos
- b. Ordering spare parts
- c. Omni-channel sales platform for online orders

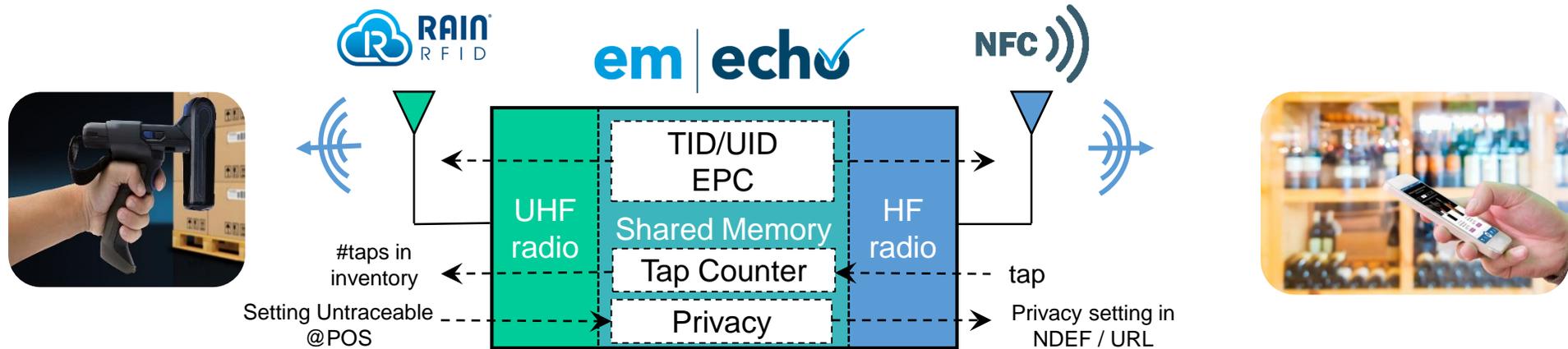
Pre-Purchase Consumer Engagement

Sales Process

At Home

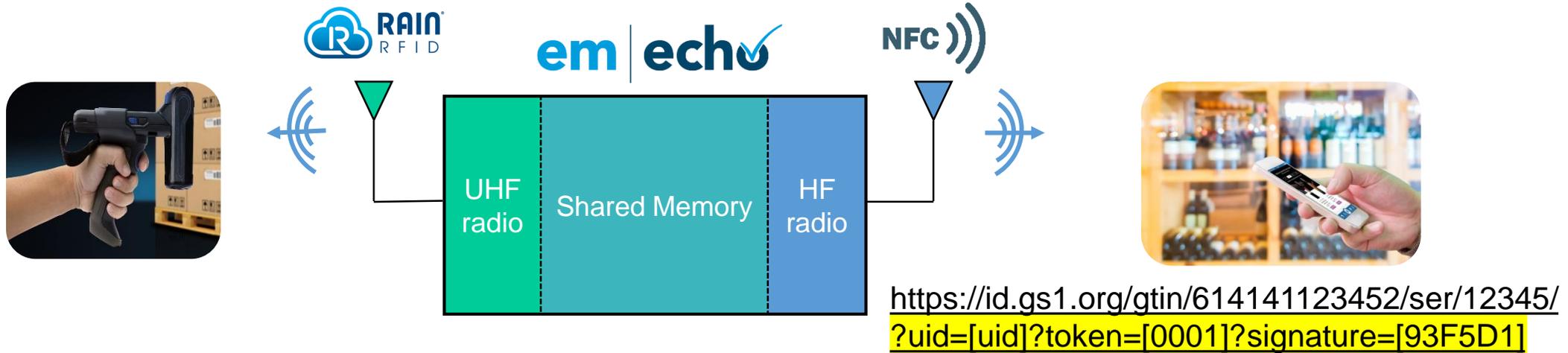


# The RAINFC Shared Memory Concept



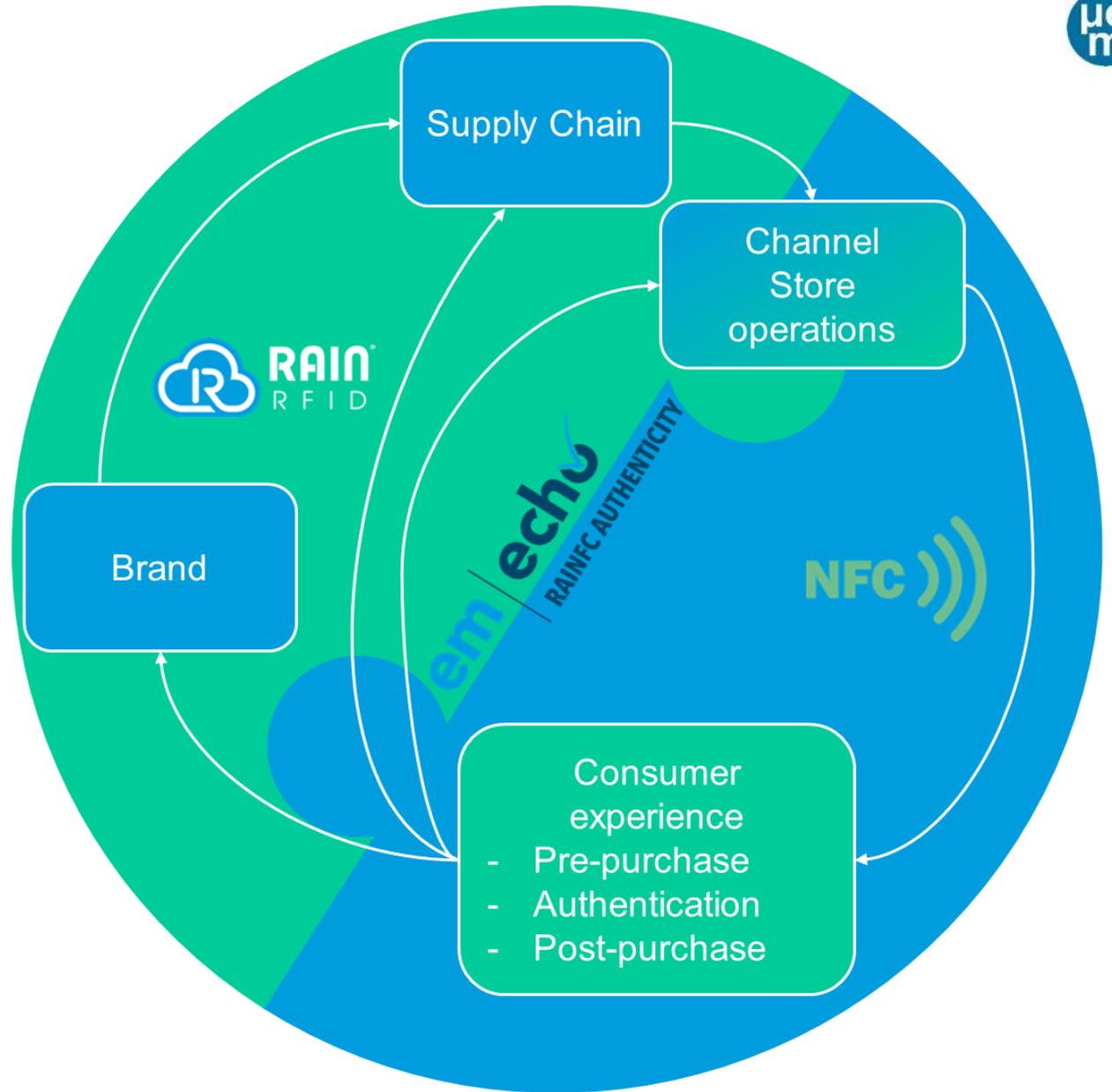
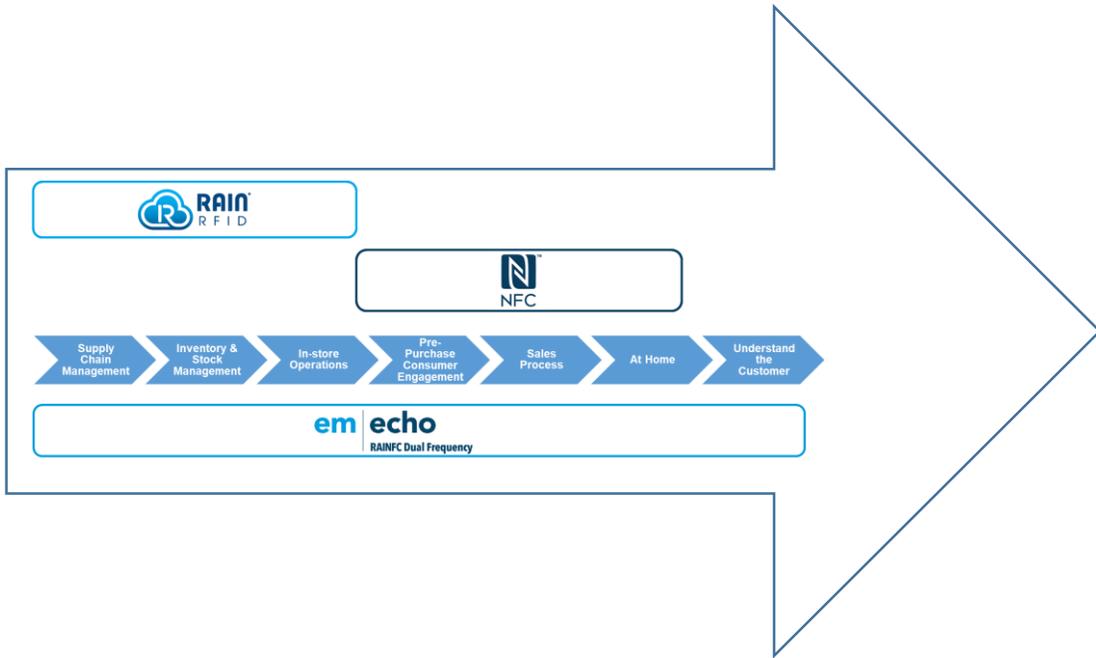
- Shared EPC code
  - Consistent identification of each item through either interface
  - NFC read-out using GS1 Digital Link Standard <https://id.gs1.org/gtin/614141123452/ser/12345/>
- Consumer engagement “tap” counter read by RAIN RFID inventory management
  - Enables advanced store and consumer behavior analytics
- EPC Gen2v2 privacy settings included in NFC NDEF message
  - Providing differentiated pre-purchase / post-purchase consumer engagement content

# Additional Benefits



- Full tag personalization using standard RAIN RFID printers/encoders
  - One-step RAIN encoding is the most cost-effective way to deploy NFC technology
- A highly optimized AES-128 hardware cryptographic engine
  - Best-in-class secure web-authentication capability for brand protection applications
- Smartphone-based NFC read range beyond 2" on standard retail labels
  - Superior user experience (UX) vs other NFC products in the market thanks to NFC Type-5

# Moving to a 2D Supply Chain



Control logistics flow through sales channels



Prevent grey market

In-store mobile shopping assistant

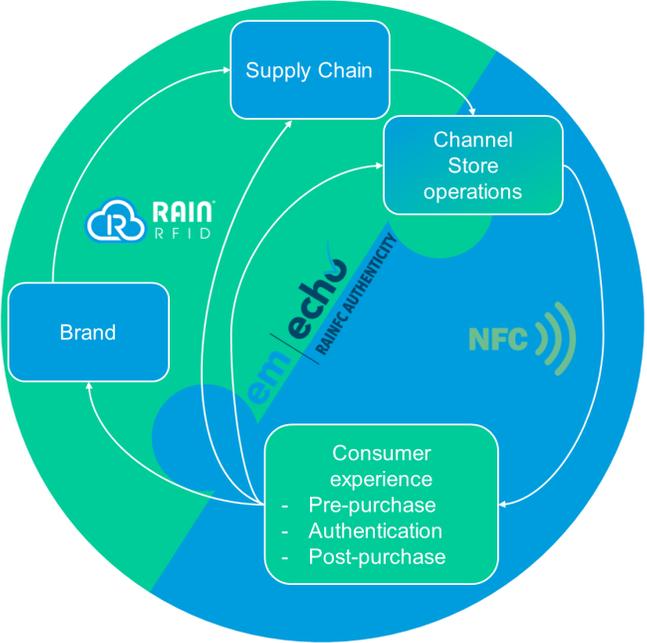


Warranty registration



Order accessories, service, appointments

Cross-sell, upsell



Enable omnichannel shopping



Product information and story-telling



Product and channel authentication

1. RAIN RFID enables inventory accuracy improvement from ~75% to >95% resulting in up to 15% sales uplift
2. RAIN RFID enables significantly (>10%) lower working inventory
3. RAIN RFID inventory accuracy enables you to turn your store locations into individual fulfilment centers
4. NFC-enabled “Endless Aisle” gives shoppers autonomy when store assistants are unavailable or lack training – less than 50% of consumers are satisfied with stores’ ability to explain products, while more than 4/5 are willing to pay more for great customer experience
5. NFC “Tap & Go” self-checkout allows shoppers to skip the queue – retailers lose hundreds of millions of shopping transactions due to queuing before the pandemic
6. RAINFC, through its shared product identity, builds consumer trust through product and channel authenticity and transparent privacy management
7. RAINFC is the most cost-effective way of deploying RAIN + NFC or NFC on top of RAIN, thanks to optimized tag hardware, one-step inlay assembly and one-step label encoding.

- End-to-end product lifecycle management enables a sustainable circular economy
- Product and channel authenticity enables trusted holistic omni-channel sales models
- RAINFC enables retailers and brands to thrive in the current and post-pandemic world



em microelectronic

A COMPANY OF THE **SWATCH GROUP**

empowering connected things

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**ultra-low power.  
time accuracy.**



- Single-chip
- Shared memory → enable synergy
- Cost-effective
  - Optimized IC platform
  - 1 step assembly
  - 1 step tag encoding
- Fully backwards-compatible with existing RAIN RFID infrastructure
- Improved EPC privacy feature

- Use the existing RAIN RFID infrastructure: readers, encoders, printers, middleware...
  - ... while accessing additional budgets:
    - Consumer engagement
    - Marketing
    - Anti-counterfeit
    - Environmental compliance
- No need to train the personnel
- Target only the relevant subset of the tag population
- Pilot, deploy or roll back anytime within your normal operational setup