

# RFID JOURNAL LIVE!

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## **Integrating RFID into Manufacturing Processes and Systems**

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ST Microelectronics

Business Development/Technical Marketing NFC/RFID

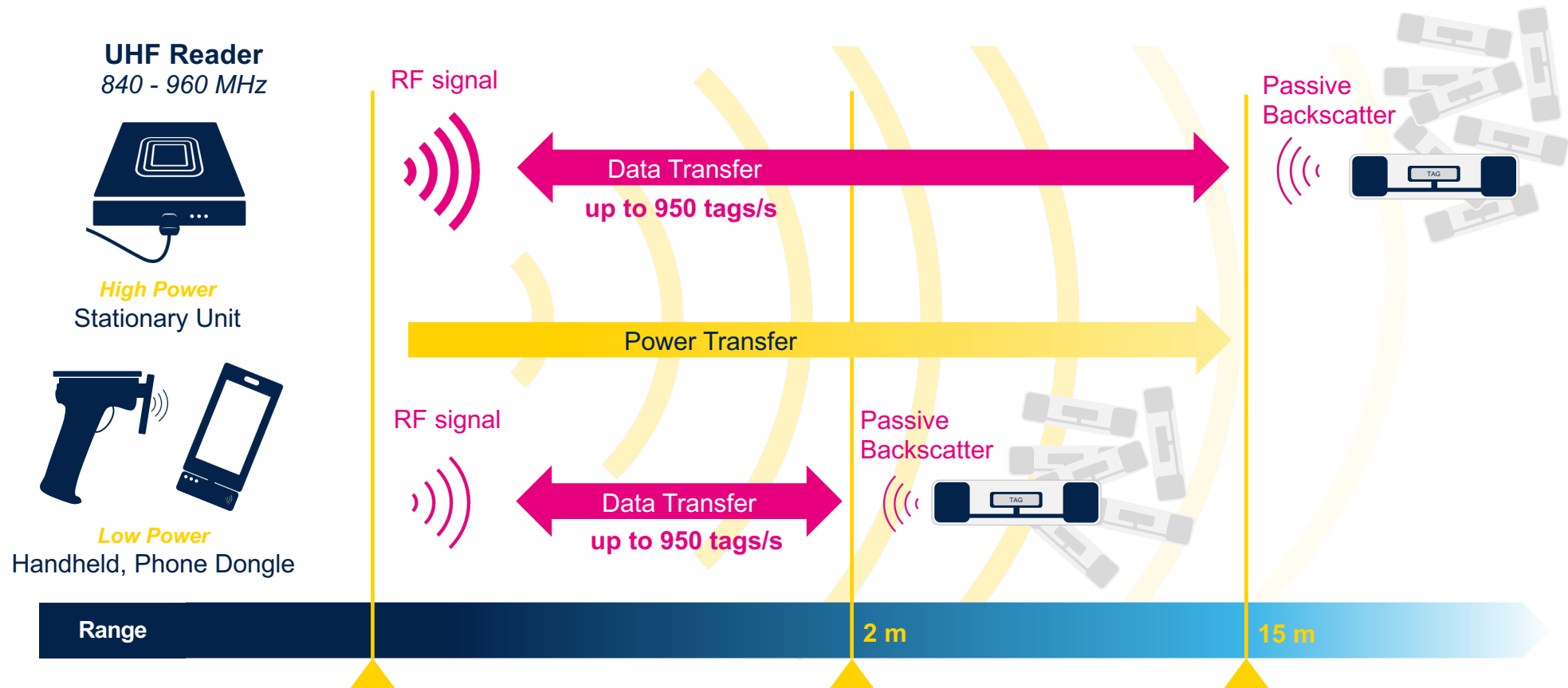


RFID	LF	HF	UHF
<b>Coupling mode</b>	Inductive	Inductive	Electro-magnetic backscatter
<b>Operating frequency</b>	125kHz – 134kHz	13.56MHz	860MHz – 960MHz
<b>Antenna</b>	Coil	Coil	Dipole
<b>Max operating distance</b>	up to 1m	Vicinity: up to 1m Proximity: up to 10cm	~10m
<b>Regulation</b>	Worldwide harmonized	Worldwide harmonized	Different regulations per country
<b>Standards</b>	ISO14223 ISO18000-2	ISO14443 A/B ISO15693 ISO18092 ISO18000-3 NFC Forum	ISO18000-6 B/C EPC Class 1 Gen 2 RAIN RFID
<b>Environmental influences</b>	Small influence on operating distance Works in metal and industrial environment	Small influence on operating distance Works in metal and industrial environment	Influence on operating distance by reflection and absorption (metal and liquids)
<b>Applications</b>	Animal tagging	Product identification Public transport / Libraries Access control / Payment	Pallets and container ID Retail / Logistics Authentication
<b>ST solutions</b>			

## RFID Comparison With Other Wireless Technologies

Feature	NFC	UHF/RAIN	BTLE	Wifi	ZigBee
Base station cost (incl. reader)	\$\$	\$\$\$\$	\$\$\$	\$\$\$	\$\$\$
Receiver cost (tag)	\$\$	\$	\$\$\$	\$\$\$	\$\$\$
Passive receiver	Yes	Yes	No	No	No
Current consumption receiver	<0.1mA <i>passive</i>	<0.1mA <i>passive</i>	15mA	>100mA	15mA
Multipoint connection	No	Yes	No	Yes	Yes
User setup required	No	No	Yes	Yes	Yes
Typical number of receivers	1~5	>1000	~7	1~1000	32
Typical range	0.1m	1-15m	1-10m	1-100m	1-300m

A UHF system typically comprises a **few readers** and **many tags**



Ideal for battery operated handheld or stationary devices

## UHF solution

Suitable for Hand-held readers, stationary readers,  
Embedded readers and mobile UHF RFID readers

**Dense Reader Mode**  
for Battery Handheld

**Fast Moving Consumer Goods**

ST solutions



- UHF Reader

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## Tools & Inventory Management

Ensure availability of tools and planning certainty by automated tracking of tools and machinery as well as of the stock of inventory and goods.



## Process Optimization

Monitor manufacturing processes and supply routes to optimize machine usage or downtimes and to prevent traffic jams and bottlenecks within the factory.



## Condition Monitoring

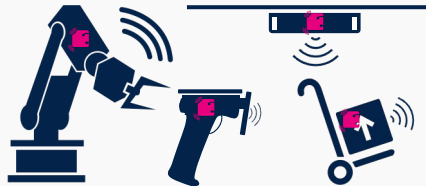
Track and record environmental conditions of your products at production and in storage to ensure a correct handling.



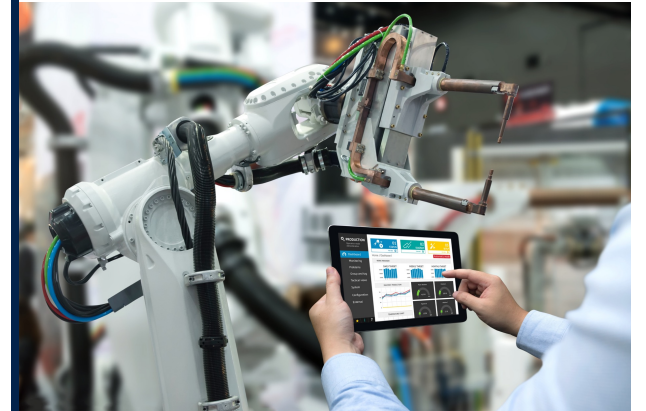
## Smart Sensing

Use battery- and wireless sensor tags to monitor various parameter and conditions of tools, goods or machinery with a simple and quick setup.

UHF reader  
with ST25RU



UHF tags  
third party







## Inventory Management

Manage the check-out and replenishment of medication. Automate processes and ensure stock of critical inventory.



## Safer Patient Care & Tracking

Avoid incompatible cross medication with UHF enabled safeguards. Track the movement and location of patients with special needs to ensure their safety.



## Access Control

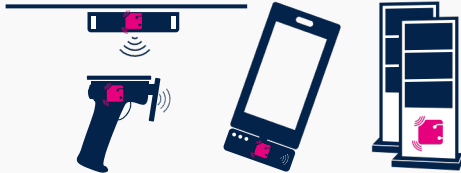
Secure critical premises like storage or emergency rooms while ensuring automatic and remote opening of doors for patient beds or medical equipment.



## Asset Management

Manage storage, maintenance, utilization tracking and access to assets.

UHF reader  
with ST25RU



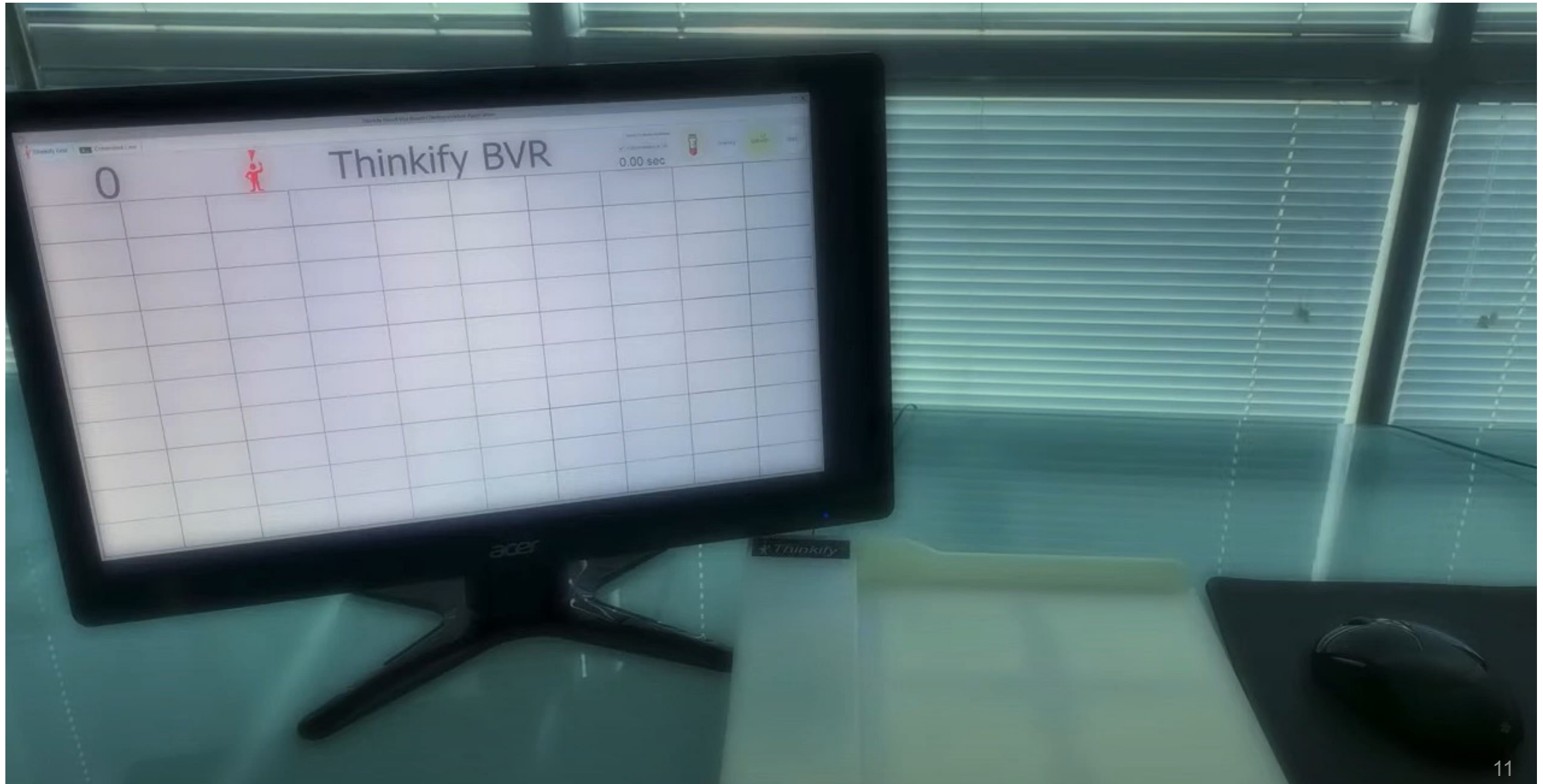
UHF tags  
third party





# UHF RFID Medical Tracking Example

Courtesy Thinkify <https://thinkifyit.com/>







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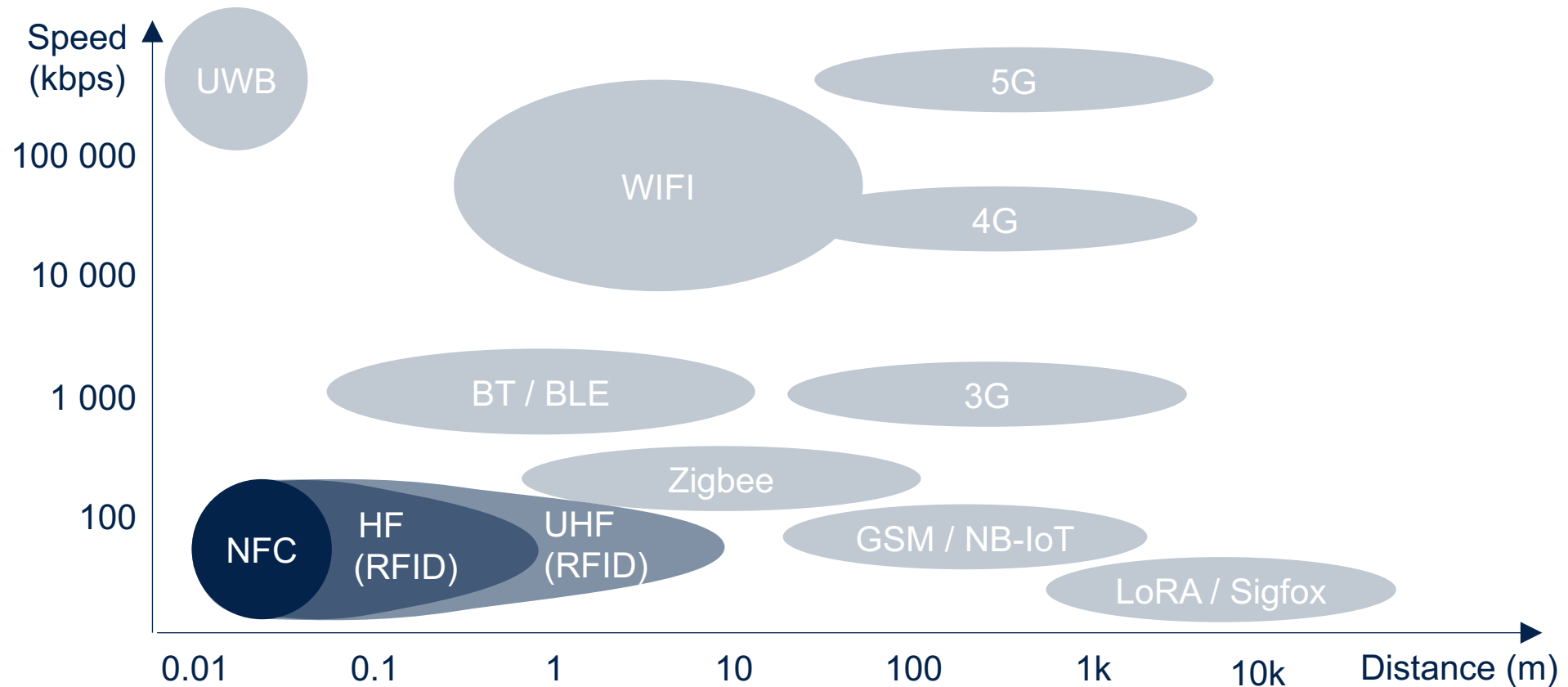
## NFC technology at a glance



- Near Field Communication, a **short range** wireless technology
  - Operating at **13.56MHz**
  - Based on the RFID HF standard (ISO14443 & ISO15693)
- **Interactive** and **zero power**, enabling convenient connection to the Internet of Things  
➔ **NFC-enabled mobile phone can engage with items by a simple tap**
- NFC is developed by the NFC Forum
  - **Interoperability** between devices
  - **Standardized** use cases (web link, Bluetooth handover,...)
- Fast growing deployment in Mobile phone
  - In 2022, more than 75% phones to come with NFC
  - NFC is used for Mobile payment (EMVco) like ApplePay
  - Apple added in 2017 support of NFC reader mode from iOS11 onward and support of NFC writer mode from iOS13 in September 2019



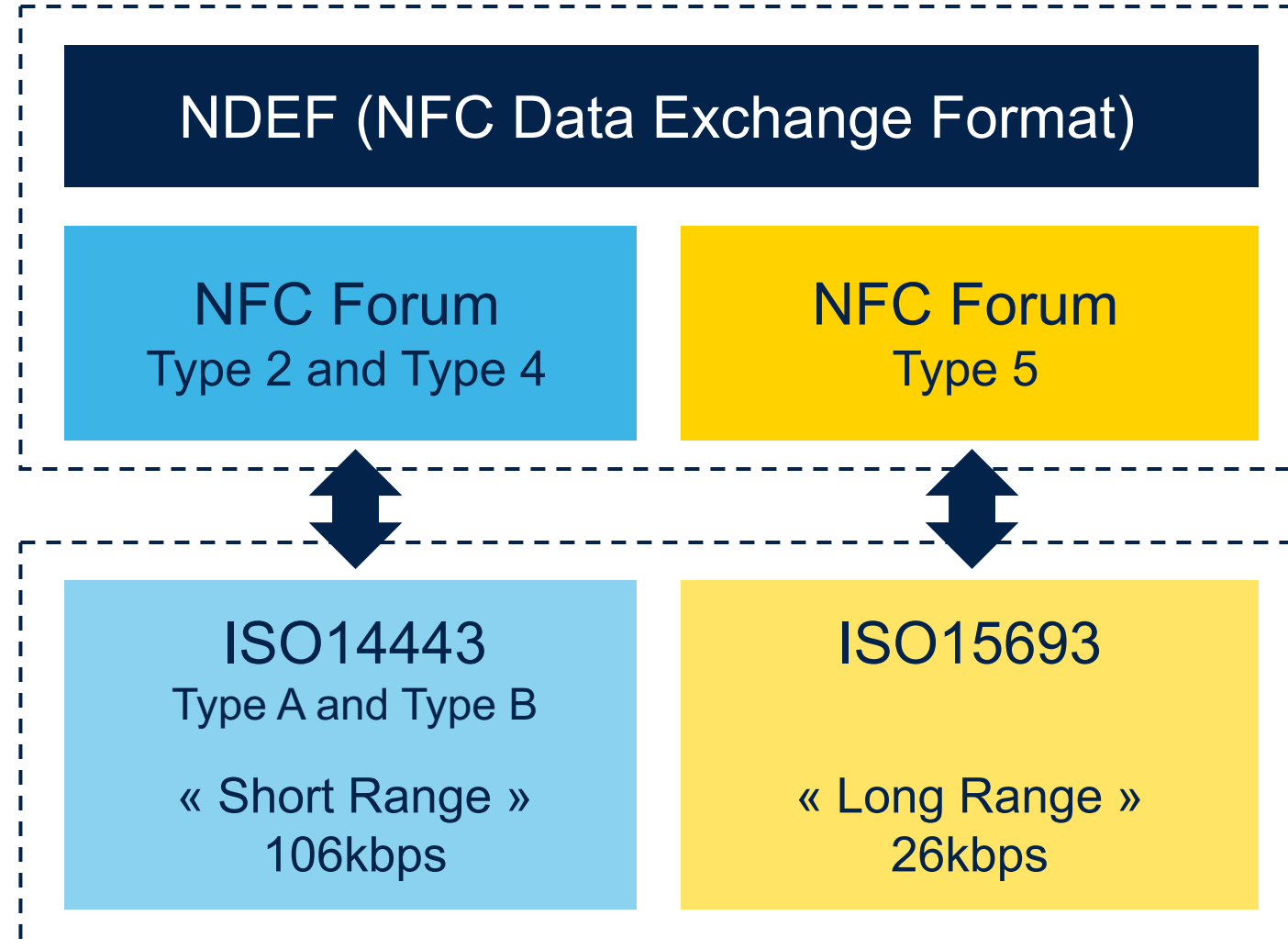
**NFC is unique in the wireless spectrum: Short distance,  
Low data-rate & Zero power consumption for the application**



NFC specification  
→ Upper layer SW

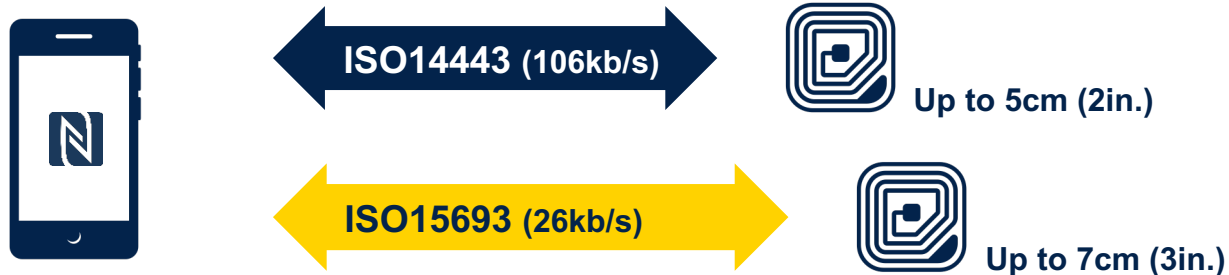


RFID HF ISO standards  
→ HW / SW protocol





## NFC Phones



## RFID Readers



- ISO14443 (NFC Forum Type 2 & Type 4) is called « **short range** » standard while with higher RF speed
- ISO15693 (NFC Forum Type 5) is called « **long range** » standard

Consumer engagement, Asset tracking, Ticketing, Brand protection, Access control, Gaming...

[www.st.com/st25t](http://www.st.com/st25t)

Tags



ST25T



13.56MHz



NFC phone / RFID Reader

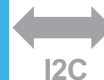
Industrial, Lighting, Metering, Motor control, Consumer, Appliance, Healthcare...

[www.st.com/st25d](http://www.st.com/st25d)

Dynamic tags



STM32  
microcontroller



ST25D



13.56MHz



NFC phone / RFID Reader

POS & mPOS terminals, Automotive, Access control, Gaming, Reader+Tag...

[www.st.com/st25r](http://www.st.com/st25r)

Readers



STM32  
microcontroller



ST25R



13.56MHz



NFC phone

or



or



## Consumer engagement & brand recognition with Cloud management



Branding and Consumer Engagement

Product identification with enriched information

Identity check using TruST25 digital signature

Tamper detect for open-close detection

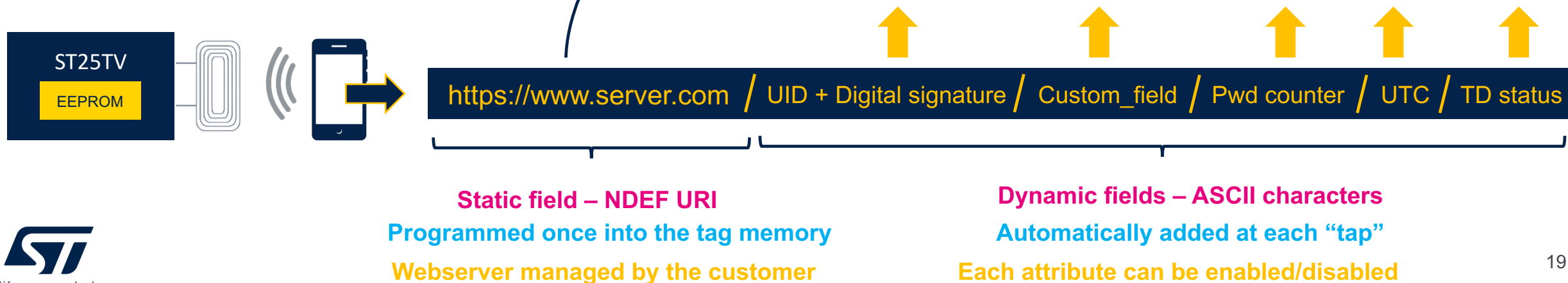
ST solutions



• Tag

## Advanced NDEF message services

- The Augmented NDEF feature is a contextual automatic NDEF message service, allowing the tag to respond dynamic content without an explicit EEPROM update.
- Native operation : no mobile application required !



## Enhanced logistic operations

**Add relevant information onto your NFC / RFID tag**

Information will be protected by passwords

**Up to date information**

Up-date the electronic label whenever necessary

**Combined benefits of RFID & NFC technologies**

ST solutions



- Tag
- HF Reader



## Save time on your production lines

**From DIP switch / resistor to contactless setting**  
Get rid of manual operation

**In the Box “programming”**  
Simple & flexible

**Upload new setting to powered off devices**  
Personalize your boxed devices on the production belt

ST solutions



- Dynamic Tag

## Real-time communication and in application programming

**Fast Transfer Mode with 256 Byte buffer**  
for data synchronization and Firmware update

**Manage your stock efficiently**  
With easy reconfiguration of boxed products

**Convenient access to the embedded device**  
For diagnostic and re-programming

ST solutions



• Dynamic Tag



## Brand recognition and parameters setting



### **NFC for accessory identification**

Convenient and reliable brand identification

### **Automatic System configuration**

Upon accessory type recognition

### **Brand Recognition**

Ensure only branded accessory are used

ST solutions



- Tag
- Dynamic Tag
- HF Reader

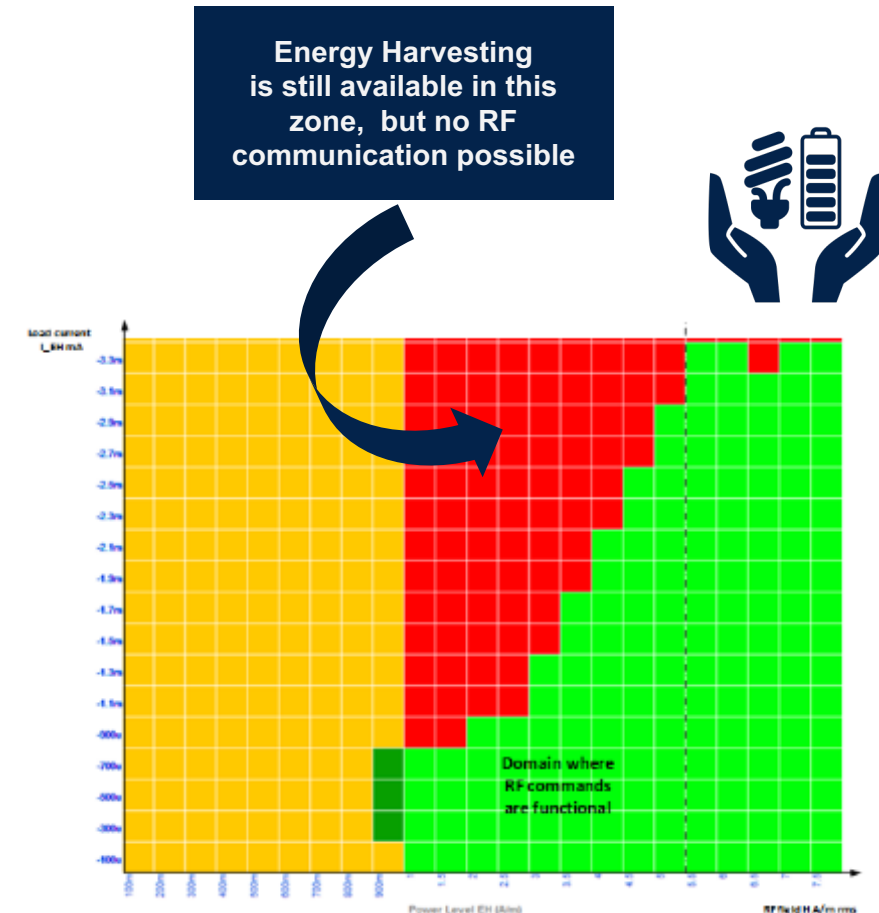
## • How much power can I get?

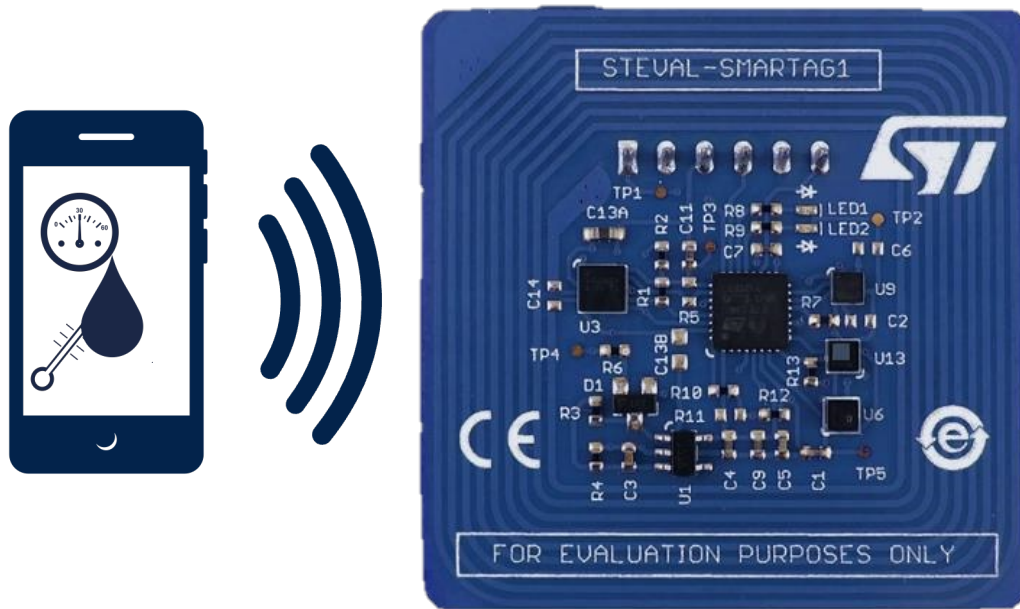
- Reader's **AM= 100%** (NFC Forum & ISO15693)

H_EH	A/m rms	1	1,5	2	2,5	3	3,5	4	4,5	5
V_EH	V	3,25	3,25	3,2	3,15	3,1	2,99	3,05	3,13	3,31
I_EH	mA	0,7	0,7	0,9	1,1	1,3	1,9	2,1	2,7	3,1
P_EH	mW	2,275	2,275	2,88	3,465	4,03	5,681	6,405	8,451	10,26

- Reader's **AM= 10%** (ISO15693)

H_EH	A/m rms	1	1,5	2	2,5	3	3,5	4	4,5	5
V_EH	V	3,25	3,25	3,2	3,15	3,1	2,99	3,05	3,13	3,31
I_EH	mA	0,7	0,7	0,9	1,1	1,3	1,9	2,5	3,3	4,3
P_EH	mW	2,275	2,275	2,88	3,465	4,03	5,681	7,625	10,33	14,23



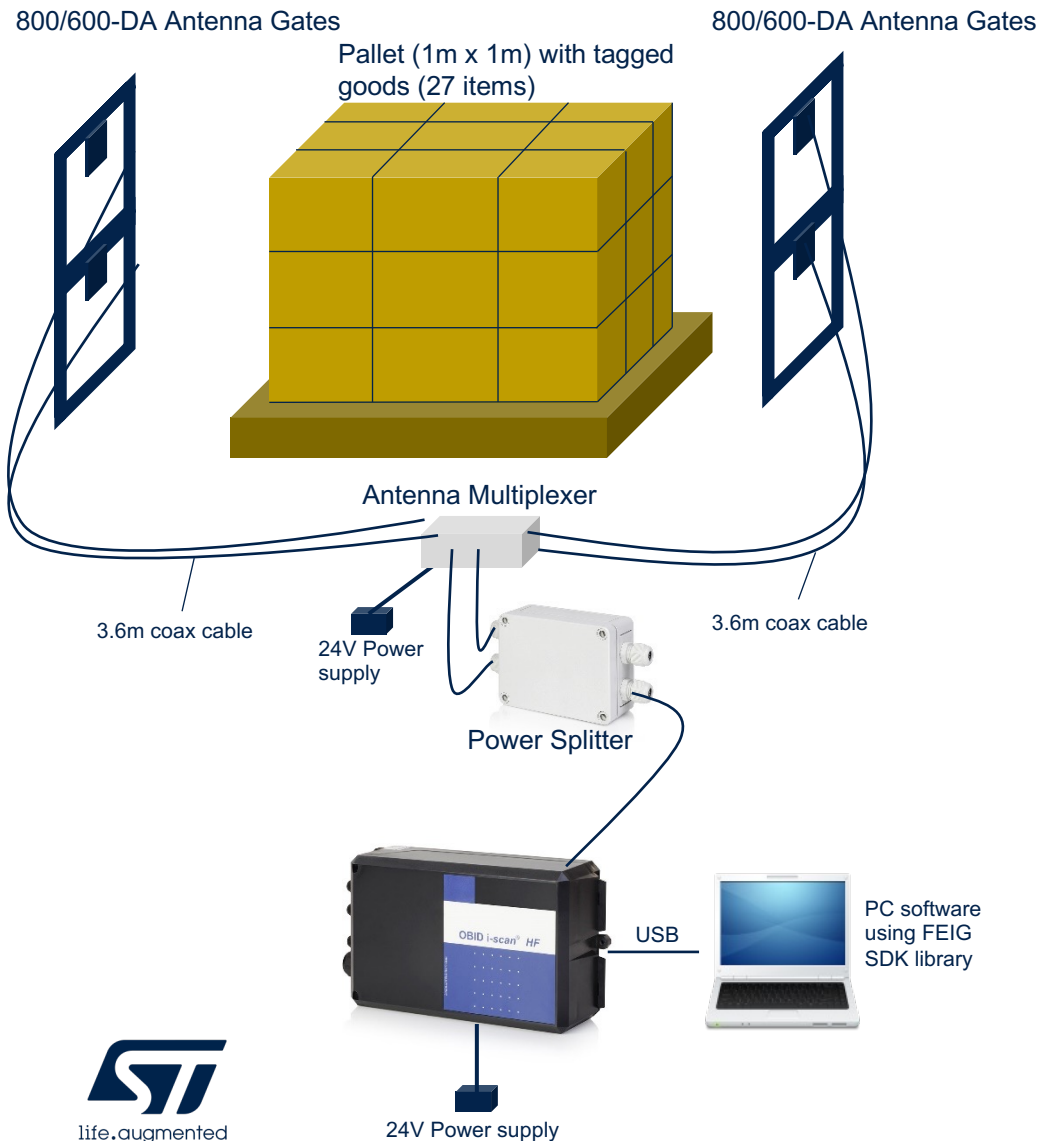


STEVAL-SMARTAG1

## NFC Sensor Tag

- **ST25DV64K** dynamic NFC tag
- STM32L0 ultra-low-power MCU
- LIS2DW12 three-axis linear accelerometer
- LPS22HB piezo-resistive pressure sensor
- HTS221 humidity and temperature sensor
- 40x40mm 8 turns antenna
- Optional CR2032 battery

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- Use cases
  - Inventory + parameters setting using RFID/NFC on a large volume (1m x 1m x 1m (3 feet 3 inches x 3 feet 3 inches x 3 feet 3 inches))
  - Firmware upgrade (for devices stocked for a long time)
- Benefits
  - Taking advantage of the presence of HF in the final products (for parameters settings, consumer engagement in the field etc.) for quick configuration at warehouse or before shipment to final customer's location.

- Pallet + 27 boxes (30x20x20cm)
- 27 x ST25DV-I2C Disco kits Ant\_C1
- Reader LR2500
- 2 x 2 antennas (80x60 cm)
- Feig SDK
- Distance between antennas 110cm

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THANK YOU

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