*Powering the trusted identities of the world's people, places & things*

# Beyond Payment:
Secure NFC applications and their relation to RFID

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# About HID Global

- Privately held company and an ASSA ABLOY Group brand

- Headquartered in Austin, TX

- 2,500+ employees worldwide

- International offices that support 100+ countries

- Production facilities in U.S., South America, Asia and Europe

- Primary brands include ActivID®, EasyLobby®, FARGO®, IdenTrust®, LaserCard®, Lumidigm®, Quantum Secure, Bluvision®

- Serves a variety of markets:  PACS (physical access control), LACS (strong authentication/credential management, card personalization, visitor management), Government ID and RFID technologies for a range of industrial applications

Leading the industry in security and sustainability

# HID Offering in RFID Tags www.hidglobal.com/rfid

- Top quality RFID tags, cards and inlays (prelaminates)
- Frequency agnostic - LF, HF and UHF to suit various applications, incl. NFC

- 

- Swiss engineering combined with own Malaysian, fully automated, ISO 9001:2008 certified production ensures affordable top quality
- Custom design services help system integrators to create innovative or specialized RFID solutions across the world
- Examples:     **LF**          **HF incl.** NFC          **UHF** RAIN RFID

# What is NFC?

- Near field communication (NFC) is a set of standards for smartphones and similar devices to establish radio communication with each other by touching them together or bringing them into close proximity, usually no more than a few centimeters. - Wikipedia

# Positioning NFC within RFID

## (passive) RFID

**Low Frequency (LF)**

125 KHz (Industrial use)

134.2 KHz (Animal ID)

**High Frequency (HF)**

13.56 MHz

NFC™

Other, non-NFC data and command formats

**Ultrahigh Frequency (UHF)**

ETSI RFID / EU
(865 MHz - 868 MHz),
FCC RFID / US
(902 MHz - 928 MHz)

RAIN™ RFID

# NFC Operation Modes



**Card Emulation**

The NFC phone emulates a contactless card

- Payment
- Ticketing
- Access control

**Reader/writer mode**

The NFC phone reads or writes tags

- Read posters
- Interactive advertising
- Launch mobile internet, SMS or make a call

**Peer-to-Peer mode**

NFC devices can exchange data

- Setup Bluetooth / Wi-Fi
- Share business cards

# NFC Devices

- Smartphones

  ✔ Android, Windows Phone, Blackberry,
    + New in fall 2017: iPhone 7/8 + iOS11!

  ✖ iPhone 1-5 does not have NFC hardware,
    iPhone 6/7 and Apple Watch usable for
    payment only (iOS <11)

- Laptops or Desktop PC

  – Built-in or external reader

- Loudspeakers, headphones, cameras …

- Payment terminals, Door-locks

# NFC Tags

- Most standard HF tags can be used as NFC tag if data is stored on them in NFC forum compliant NDEF format

- There are currently 5 tag types defined by NFC Forum

- Being compliant to a NFC tag type provides interoperability with billions of NFC enabled devices

- Every NFC tag is also an (HF) RFID tag – but not vice versa!
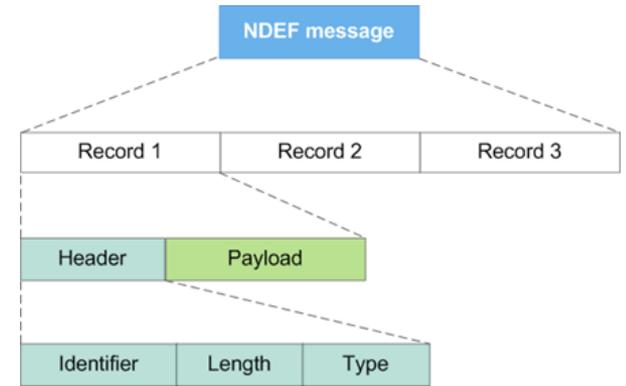
# Common NFC Tags - Chip overview

| Tag Type | Use Case | Chip Examples | User Memory (bytes)* | UID Length (bytes) | Cost |
|---|---|---|---|---|---|
| Forum Type 1 | Specialized | Innovision Topaz | 90 - 454 | 4 | $ |
| Forum Type 2 | Most common, low cost, single application like smart poster, personal label etc. | NXP MIFARE UL, MIFARE UL-C, NTAG 203, 210, 212, 213, … | 46 – 142 | 7 | $ |
| Forum Type 3 | Specialized, Asian markets | Sony FeliCa (Lite) | 224 – 3984 | 8 | $$$ |
| Forum Type 4 | High memory applications, high security (in non NFC mode) | NXP MIFARE DESFire EV1/EV2 -2K, 4K, 8K, Inside Secure VaultIC 151/161, NTAG 413 DNA, HID Trusted Tag™, … | 1536 - 7678 | 7 | $$$ |
| Forum Type 5 (NFC-V / ISO 15693) | If longer read range is required, industrial rugged tags – added as forum tag type June 17, 2015. | NXP ICODE SLIx family, EM4233, Fujitsu FRAM MB89R118C, MB89R112, HID Vigo™, … | 32 – 8192 (112 for ICODE SLIx) | 8 | $ - $$$ |
| *MIFARE Classic / EV1* | *Very common, high memory Not compatible to all devices!* | *NXP MIFARE Classic EV1 1K, 4K, MIFARE Plus, …* | *716 - 3356* | *4 or 7* | *$$* |

# Common NFC Tags – Device Compatibility

| Tag Type | Android 4 | Android 5+ | Windows 10 | iPhone 1-6 | iPhone ≥ 7 with iOS ≥ 11 |
|---|---|---|---|---|---|
| **NFC Forum Type 2:** MIFARE UL, NTAG 2xx | 🙂 | 🙂 | 🙂 | ☹️ | 😐 No writing to tag |
| **NFC Forum Type 4:** MIFARE DESFire EV1/2 VaultIC, HID Trusted Tag™, NTAG 413 DNA | 🙂 | 🙂 | 🙂 | ☹️ | 😐 No writing to tag |
| **NFC Forum Type 5:** ICODE SLIx family | 🙂 | 🙂 | 😐 No formatting (read NDEF only) | ☹️ | 😐 No writing to tag |
| **NFC Forum Type 5:** Non-ICODE SLIx chips e.g. EM4233, Fujitsu MB89Rxxxx, HID Vigo™ | 😐 No formatting (read NDEF only) | 🙂 | 😐 No formatting (read NDEF only) | ☹️ | 😐 No writing to tag |
| **MIFARE** *Classic / EV1* | 😐 Selected devices e.g. Galaxy S3 | 😐 Selected devices only | 😐 No formatting (read NDEF only) | ☹️ | ☹️ |

# NFC / NDEF Security

- NDEF NFC data is clear text with optional write protection only
  - Encryption requires a dedicated App

- Optional signature record type (SRT) 2.0 can be appended to identify author of NFC data
  - Requires few hundred bytes extra memory and PKI certificates
  - Does not prevent data to be copied & data remains in clear text

- Secure Element (for Card Emulation mode)
  - Hardware options complex to use and inconsistent
  - Software option – Host Card Emulation (HCE) from Android 4.4 and Windows 10 onwards



NDEF message

| Record 1 | Record 2 | Record 3 |

| Header | Payload |

| Identifier | Length | Type |

NFC FORUM

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# How most NFC Tags are used

- **Option 1:**
  Constant URL stored on Tag, Write locked
  - All tags have the same URL
  - Upon tap, the NFC phone will open its browser and access the URL provided by the tag

[URL]
www.service.com

- **Option 2:**
  URL Combined with Tag UID, Write locked
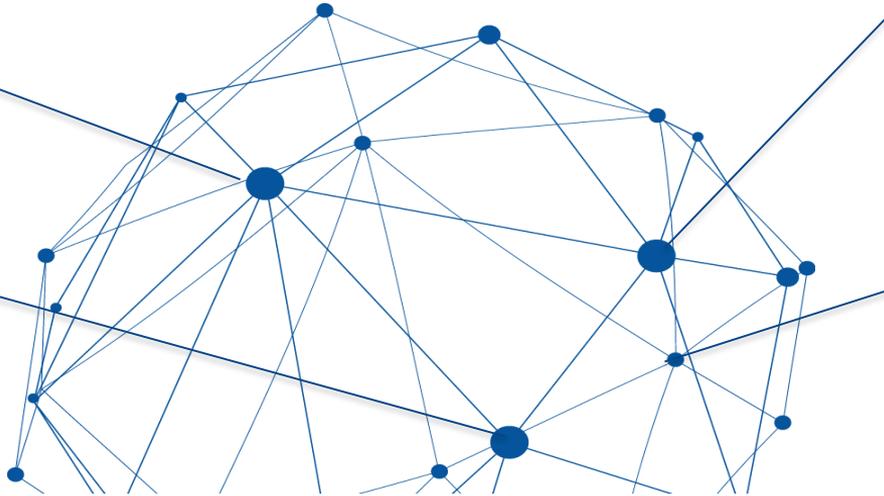  - URLs unique by tag, but may be copied
  - Upon tap, the NFC phone will open its browser and access the URL provided by the tag with UID as parameter

[UID]                    [URL]
03 B4 25 FF A1 35 80     www.tag.com

[URL+UID]
www.service.com?03 B4 25 FF A1 35 80

# Current uses focus on "convenience"



[URL]
www.service.com

[URL]
www.service.com

# How to „Hack" a NFC tag

- **Option A:**
  Copy the tag
  – Use one of many free NFC apps from App Stores
  – Read Tag 1 copy content to Tag 2

- **Option B:**
  Remember the URL
  – Bookmark the URL after the first tap in your browser
  – or publish/retrieve it from Social media sites etc.
  – The server will not notice a difference from a tapped tag!

- *For some use cases this is critical, for others not*

[URL]
www.service.com

[URL]
www.service.com

[URL+UID]
www.service.com?03 B4 25 FF A1 35 80
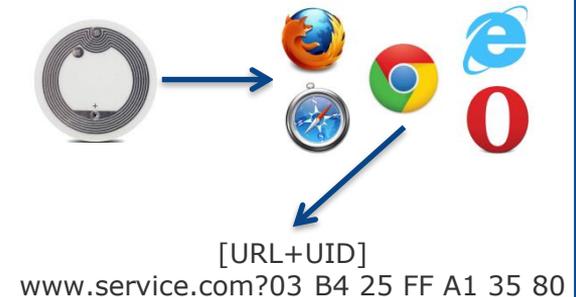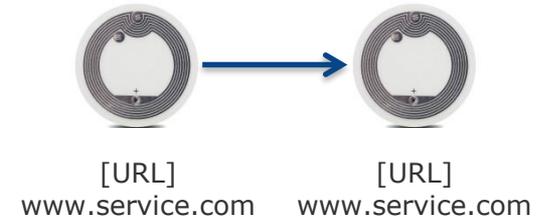
# Benefits of Frictionless Trust



| Frictionless | Trusted |
|---|---|

**Frictionless Benefits:**
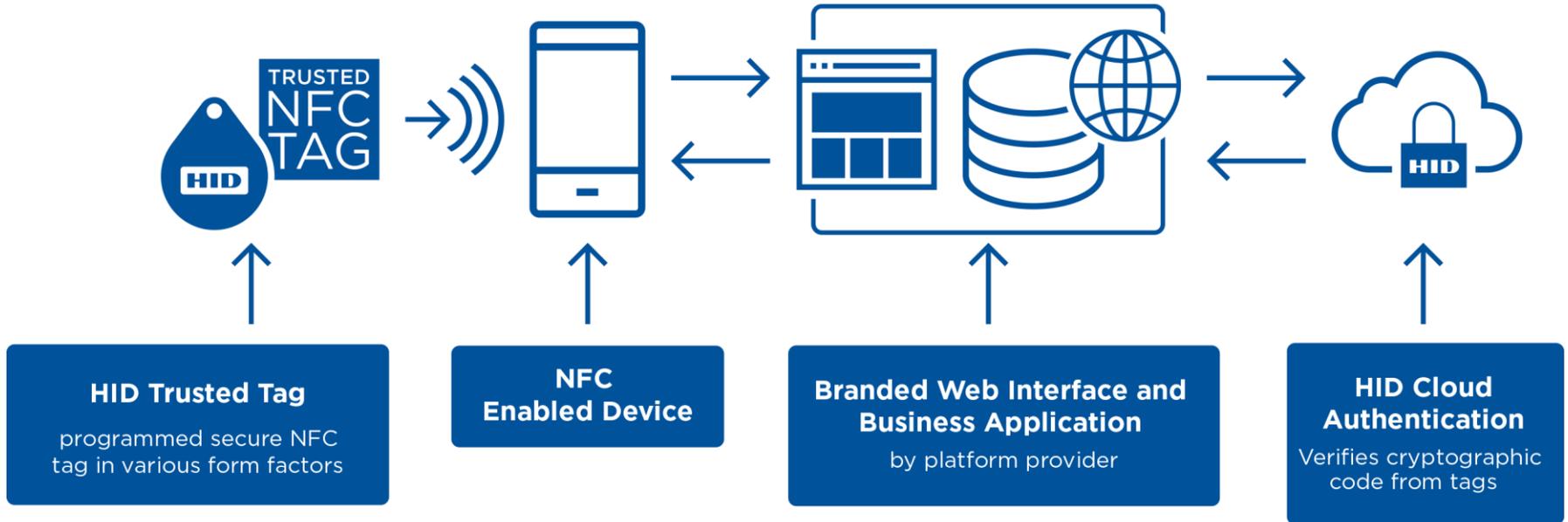
- Easy customer adoption
- Simple integration

**Trusted Benefits:**

- Unclonable Tags
- Proof of Presence

# HID Trusted Tag® Services Overview



**HID Trusted Tag**
programmed secure NFC tag in various form factors

**NFC Enabled Device**

**Branded Web Interface and Business Application**
by platform provider

**HID Cloud Authentication**
Verifies cryptographic code from tags

# How Trusted Tag works



| | | |
|---|---|---|
| **Tap** | **http://...ABCD** | ✔ |
| **Tap** | **http://...7635** | ✔ |
| **Refresh** | **http://...7635** | ✖ |
| **Tap** | **http://...B423** | ✔ |

HID Trusted Tags are NFC Forum Tag Type 4 compliant and work with any NFC forum compatible device without requiring special apps!

# Trusted NFC Use Cases

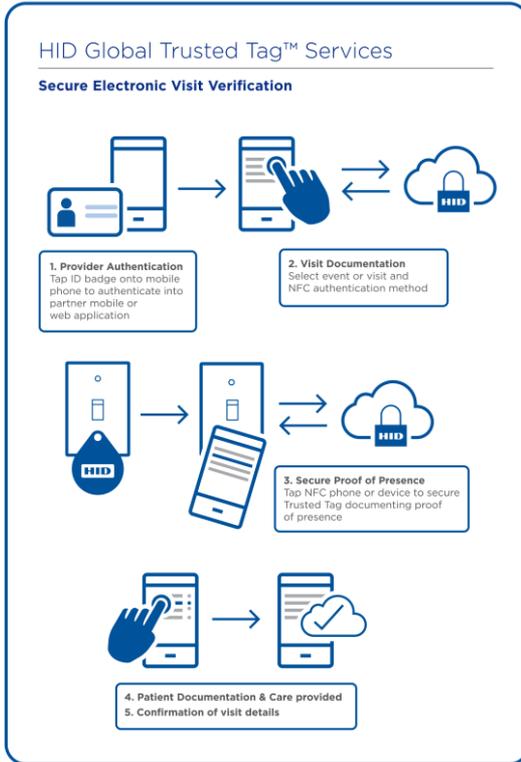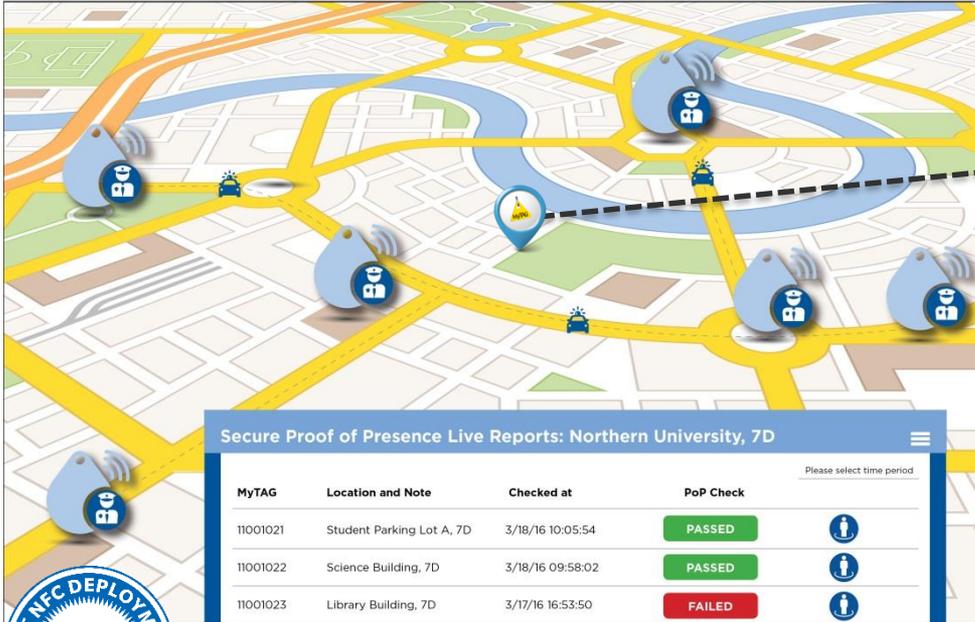| Authenticity | Trusted Transactions | Secure Proof of Presence |
|---|---|---|
|  |  |  |
| Prevent counterfeiting and warranty fraud while also engaging the consumer | Controlled Sweepstakes, loyalty point issuance, small data analytics | Proving that a person is where they said they were |

# Trust care is delivered & billed accurately



HID Global Trusted Tag™ Services

**Secure Electronic Visit Verification**

**1. Provider Authentication**
Tap ID badge onto mobile phone to authenticate into partner mobile or web application

**2. Visit Documentation**
Select event or visit and NFC authentication method

**3. Secure Proof of Presence**
Tap NFC phone or device to secure Trusted Tag documenting proof of presence

4. Patient Documentation & Care provided
5. Confirmation of visit details

**Nurse's ID Badge**

**+**

**NFC Enabled Phone**

**+**

**Trusted Tag securely mounted in patients home**

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# Trusted Guard Tour and Keys



**Secure Proof of Presence Live Reports: Northern University, 7D**

| MyTAG | Location and Note | Checked at | PoP Check | |
|---|---|---|---|---|
| 11001021 | Student Parking Lot A, 7D | 3/18/16 10:05:54 | PASSED | |
| 11001022 | Science Building, 7D | 3/18/16 09:58:02 | PASSED | |
| 11001023 | Library Building, 7D | 3/17/16 16:53:50 | FAILED | |

Live reporting on Proof of Presence

Verified via HID Trusted Tag®

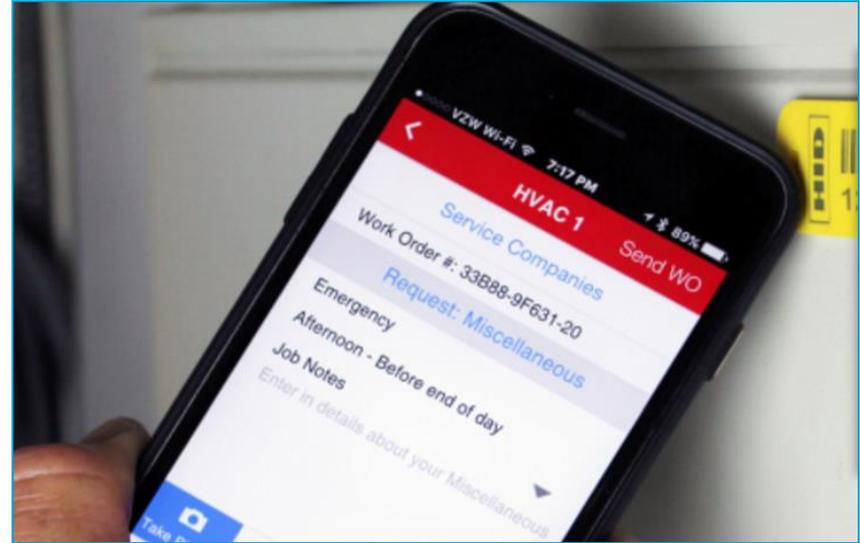Real, precise location (inside building)

Full history

No cloning / fake logs possible

Management of physical keys
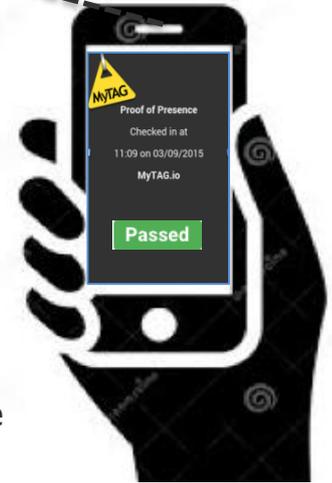
# Streamline Maintenance & Inspection





- Improve efficiency with relevant & historical data
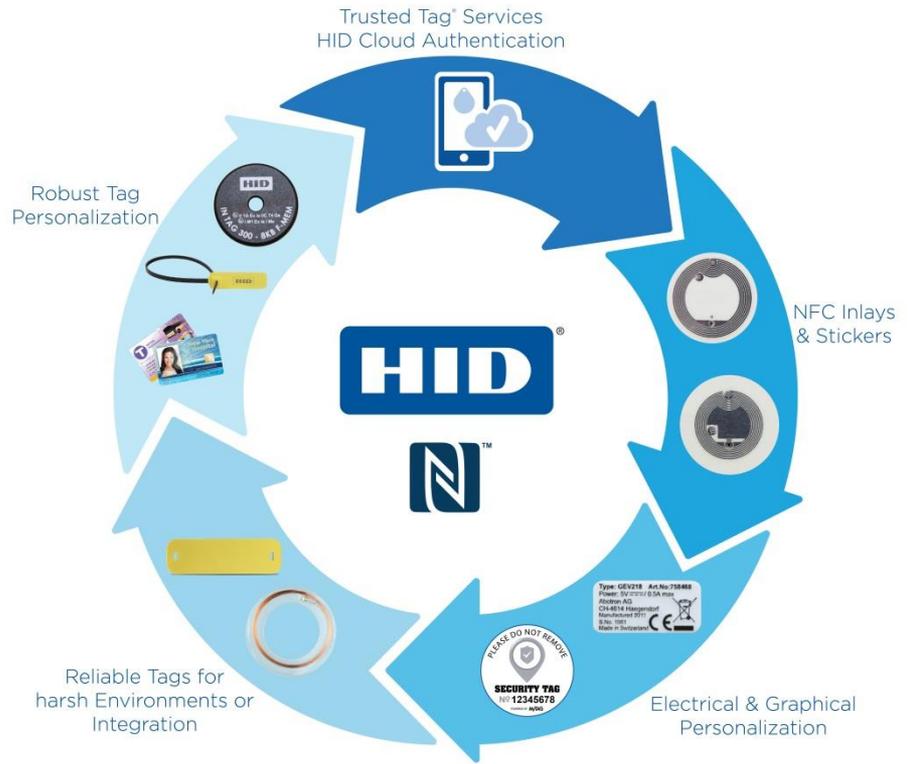- Secure audit trails to comply with city ordinance

- Physically link equipment to Computerized Maintenance Management Systems (CMMS)
- Field technicians are going mobile

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# Mobile Access

- NFC Card Emulation mode may be used to authenticate against existing access control infrastructure

- Bluetooth (BLE) may be used as alternative to NFC

  + Supports all modern devices incl. iPhone

  – Requires BLE enabled door locks



Keys and access cards in daily life → Converged into NFC-enabled smartphone → Used to open different types of doors and Windows®

# The right NFC Tag for every use



Trusted Tag® Services
HID Cloud Authentication

Robust Tag
Personalization

NFC Inlays
& Stickers

Reliable Tags for
harsh Environments or
Integration

Electrical & Graphical
Personalization

# Questions and Answers

# HID
## Powering
## Trusted Identities

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