NFC IN CONSUMER ELECTRONICS AND HOME APPLIANCES

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NXP

SECURE CONNECTIONS
FOR A SMARTER WORLD

AGENDA

- What is NFC?
- Use cases
  - Parametrization
  - Diagnosis
  - Enhanced GUI
- Product portfolio & support

01.
What is NFC?

NFC

- NFC is a contactless short range technology, based on inductive coupling (10cm / 4 in)
- Operating frequency 13.56MHz, speed < 848 kbits/s
- Co-invented in 2002 by NXP and Sony
- NXP is NFC market leader (80% share in POS terminals, 82% NFC tags share)

Big reasons to consider NFC

More intuitive than any technology
It's like shaking hands

Use Power Very Efficiently
Only one of the two devices needs to be powered

Trusted addition to other technology
Especially for pairing devices

RFID, proximity cards and NFC

RFID

Generic term for
contactless technology

Wide reading range
(few cm to several meters)

Standardized in
ISO/IEC 18000

Proximity cards

Subset of RFID
HF 13,56 MHz

Short reading range
(few cm)

Standardized in
ISO/IEC 14443

NFC

Adds a **two-way** communication
between NFC-enabled devices

NFC-enabled device can behave as
a contactless smartcard

Standardized in
ISO/IEC 18092 and **ISO/IEC 21481**

Act of will ("Tap to initiate an action") • Zero-power • Highest Security

Different possibilities of NFC interaction

An NFC device can interact with …

… any NFC tag or card

… any NFC-enabled smartphone

… any other NFC-enabled embedded system
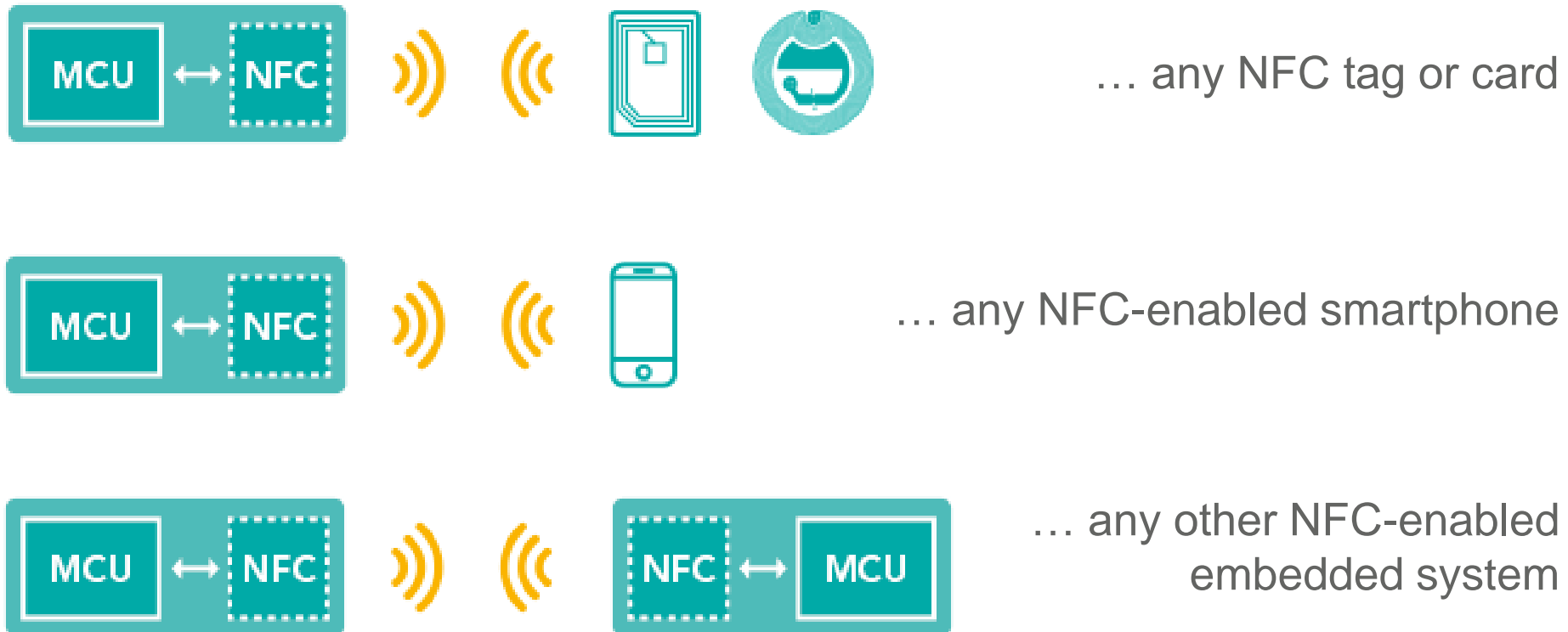
02.
Use cases

Most common architectures

Zero-power parameterization
Zero-power diagnosis
Zero-power firmware update
Network node commissioning
Enhanced GUI

Identification and Authentication of consumables and accessories

List of countries by smartphone penetration

Rank	Country	Total Population	Smartphone Penetration	Smartphone Users
26	China	1,388,233,000	51.7%	717,310,000
45	India	1,342,513,000	22.4%	300,124,000
7	United States	326,474,000	69.3%	226,289,000
33	Brazil	211,243,000	37.7%	79,578,000
25	Russia	143,375,000	54.7%	78,364,000
27	Japan	126,045,000	50.1%	63,089,000
9	Germany	80,636,000	68.8%	55,492,000
46	Indonesia	263,510,000	20.7%	54,494,000
30	Mexico	130,223,000	40.7%	52,993,000
10	United Kingdom	65,511,000	68.6%	44,953,000
16	France	64,939,000	65.3%	42,399,000
28	Turkey	80,418,000	49.8%	40,010,000
15	Italy	59,798,000	65.8%	39,323,000

Identification and Authentication of consumables

- Identification and authentication of genuine replacement parts or consumable refills
  - With the help of the device itself, or the phone
- Automated transfer of settings
  - Device reader communicates with tagged part / consumable in the unit for ease-of-use and best performance
- Facilitates purchasing and usage decisions
  - E.g. warranty registration, replenishment alert, promotion, how-to video, linking to service center

Embed NFC into any Electronics device for smart interaction

- **Smart Home**

Tap your phone to securely add a smart node to your Smart Home system and build your own network

- **Appliances**

B/S/H/

Whirlpool

Tap your phone for online access of User manual / online video of troubleshooting / online assistance via your OEM or retailer App

- **Healthcare** e.g. Glucose meters

Tap your phone for retrieving vital data via your OEM or physician's App

MCU ↔ NFC

Zero power parametrization
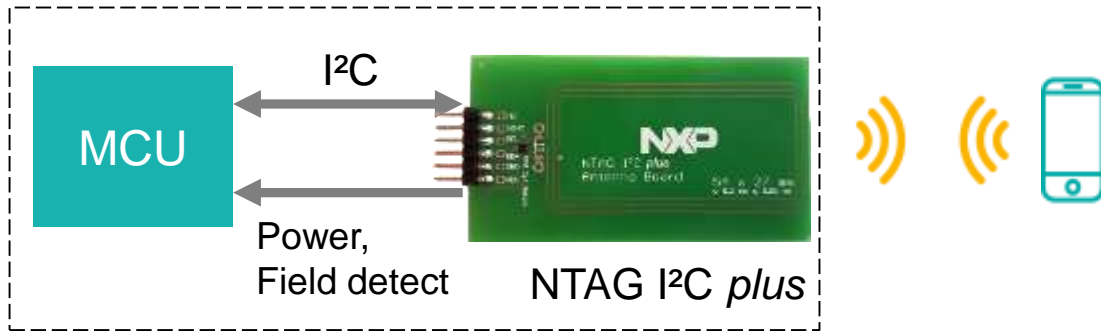
Device to be parameterized/diagnosed

- **Key steps for integration**
  - Integrate NFC NTAG I²C plus into device
  - Develop app on NFC phone

  - For details, see „How-to" guide:
    https://community.nxp.com/docs/DOC-333834
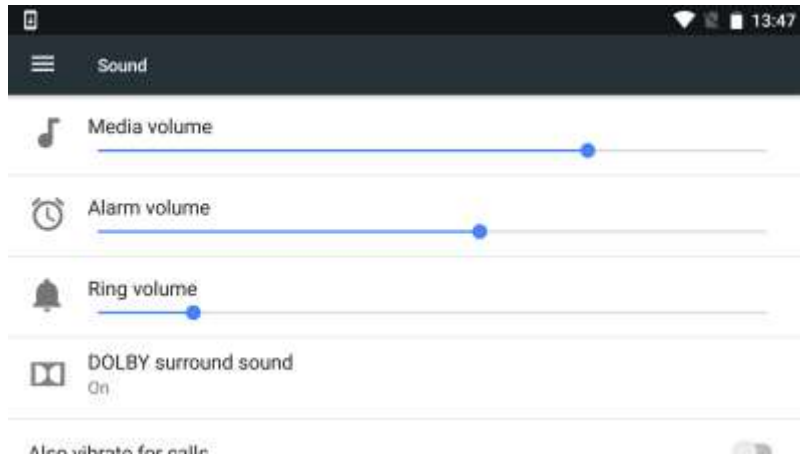 - Product: NTAG I²C plus (NT3H2211)

Parameterization

- Select settings in the app on the NFC phone
- Tap phone to the (unpowered) device
- Phone writes configuration into the NTAG I²C *plus* user memory via NFC
- At boot time, MCU reads configuration via I²C bus

Currently only supported by Android phones

Zero power diagnosis
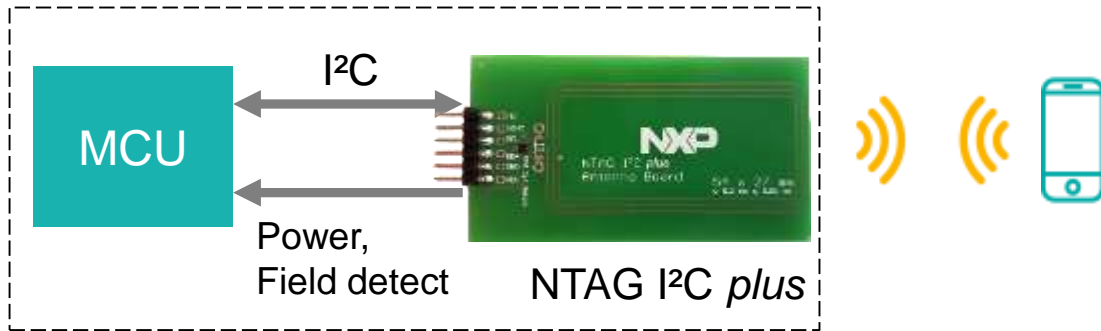
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  - Product: NTAG I²C plus (NT3H2211)

Diagnosis

- At runtime, MCU writes data into the NTAG I²C *plus* user memory via I²C
- Tap phone to the (also unpowered) device
- Phone reads data via NFC and shows in an app

Enhanced GUI
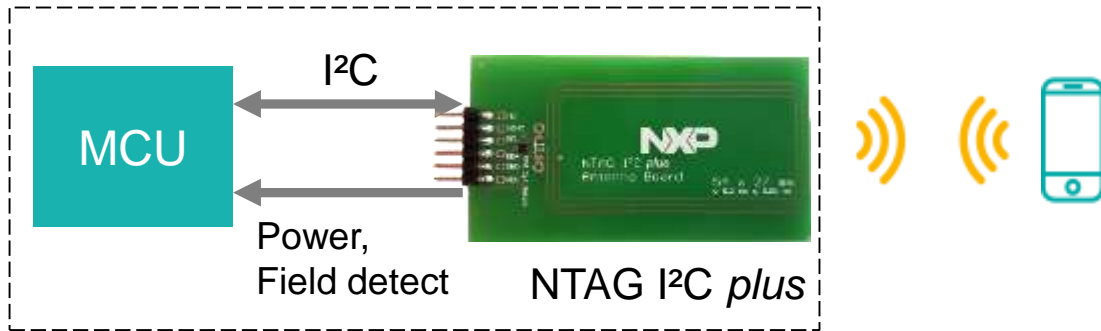
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Parameterization

- Select settings in the app on the NFC phone
- Tap phone to the (unpowered) device
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References: NFC used today already for parameterization and diagnosis

Schneider Electric – Zelio **NFC Timing Relay**

https://www.youtube.com/watch?v=I4sUMhLyhwQ

Sigma Sport BC14.16 and 16.16 bike computer

Theben Dimax 544 plus dimmer

Finder 12.51 day/week timer

NTAG I²C *plus*

- The simplest, most cost-effective NFC interface
- Dual interface to the memory: NFC and I²C slave
- Configure memory for multiple rewrites or password protect it
- Energy harvesting to power the device from the NFC reader field
- Field detection to wake up the MCU saves power
- Pass-through mode (SRAM) lets NTAG I²C *plus* act as a modem for direct communication between the NFC device and the MCU

Software

From the MCU side, the NTAG I²C plus looks like an I²C memory, and from the phone side it looks like an NFC tag.
All source code: OM5569-NT322ER

	NTAG I²C plus
NFC Forum Tag Format	Type 2
EEPROM User Memory (B)	888 or 1912
RF Baud Rate (kbit/s)	106
Fast READ Command	x
Fast WRITE Command	x
Originality Signature	x
Memory Access Protection	RF Interface & I²C (Read/Write)
Field Detection	x
Energy Harvesting	Up to 15 mW
Pass-Through Mode	Up to 40 kbit/s
Temperature range	-40 °C … +105 °C
Packages	XQFN8, TSSOP8, SO8

Tools		
	OM5569-NT322E	NTAG® I²C plus Explorer Kit
	OM5569-NT322ER	NTAG® I²C plus Explorer Kit with NFC Reader
	OM5569-NT322F	NTAG I²C plus Flex Kit

NTAG I²C *plus* Kits overview

3 HW versions

Explorer kit ER

Explorer kit E
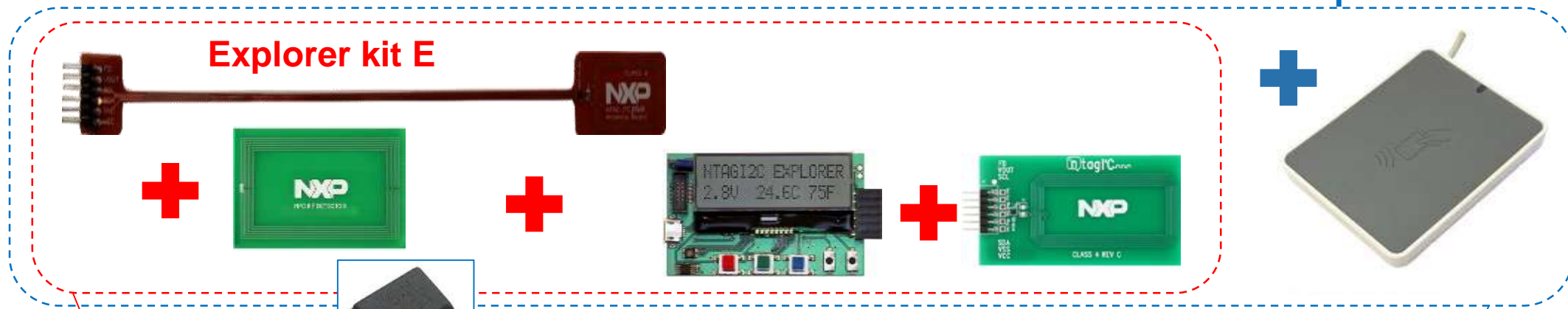
CE & FCC certified

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OM5569/NT322E
- *Mother board* (incl. low power display + T sensor + RGB LED + Push buttons + USB connector)
- *Class 4 PCB antenna* + NTAG I²C *plus*
- **10 samples of NTAG I²C** *plus* in SO8 package
- **RF detector board**
- **Class 6 Flex antenna**

OM5569/NT322ER
- *Same content as OM5569/NT322E*
- *+ USB NFC reader*

OM5569/NT322F
- *3 Flex antennas class 4,5&6*

03.
Product Portfolio & Support

NFC focus products for each application need –

Readers/connected tags

Features and price (vertical axis)

Specialist

One chip system, programmable NFC controller with DPC
PN7462/PN736x

High-perf full NFC with DPC
PN5180

All round

High-perf multi-protocol reader
CLRC663 *plus*

Plug&Play NFC for Linux, Android, WinIoT
PN7150

Entry level

NTAG I²C *plus*

High-perf proximity&vicinity readers
MFRC630
(ISO14443A – MIFARE/NTAG reader)
SLRC610
(ICODE ISO15693 and ISO18000-3M3)

Connected tag solutions
NFC tags with non-volatile memory and host connection

NFC Frontend solutions
NFC reader with NFC Reader SW Library

NFC controller solutions
NFC reader with integrated 32-bit Cortex MCU and either integrated firmware or freely programmable memory

* Single chip: Cortex M0 MCU + last generation NFC reader + ISO 7816 Contact reader

Support material / references

- NTAG I²C *plus* product page:
  http://www.nxp.com/products/:NT3H2111_2211

- Customer development board page:
  http://www.nxp.com/demoboard/OM5569-NT322ER

- How-to guide:
  https://community.nxp.com/docs/DOC-333834

- Community for technical questions:
  https://community.nxp.com/community/nfc

NFC Webinars

Best place for getting quick information on

- NFC technology
- Application use cases
- Products description
- In-depth technical Training

2 ways to get there

- Support → Online training academy → NFC Webinars
- Or in 1 click from nxp.com/nfc: NFC Webinars (at the bottom right hand side under "NFC support")

http://www.nxp.com/support/:NFC-WEBINARS

Use our technical community for your questions

• Become a registered member and get expert advice from the developer community

How to get there

▪ NFC and Reader ICs → NFC Technology hub → NFC support → NFC community

https://community.nxp.com/community/nfc

NTAG I²C plus ordering details

Product	Part number	12NCs	Package	Delivery form	MOQ
NTAG I²C *plus* 1k	NT3H2111W0FTT (1k)	9353 069 32118	TSSOP8	Tape&reel	2.5kpcs
NTAG I²C *plus* 2k	NT3H2211W0FTT (2k)	9353 069 33118	TSSOP8	Tape&reel	2.5kpcs
NTAG I²C *plus* 1k	NT3H2111W0FT1 (1k)	9353 070 09115	SO8	Tape&reel	500pcs
NTAG I²C *plus* 2k	NT3H2211W0FT1 (2k)	9353 070 16115	SO8	Tape&reel	500pcs
NTAG I²C *plus* 1k	NT3H2111W0FHK (1k)	9353 069 39125	XQFN8	Tape&reel	4kpcs
NTAG I²C *plus* 2k	NT3H2211W0FHK (2k)	9353 069 43125	XQFN8	Tape&reel	4kpcs

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