

# NFC IN CONSUMER ELECTRONICS AND HOME APPLIANCES

TVR TKO BARBARIC  
REGIONAL MARKETING DIRECTOR NFC

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SECURE CONNECTIONS  
FOR A SMARTER WORLD

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# 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

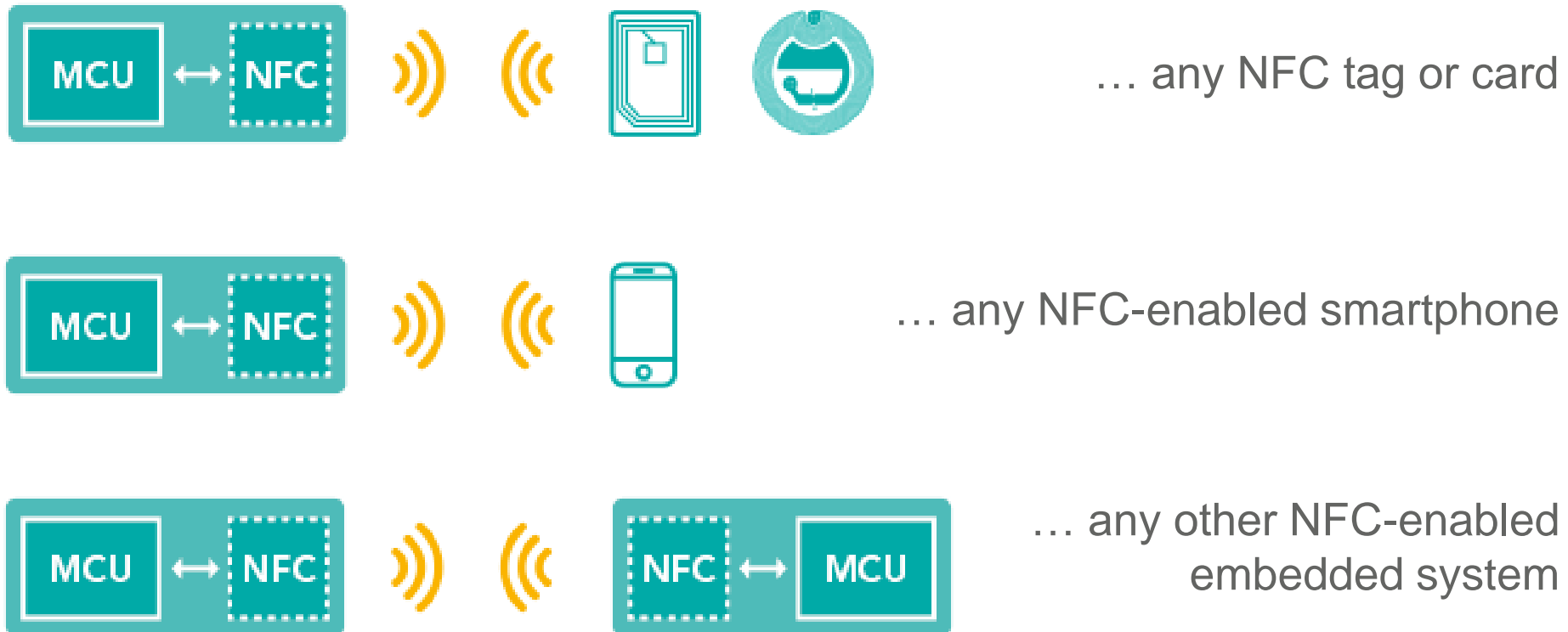
NFC-enabled device can behave as  
a contactless smartcard

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 ...





# 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

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

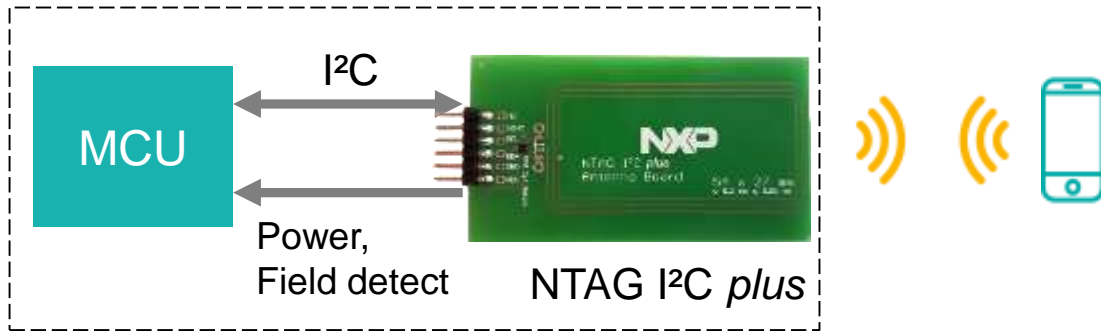


## • Healthcare e.g. Glucose meters

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



# 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>

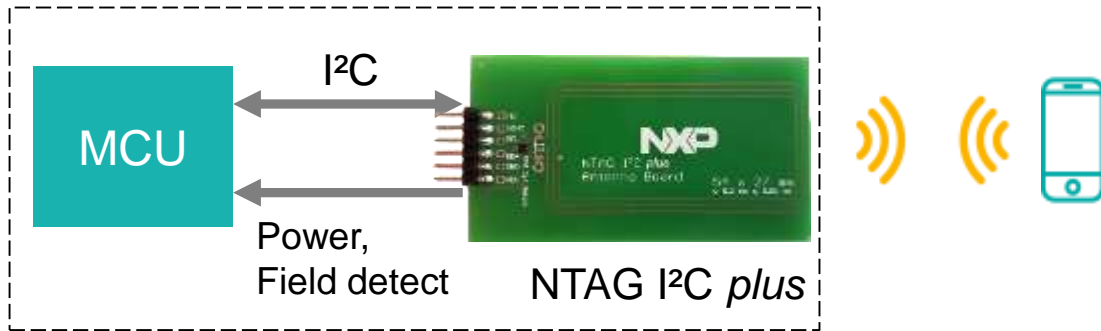
- Product: NTAG I2C plus (NT3H2211)

## 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



Device to be parameterized/ Diagnosed

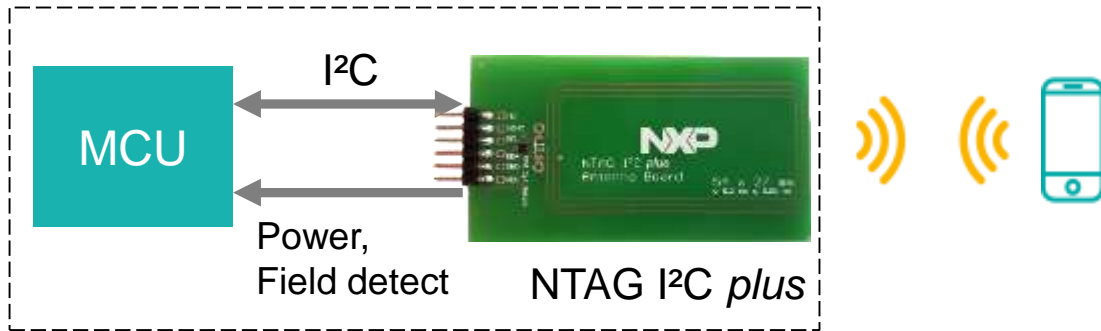
- **Key steps for integration**

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<https://community.nxp.com/docs/DOC-333834>
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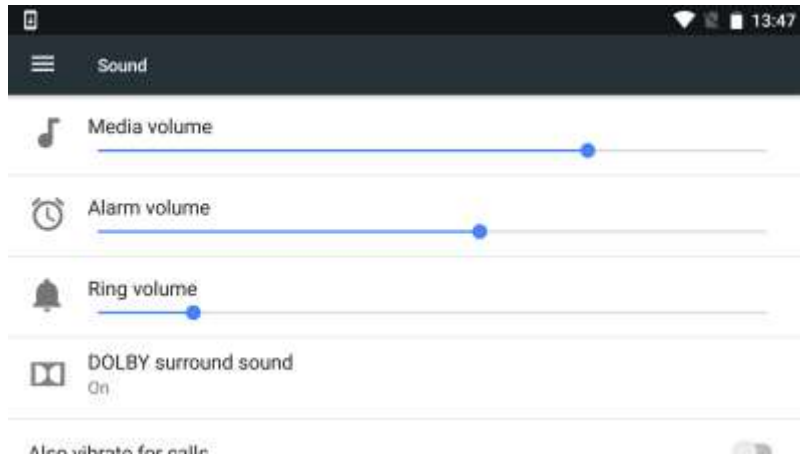
## Diagnosis

- 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



Device to be parameterized/ Diagnosed



## 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



## 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

# 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 I<sup>2</sup>C *plus*

- The simplest, most cost-effective NFC interface
- Dual interface to the memory: NFC and I<sup>2</sup>C 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 I<sup>2</sup>C *plus* act as a modem for direct communication between the NFC device and the MCU

## Software

From the MCU side, the NTAG I<sup>2</sup>C *plus* looks like an I<sup>2</sup>C memory, and from the phone side it looks like an NFC tag.

All source code: [OM5569-NT322ER](#)

Tools	OM5569-NT322E	NTAG <sup>®</sup> I <sup>2</sup> C <i>plus</i> Explorer Kit
	OM5569-NT322ER	NTAG <sup>®</sup> I <sup>2</sup> C <i>plus</i> Explorer Kit with NFC Reader
	OM5569-NT322F	NTAG I <sup>2</sup> C <i>plus</i> Flex Kit

	NTAG I <sup>2</sup> C <i>plus</i>
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 & I <sup>2</sup> C (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



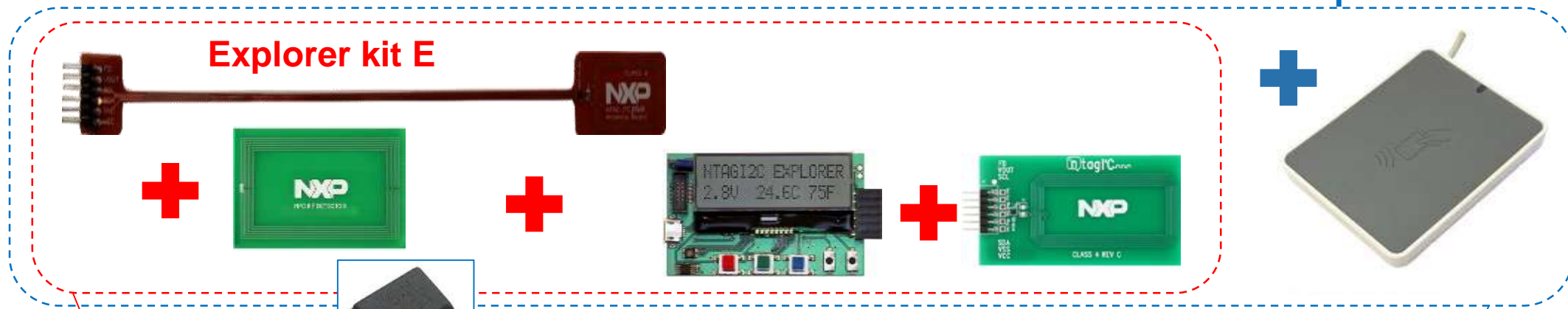


# NTAG I<sup>2</sup>C *plus* Kits overview

3 HW versions

Explorer kit E

Explorer kit ER



CE & FCC certified

CE & FCC certified

## OM5569/NT322E

- **Mother board** (incl. low power display + T sensor + RGB LED + Push buttons + USB connector)
- **Class 4 PCB antenna** + NTAG I<sup>2</sup>C *plus*
- **10 samples of NTAG I<sup>2</sup>C *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**

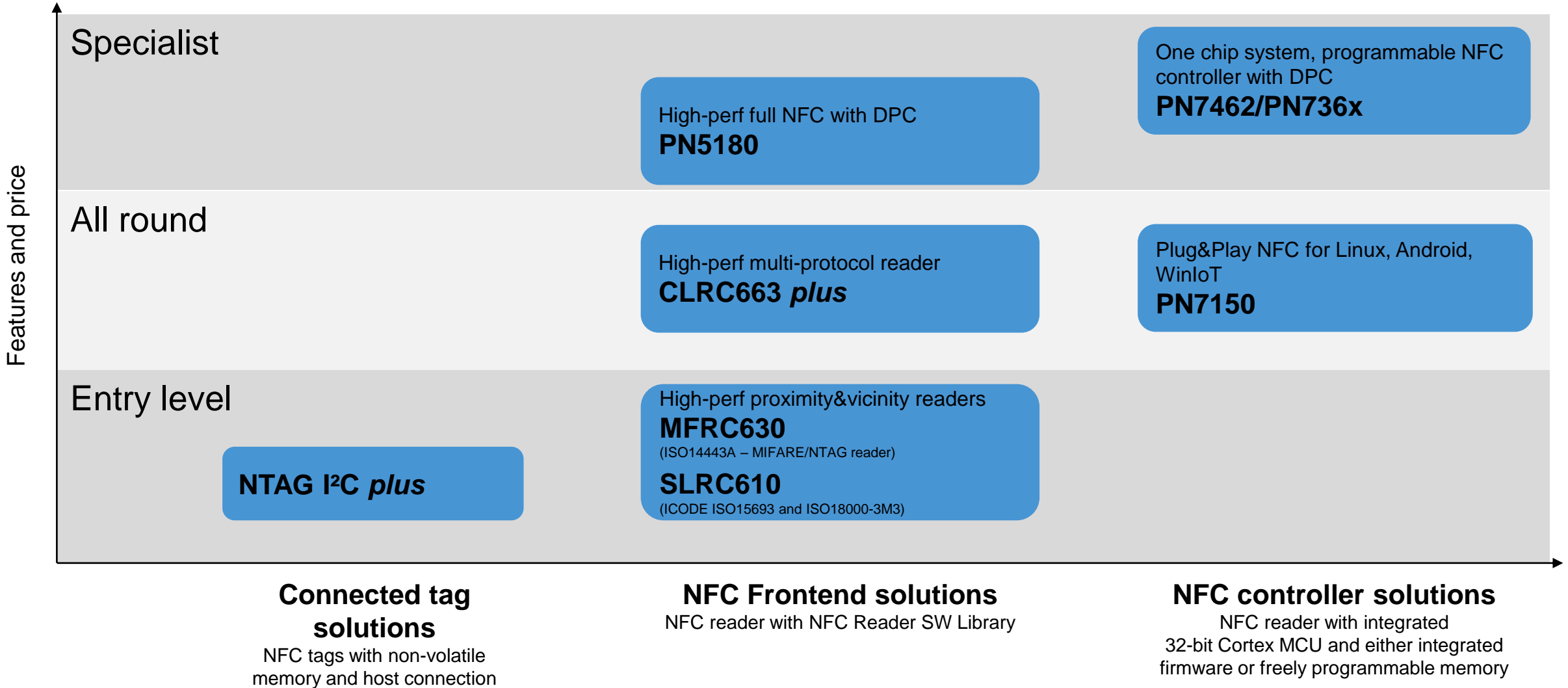


# 03.

## Product Portfolio & Support

# NFC focus products for each application need –

## Readers/connected tags



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

# Support material / references

- NTAG I<sup>2</sup>C *plus* product page:  
[http://www.nxp.com/products/:NT3H2111\\_2211](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](http://www.nxp.com/nfc): NFC Webinars (at the bottom right hand side under “NFC support”)

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



NFC Basics			
Topic	Description		
NFC Essentials	Introduction to NFC technology and functionality.	Full Webinar	<a href="#">Short Read</a>
NFC use cases	Introduction to NFC use cases, including recommended product solutions.	Full Webinar	<a href="#">Short Read</a>
NXP's NFC product portfolio	Introduction to NXP's NFC Reader IC portfolio: NFC frontends, NFC controllers, NFC connected tag ICs.	Full Webinar	<a href="#">Short Read</a>
NFC reader design - how to build your own reader	How to design and build an NFC reader, main components, how to choose the right reader and microcontroller ICs, reader architecture with respect to security requirements, NFC antenna theoretical fundamentals, how to match it in our NFC reader design.	Full Webinar Part 1	<a href="#">Short Read</a>
		Full Webinar Part 2	

Products			
Topic	Description		
PN71xx product presentation	Overview, features and applications of PN71xx high-performance plug'n play full NFC Forum compliant controller family.	Full Webinar	<a href="#">Short Read</a>
PN71xx product support package	Getting started with OM5577 and OM5578 kits for the PN7120 and PN7150 NFC Controllers, interface boards compatible with Raspberry Pi, BeagleBone Black, and boards featuring Arduino compatible headers including many LPCXpresso, Kinets and i.MX boards.	Full Webinar	
PN7462 - First all-in-one full NFC solution	Overview, features and applications of PN7462 NXP's all-in-one NFC contact smart card reader.	Full Webinar	
PN7462 - Product support package	Getting started with C...		
NTAG I2C plus - Your entryway to NFC	Overview, features and applications of NTAG I2C plus.		
NTAG I2C plus - Product support package	Getting started with C...		

Applications			
Topic	Description		
NFC use cases for industrial applications	NFC use cases in industrial applications, overview, requirements, NFC Reader solutions.	Full Webinar	<a href="#">Short Read</a>
Tap-and-Play: NFC in gaming	NFC use cases in gaming applications, overview, requirements, NFC Reader solutions.	Full Webinar	
Smart Home NFC commissioning solution	NFC use cases in smart home and IoT, overview, requirements, NFC Reader solutions.	Full Webinar	

Technical			
Topic	Description		
How to develop NFC applications 1: Parametrization via NFC	30 min hands-on session on how to integrate NFC into your application for configuration and parametrization, along the concrete implementation of a DIN rail demo.	Full Webinar	<a href="#">Demolab</a>
How to develop NFC applications 2: Device-to-device communication via NFC	30 min hands-on session on how to integrate NFC for device-to-device communication, e.g. when you need to exchange data between devices which cannot be connected via a cable, as sealed, moving or rotating parts.	Full Webinar	<a href="#">Demolab</a>
Design and Implement NFC applications 1: Product support package for NXP NFC readers	Hardware support, software support and design support resources for NXP connected NFC tags, NFC frontends and NFC controllers.	Full Webinar	<a href="#">Short Read</a>
Design and Implement NFC applications 2: Antenna design considerations for NXP NFC reader solutions	Theoretical fundamentals and antenna principle, NFC antenna design procedure for NXP solutions, NFC reader test and qualification.	Full Webinar	

# 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>

Additional Communities | nxp.com

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**Log in** Log in to follow, share, and participate in this community.

WELCOME TO NFC

**NFC**

Welcome to the NFC community. With our broad portfolio ranging from high power RF reader ICs to NFC enabled solutions we address all your needs. Based on our long experience we continue to lead the expansion from traditional smart card applications to a wide infrastructure based on NFC enabled devices. Get expert advice from the developer community. The support team also monitors these forums to provide answers and take your feedback.

Anyone can read the discussions, but only registered NXP Community members may participate. Before you ask a question, please search the community to find if someone has already offered a solution. If you don't see a solution, then ask the community your question.

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ASK NFC YOUR QUESTION

Type your question

**Ask your question**

Ask it

CATEGORIES

Contact Smart Card Reader ICs	24	0	0
HITAG Reader ICs	16	0	0
Connected Tag Solutions	28	0	0
MIFARE SAMs for Reader Systems	20	0	0
NFC Frontend Solutions	52	0	1
NFC Controller Solutions	48	1	0
NFC Reader Library	30	0	1

**Look for answers**

RECENT CONTENT

Filter by Categories & Tags

NFC USB PN533 integration with Android Platform  
1 day ago by vnothraj m

Which SAM ICs are supported by PN532?  
1 day ago by Masahiro Matsuzawa

PN5180 bricked issue without warning

# NTAG I<sup>2</sup>C plus ordering details

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



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