

NFC IN CONSUMER ELECTRONICS AND HOME APPLIANCES

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SECURE CONNECTIONS
FOR A SMARTER WORLD

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PUBLIC



What application do you associate with Near Field Communication (NFC)?



Payment



Access control



Content sharing

There is much more you can do with NFC!

Pairing

Faster and secure pairing with BT/BLE and Wi-Fi devices

Authentication

Authenticate accessories and configure the base unit accordingly

Maintenance

Firmware update and assistance

Network nodes Commissioning

Add nodes securely to your network without entering codes

Identification

Identify user and provide personalized settings

Extended User Interface

Control with your phone

Device-to-Device communication

Replace wire with a contactless bi-directional connectivity

Massive release of NFC devices in the last 12 months

Audio



Printer



Projector



Camera



Home appliances



Gateway/ STB



TV





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, biggest portfolio)

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

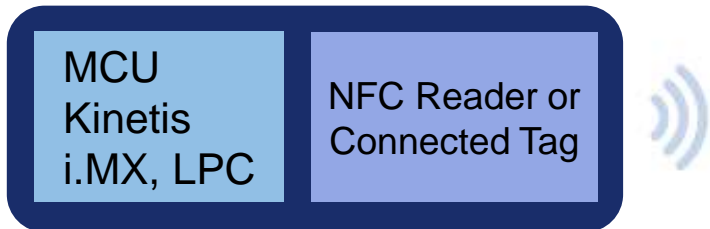


Trusted addition to other technology
Especially for pairing devices

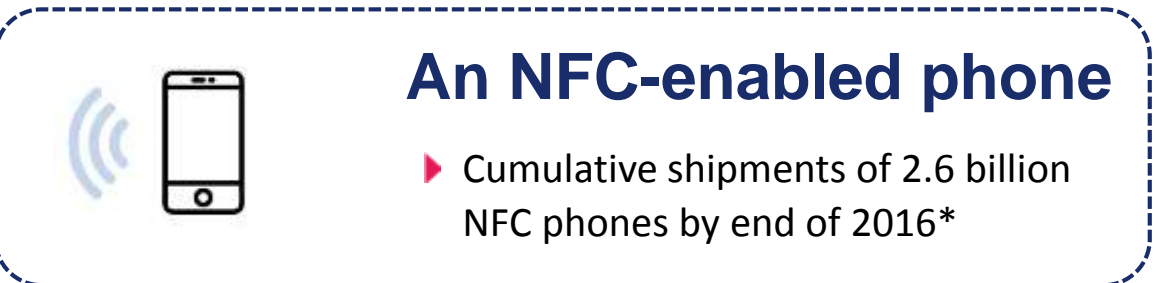
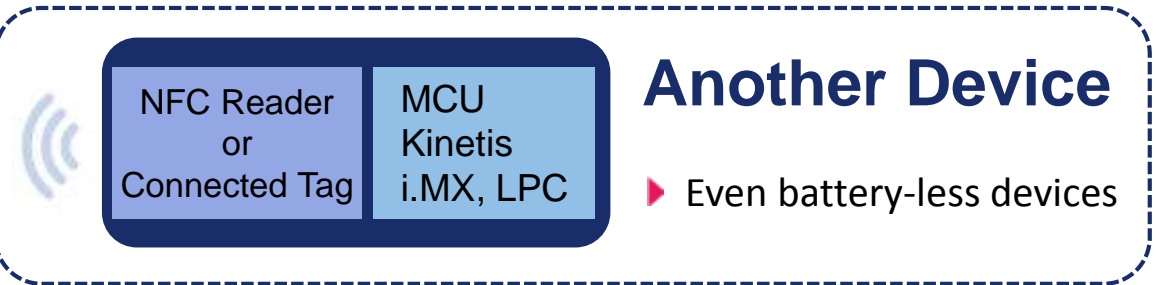
With NFC, you can interface ...

Any Device

- Powered by battery or mains
- Can initiate NFC connection
- Reads data in from device or writes data out
- Small: typically ~25 mm² IC, 40x30mm antenna
- Many form factors



to



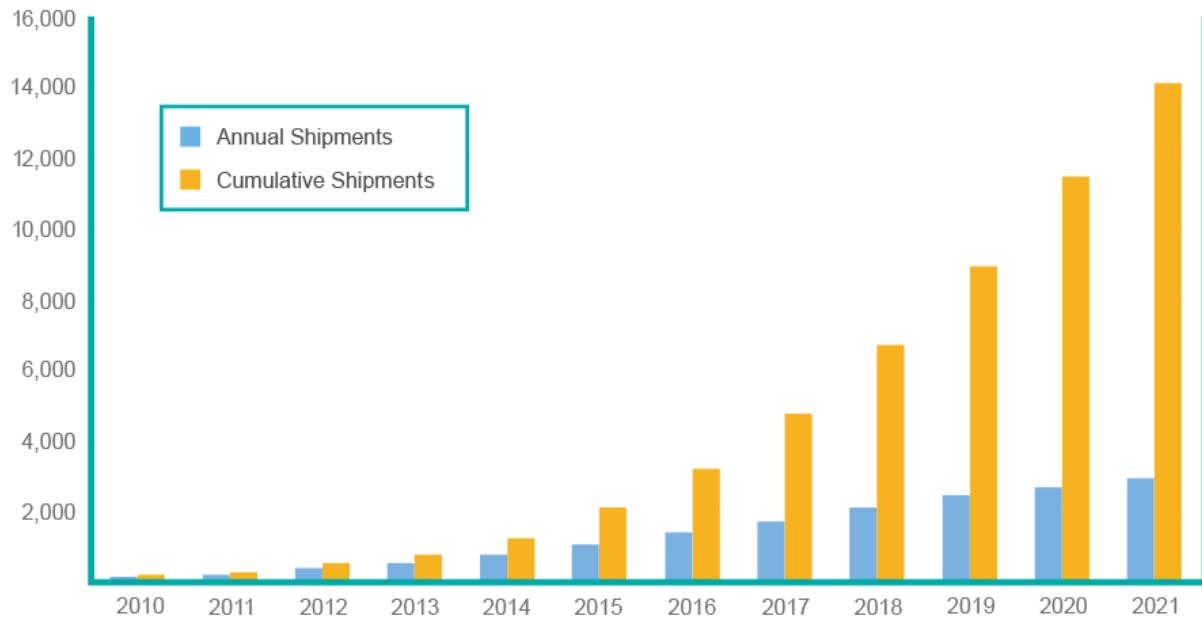
* source: ABI, 2016

NFC devices are shipping in Billion units

2 billion

NFC-enabled devices
will be deployed in 2018
ABI Research, 2016

NFC-enabled Products
Total Annual and Cumulative Shipments in Mpcs



ABI Research, 2016

This opens opportunities for **new use cases for**

- Audio device
- Printer
- TV, Set-Top Box and remote
- Gateway and router
- Wearable's and Healthcare
- Home Appliance
- And much more ...



NFC Use Cases

Pair your phone with a tap



BT speakers or
headphone



WiFi printers for
quick printing



Wearable device



WiFi camera for
transferring quickly
pictures



NFC Gateway to
allow friends to use
your WiFi network



TV to view images
and videos on the
big screen

NFC Benefits

- Simple secure pairing with a single tap
- Pair devices 20x faster than with BLE or Wi-Fi
- Identify a device instantly (no device conflicts or codes)
- Make devices easier to use
- Reduce tech-support costs
- Ensure that accessories are paired to the correct device

How to initialize Bluetooth/Wi-Fi pairing with NTAG I²C *plus*

STEP 1

Initialize the Bluetooth /
Wi-Fi module



STEP 2

The Bluetooth/Wi-Fi module writes the
NDEF message for pairing via the I²C
interface to the NTAG I²C *plus*.
No NFC/RF handling required

Alternatively: Configure the MAC address
via NFC, write to the Bluetooth/Wi-Fi module
via I²C (late stage configuration)

References of pairing use case



EPSON Inkjet series 2016



SFR 4k GW & STB

Let's demo!



Bose Soundsport



Creative mini Muvo



Canon EOS1300D

Key NFC Use Cases for Home Appliances



Authentication
of accessories
or consumable

→ Check that the right
and genuine filter is
used



Wireless
Configuration of the
device

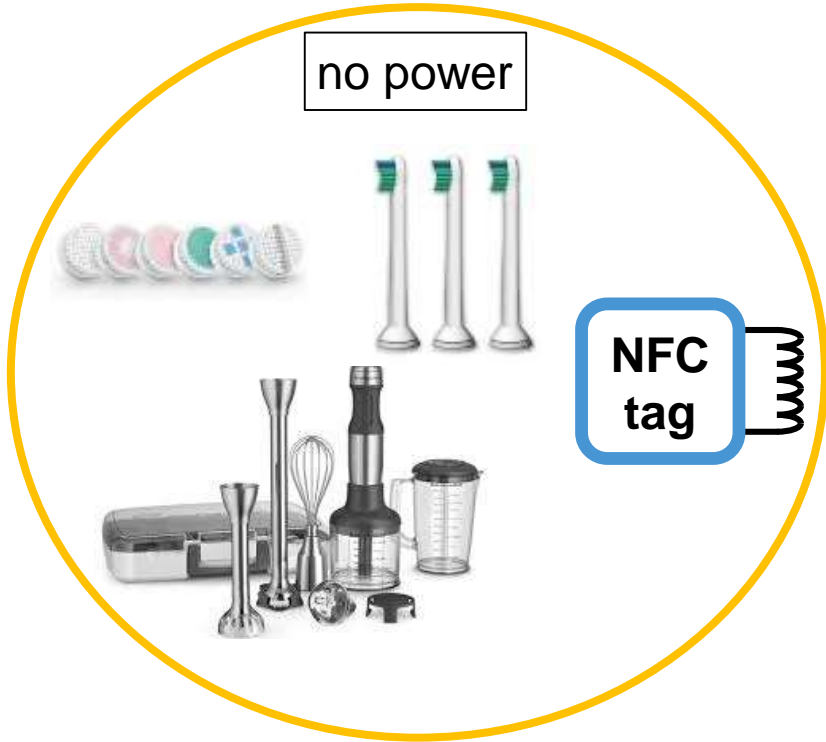
→ Configure automatically
the brush speed, spinning
parameters, ...



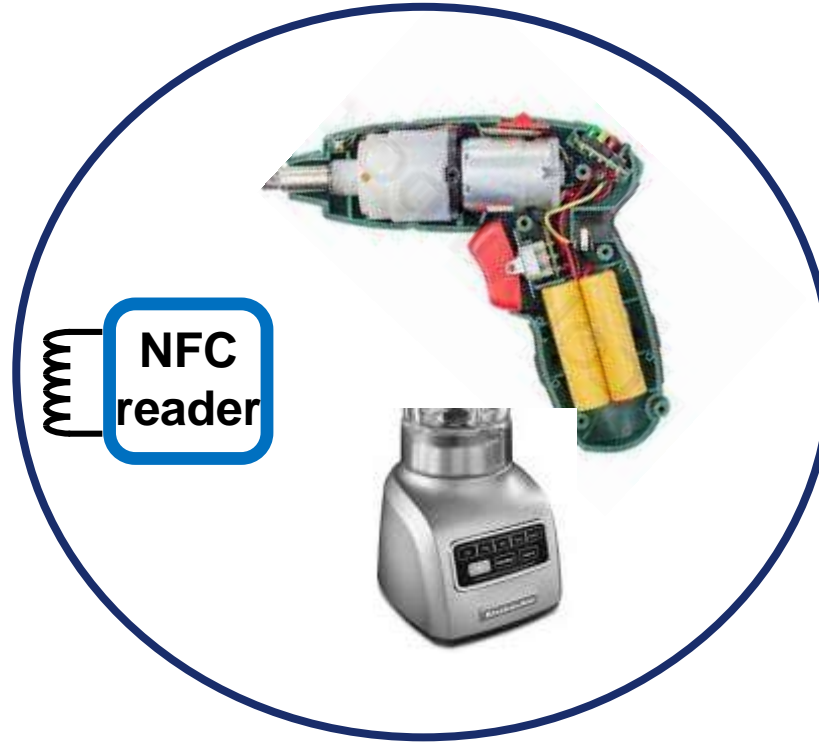
Safe NFC latch
mechanism

→ No power until NFC
connectivity is on

How it works



NFC Tag in the removable part, e.g. brush head, water or air filter, ...



Data read by NFC Reader inside the base unit, e.g. fridge, blender, then sent to MCU

Enables

- Accessory **authentication**
- Base unit **configuration**
- **Safe latch**

Benefits

- No mechanical constraint thanks to wireless connectivity
- Possibly additional interaction with NFC phone, e.g. download online manuals or ordering

References



Let's demo!

Philips Visapure facial brush

Configuration



Vitamix Ascent series

Configuration

Safe latch

Device-to-Device communication

- NFC is used as the communication interface between 2 devices



- Enables to replace wires with a contactless bi-directional connectivity
- Remove mechanical constraints and save connector cost
- Give battery-free devices the ability to communicate, powered by the NFC field
- Data sent up to 848kbits/s with a **NFC reader**, 106kbits/s with a **connected Tag**
- Applications: Flipcover keyboard for smartphone, replace connectors of printer paper tray, ...



One2Touch Flipcover series & SlimType series

User Identification, and access to special services

- **Example: NFC in office printer (MFP)**
 1. Each user identifies himself by tapping his ID Card to the MFP (NFC reader inside)
 2. User is then authorized to release the printing or scan documents

Security: documents are printed or scanned by authorized persons only

Ease of use: only one tap, with same ID card used for access control points

Cost control: no waste, possible to get reports on each user's printing activity

- Possible extension to other application: Identification could be implemented in TV, STB or remote, for building secure parental control (NFC in Card or Toy)



Kyocera A3
MFP series



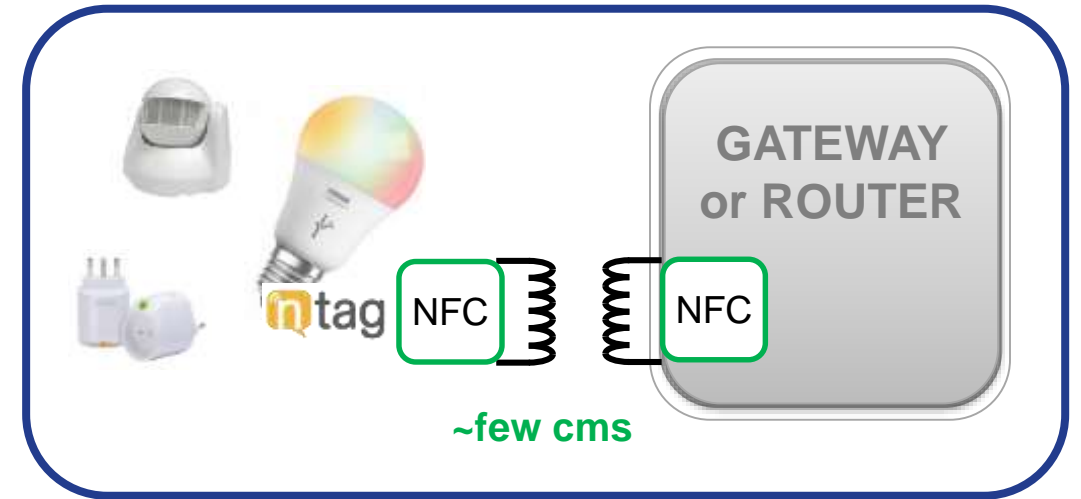


More Use Cases Are Possible

NFC solves the installation of smart Home system

- 1) Tap the NFC node to the Gateway to load the network credentials
No need to power on the node
- 2) Power on the node, and it's automatically added to the smart home network

NFC Commissioning



- Easy: no manual entry
- Flexible: all kind of protocol supported
- Secure: network key exchange is guaranteed by proximity



Use NFC as an extended user interface

- For programming your device or firmware update
- For assistance
 - Tap phone to device for retrieving the error log
 - Data sent to cloud servers, and online assistance provided after diagnostic or direct connection to hotline, no need to explain the issue again
- Save retailer cost: reduce customer care calls
- Save customer cost: self-debug
- Zero-power: error log can be retrieved even if the device can not turn on



Authenticated redirection



- Effortless consumable replenishment in one tap
- How does this work?



Consumer scans the consumable with an NFC-enabled phone. Data stored on the tag directs user phone to initiate appropriate action.

Benefits to the OEM

- Increased revenues
- Reduced ads cost
- Real-time analytics
- Offer more services

Benefits to the Consumer

- Built-in counter
- Verify correct model
- Ensure genuine replacement
- Pre-approved retailers

Recap lead NFC Use Cases

	Audio	Printers	TV, STB, remote	Gateway routers	Home appliance	
Pairing	●	●	●	●		Pair with phone Even possible between 2 speakers or headphones
Commissioning				●		Add nodes securely to your smart home system
Authentication, Config.		●	●		●	Check genuine part Device configuration Safe latch
Identification		●	●			Safe printing in office Personalization
Extended user interface	●	●	●	●	●	Use NFC phone for controlling your device and maintenance
Device-to-Device com		●	●		●	Replace wires or connectors with wireless connectivity



NFC Solutions

Tailored NFC solutions

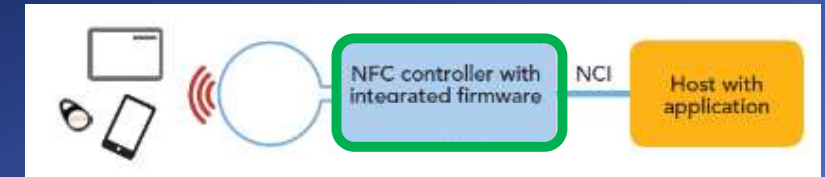
NFC Controllers with Customizable FW

- Combine an NFC frontend with freely programmable 32-bit Cortex-M0 microcontroller
- Support for contactless and contact technologies
- Very compact footprint



NFC Controllers with Integrated FW

- Plug-and-play solutions combine an NFC frontend with a 32-bit Cortex-M0 microcontroller
- Equipped with integrated firmware
- Optimized for Linux, Android, and WinIoT O/S



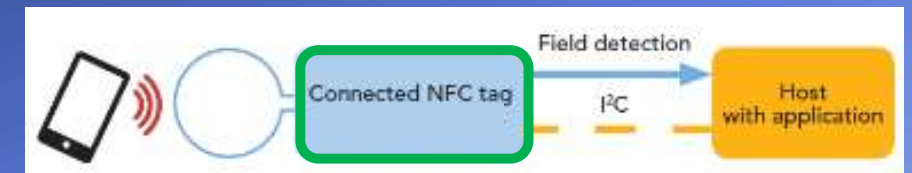
NFC Frontends

- Most flexible way to add NFC connectivity
- Supported by NFC Reader Library for fast and easy design-in



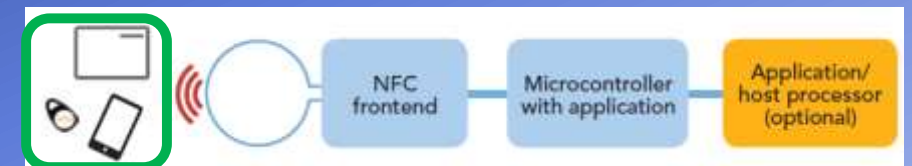
Connected Tags

- Small, passive tag ICs
- very cost-effective NFC solution with I²C interface
- Support energy harvesting








NFC Labels

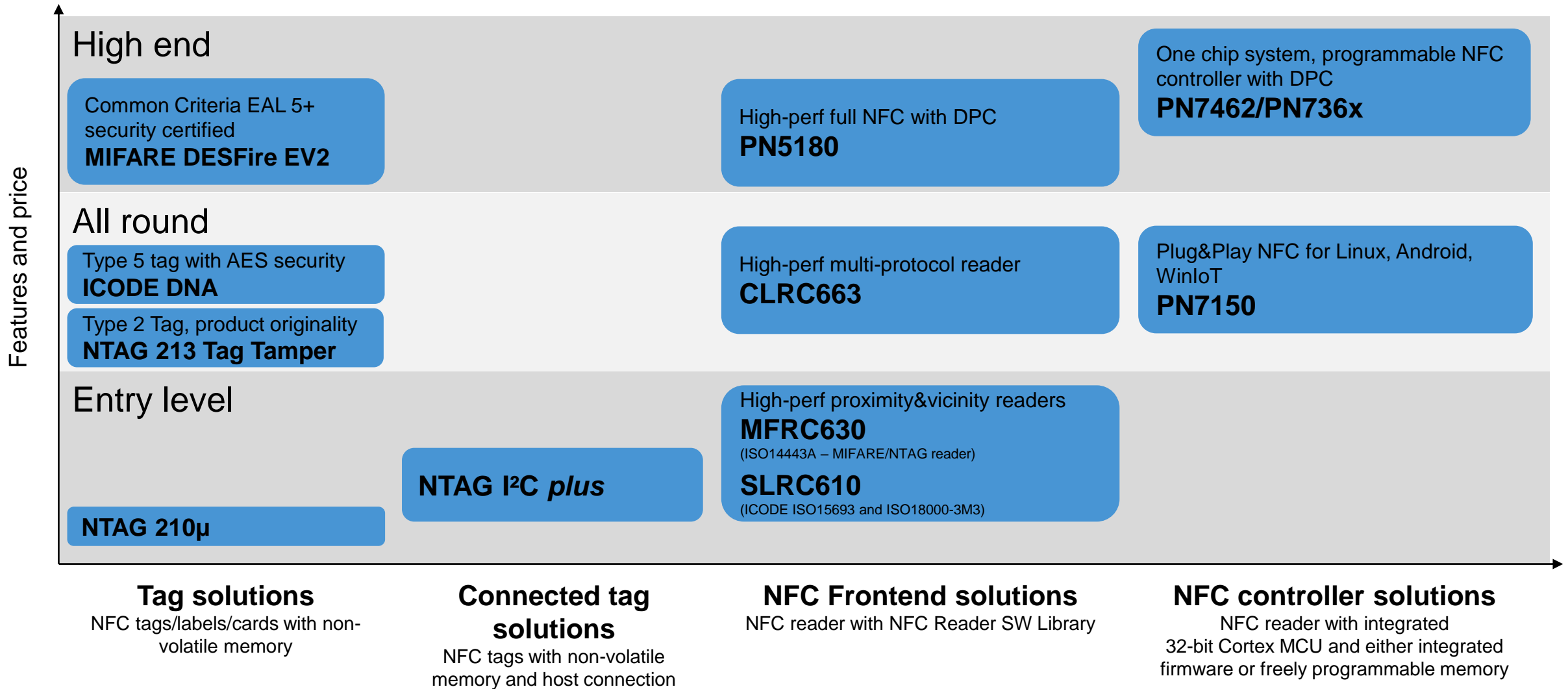
- Small, passive tag ICs
- most cost-effective NFC solution
- Optimized for small label designs



Which NFC Product Category is right for you?

	NFC label 	Connected Tag 	NFC Frontend 	NFC Controller with Customizable Firmware 	NFC Controller with Integrated Firmware 
I want to communicate with NFC smartphones	X	X	X	X	X
I want to add NFC to a non-powered system	X	X			
I want to read/write NFC/RFID HF tags			X	X	X
I want to add NFC to my OS-based design (Linux/Android/ WinIoT)					X
I want the smallest HW footprint	X	X		X	
I want to add NFC to my host MCU		X	X		X
I want NFC with an integrated microcontroller				X	X
I want to offload the memory of my main MCU					X

NFC focus products for each application need



* Single chip: Cortex M0 MCU + last generation NFC reader + iso7816 Contact reader

NTAG 210 μ

Entry level NFC label IC
to replace barcode and
QR codes

More features:

- NFC Forum Type 2 Tag
- 32-bit password protection
- Up to 10 cm reading distance
- Optimized for small label designs
(high capacitance version)

**High volume
NFC applications**

Lowest cost NTAG offering



**Customer specific
product signature**

Originality signature
customizable to a customer's
unique originality signature



40 bytes user memory

for basic device information



Connectivity

Easy information transfer
via NFC-enabled devices

**NFC
ISO14443**



NTAG I2C plus is the simplest, most cost-effective NFC solution

- Easy access to data from both NFC (Type 2 Tag) and from I2C
- Field detection to wake up connected devices
- Energy Harvesting capabilities
- EEPROM for offline data access
- Maximum interoperability with NFC devices
- Flexible memory management
- Originality signature for protection against cloning
- Fast & convenient data exchange via a 64 bytes SRAM buffer
- Small footprint package (1.6*1.6*0.5mm)



Low bill of material

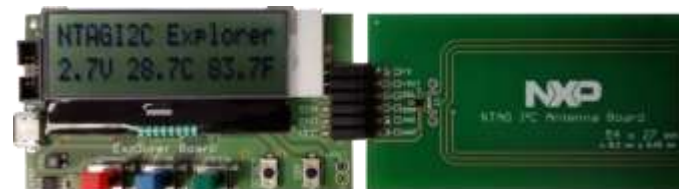
Easy to use

Easy to integrate

Ideal for low power operations

Maximum interoperability with NFC devices

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



<http://www.nxp.com/products/:NT3H2111W0FHK>



SLRC610 / MFRC630 / CLRC663

High-performance NFC reader solutions

- **High output power** IC in small footprint
- Support of all main RF protocols. ISO/IEC 14443, ISO/IEC 15693 and FeliCa compliant*
- NFC Ready enabled
- Compelling **low power card detection**
- **EMVCo compliance** without external amplifier (EMV 2.5 RF level)
- **Compact footprint of HVQFN32 package** for size optimization



High output power
and reliable RF
performance

Fast card detection
at minimized power
consumption

Fast design-in

OM25180	PN5180 Kit
OM26630	CLRC663 plus Kit
CLEV6630A	MFRC630/SLRC610 Board
OM2xxxx	NFC Antenna Kit



* SLRC610: only ISO/IEC 15693 and ISO/IEC 18000-3M3

* MFRC630: only ISO/IEC 14443A

<http://www.nxp.com/products/:CLRC66302HN>

<http://www.nxp.com/products/:SLRC61002HN>

<http://www.nxp.com/products/:MFRC63002HN>



PN7150 best plug and play full NFC solution

- NFC plug'n play solution, easy to integrate in any application
- Support NFC card emulation, reader/writer and peer-to-peer modes
- Compatible with **ISO/IEC 14443-A&B, FeliCa** and **ISO/IEC 15693** cards
- Very easy to integrate thanks to the embedded firmware and NCI standardized interface
- Linux, Android and WinIoT drivers ease integration and reduce time to market
- **Low power** operation mode
- Standard packages: HVQFN40



OM5578/ PN7150ARD	NFC Controller SBC kit for Arduino Demokit
OM5578/PN7 150BBB	NFC Controller SBC kit for BeagleBone Black
OM5578/PN7 150RPI	NFC Controller SBC kit for RaspBerry Pi



<http://www.nxp.com/products/:PN7150B0HN>

Easy to integrate
Connect directly to
application host

Easy to use

Lower bill of
materials

Optimized for low
power



PN7462 the first all-in-one full NFC solution

- State of the art RF interface, compliant with: ISO/IEC 14443, ISO/IEC 18092, ISO/IEC 15693, ISO/IEC 18000-3M3, FeliCa
- Contact interface compliant with ISO/IEC 7816-2 to 4
- Integrated 20MHz Cortex M0 microcontroller with 80/160kB flash memory, 12kB RAM and 4kB EEPROM
- One configurable host interface: I2C, SPI, USB, HSUART
- Two master interfaces: I2C and SPI
- 12 to 21 GPIOs
- DPC for optimized antenna performance
- EMVCo and NFC Forum compliance for easy certification
- Advanced power management
- Extensive support tools, including sample source code
- HVQFN64 package (9x9 mm)



**NFC and contact
interfaces, MCU,
and software
in one chip**

OM27462

PN7462/PN736x Development Kit



<http://www.nxp.com/products/:PN7462AUHN>





Design-in Support

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	Short Read
NFC use cases	Introduction to NFC use cases, including recommended product solutions.	Full Webinar	Short Read
NXP's NFC product portfolio	Introduction to NXP's NFC Reader IC portfolio: NFC frontends, NFC controllers, NFC connected tag ICs.	Full Webinar	Short Read
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	Short Read
		Full Webinar Part 2	
		Full Webinar	Short Read

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	Short Read
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	Short Read
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	
		Full Webinar	
		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	Download
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	Download
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	Short Read
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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NFC

Actions

Overview Content People Subspaces and Projects

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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阿龙...

Vincent Coli

jimmychan

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Praveen Kashyap

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

The NFC Reader Library

Focus on Scalability

Simplify Test & Debug

Optimize Performance

Validate Interoperability

Application					
Application Layer (AL)			NFC activity	SNEP	NFC P2P
MIFARE card operations	NFC Forum tag type operations	...	Discovery loop	LLCP	
Protocol Abstraction Layer (PAL) for contactless communication protocols					
ISO/IEC 14443 A	ISO/IEC 14443 B	FeliCa-compliant protocol	...	ISO/IEC 18092 (P2P)	
Hardware Abstraction Layer (HAL) supporting our NFC solutions					
Generic					
NFC frontends		NFC controller with customized firmware			
Bus Abstraction Layer (AL) with all low-level functions					
Generic					
Interfaces	SPI	I ² P	...		



The NFC Cockpit

- Let the HW designers optimize antenna parameters, including wave shape, while the SW designers work on other things
- Fine-tune the DPC and LPCD settings
- Activate a contactless smartcard, including basic card communication, with options for APDU and EMVCo polling
- Implement FW updates for the PN5180
- Access all EEPROM cells and registers

Find Your NFC Toolkit at www.nxp.com/nfc



NFC community



NFC use cases



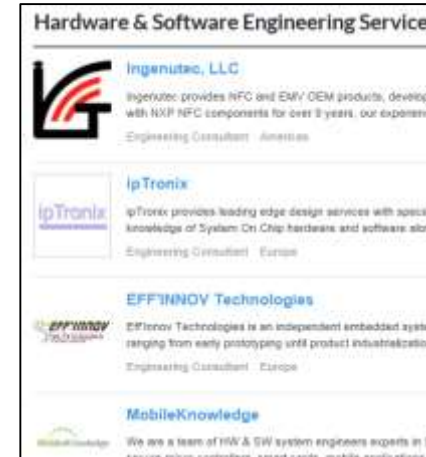
NFC Trainings



NFC IDH Partners



NFC Library
SW support for NFC frontend



If you have an NFC question please contact: nfc.readers@nxp.com





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