



Введение в технологию NFC.

- Show how industrial application can benefit from low cost NFC communication even for In Application Programming.
- Explain the concept of NFC, the product for industrial / embedded applications and the associated eco system
- At the end of this workshop you will be able to explain NFC technology and limits and demonstrate it to your customer so key usage included the IAP.

ST25R3911B-DISCO



<http://www.st.com/en/evaluation-tools/st25r3911b-disco.html>

ST25DV-DISCOVERY



<http://www.st.com/en/evaluation-tools/st25dv-discovery.html>

CLOUD-ST25TA (optional)



<http://www.st.com/en/evaluation-tools/cloud-st25ta.html>

ST25R3911B GUI



<http://www.st.com/en/embedded-software/stsw-st25r001.html>

ST25 NFC Tap application for smartphones



Versions for Android and iOS aren't the same.

FTM demos are available only in Android version.

Android: <https://play.google.com/store/apps/details?id=com.st.st25nfc&hl=en>



iPhone iOS: <http://www.st.com/en/embedded-software/stsw-st25ios001.html>

- Introduction to NFC technology (10 min)
- NFC portfolio with focus on ST25DV (10 min)
- Hand-on : Fast transfer and IAP to STM32 (50min)
 - ST25DV discovery description and demo 10 min
 - Android Phone app
 - Read and NDF message and write your company URL
 - Concept of Transfer of data and demo of Clock transfer
 - Flash in STM32
 - Flash system / consumption
 - Overview of NFC Library (2 slides only)
 - Phone + ST3911B/GUI demo of IAP
- Survey for this session (5 min)



Introduction to NFC technology

RFID technologies at a glance

	LF	HF 	UHF 
Coupling mode	Inductive	Inductive	Electro-magnetic backscatter
Operating frequency	125kHz – 134kHz	13.56MHz	860MHz – 960MHz
Antenna	Coil	Coil	Dipole
Max operating distance	up to 1m	Vicinity: <1.5m Proximity: <10cm	~10m
Regulation	Worldwide harmonized	Worldwide harmonized	Different regulations per country
Standards	ISO14223 ISO18000-2	ISO14443 A/B ISO15693 ISO18092 ISO18000-3 NFC Forum	ISO18000-6 B/C EPC Class 1 Gen 2
Environmental influences	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)
Applications	Animal tagging	Product identification Public transport / Libraries Access control	Pallets and container ID Retail / Logistics Authentication

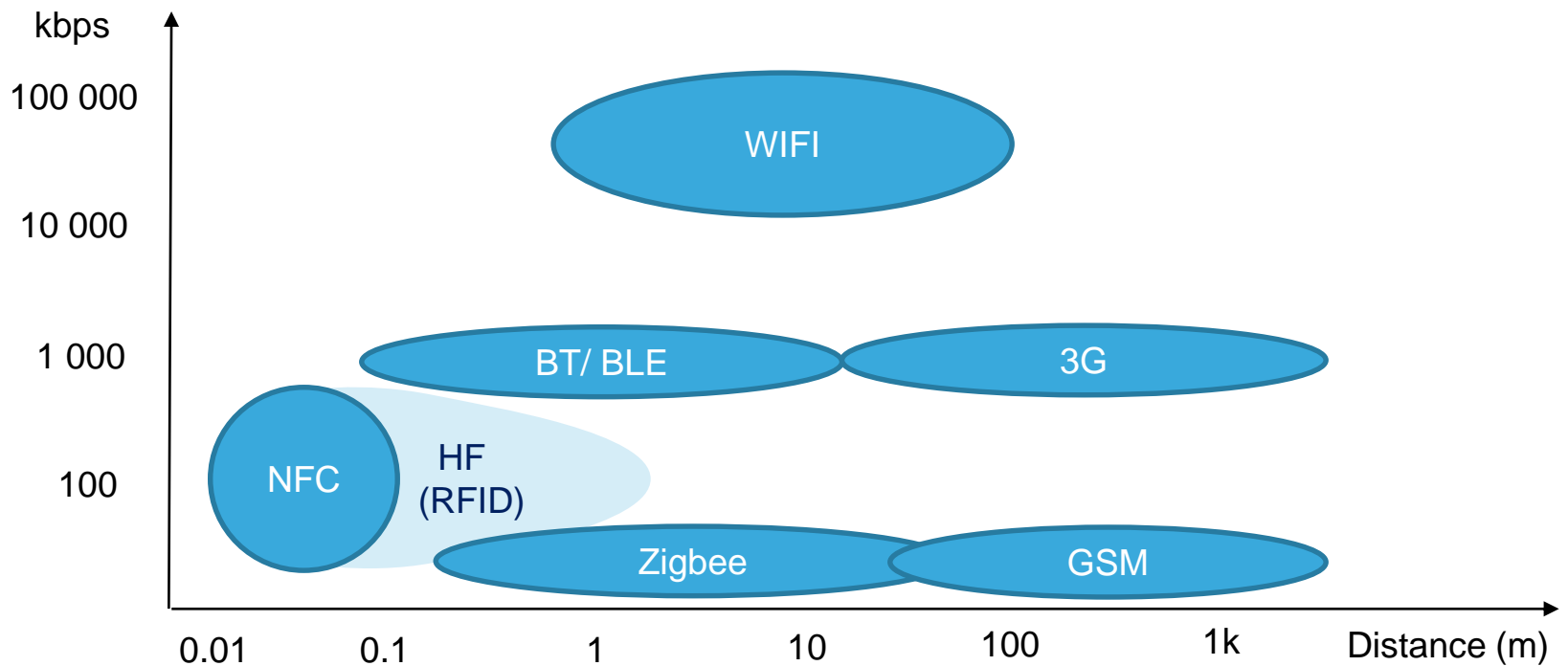
NFC technology at a glance

- Near Field Communication, a **short range** wireless technology operating at **13.56 MHz** based on the RFID HF standard (ISO 14443 & ISO 15693)
- Interactive and zero power, enabling convenient connection to the Internet of Things
- NFC is developed by the NFC Forum
 - To ensure interoperability between devices
 - Standardized use cases (web link, Bluetooth handover,...)
- Fast growing deployment in Mobile
 - In 2016, more than 60% of smartphones are compatible with NFC
 - NFC is used for ApplePay, and in 2017 Apple announced support of NFC tag reader mode from iOS11 onwards

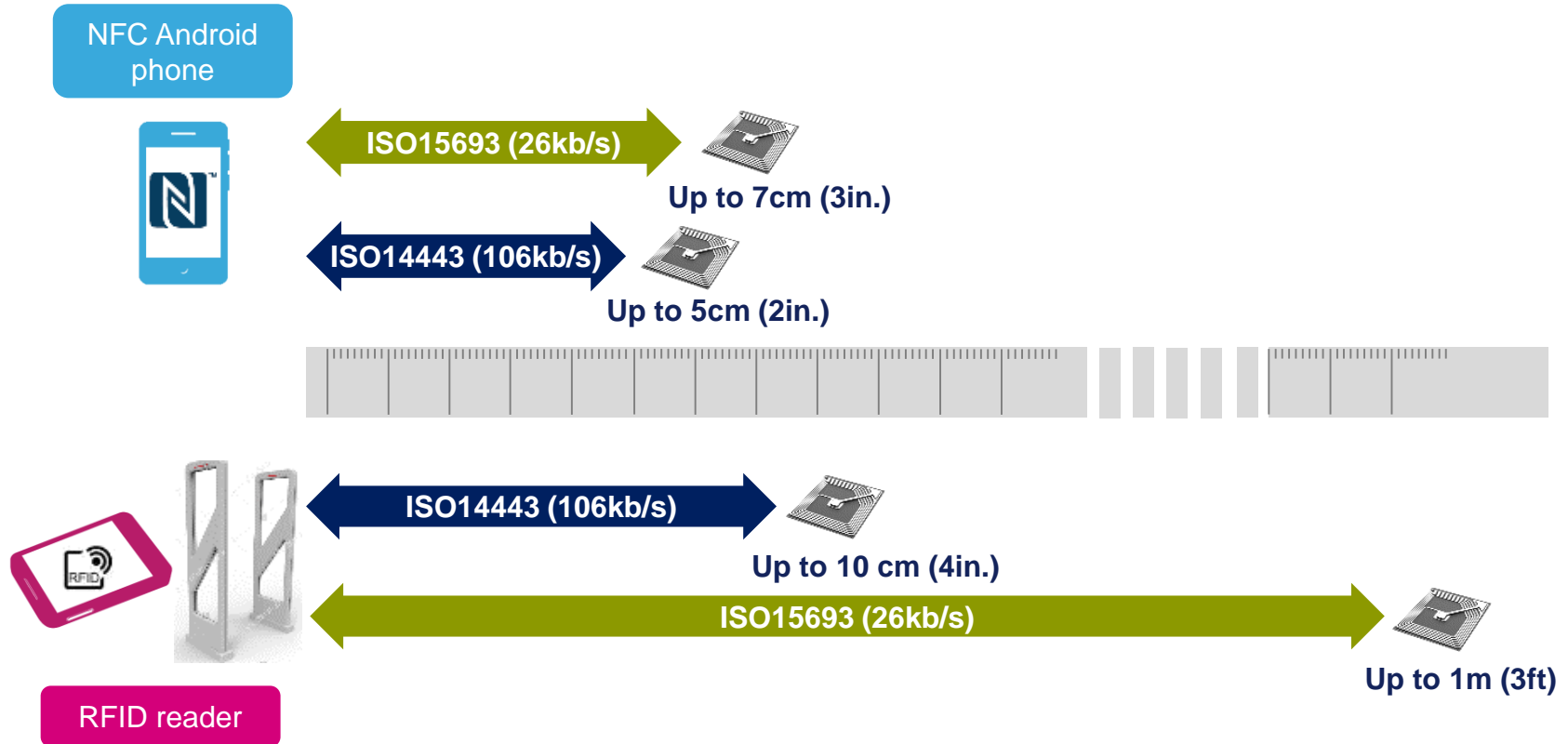


NFC technology position

- Complementary to Wi-Fi or Bluetooth

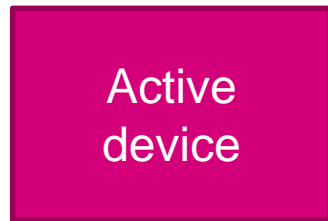


Typical RF range



- ISO15693 is called « long range » standard
- ISO14443 is called « short range » standard while with higher RF speed

- NFC device can act like:



Reader/writer



Tag / Card

Zero Energy

- **Reader mode:** Reader/Writer drives the communication with the tag. Tag can only answer to Reader/Writer requests.
- **Card Emulation:** Device acts like a Tag or Card
- **P2P mode:** Each active device can switch personalities between Reader and Tag on the fly.

Reader/Writer
(Active device)

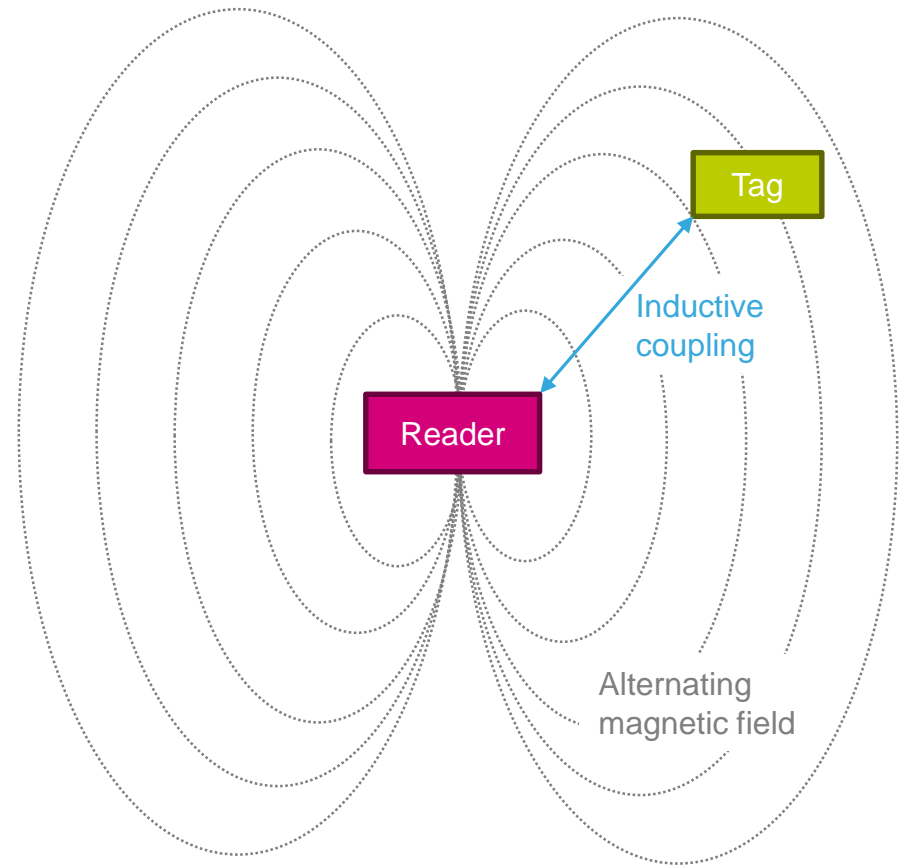


Tag
(Passive)

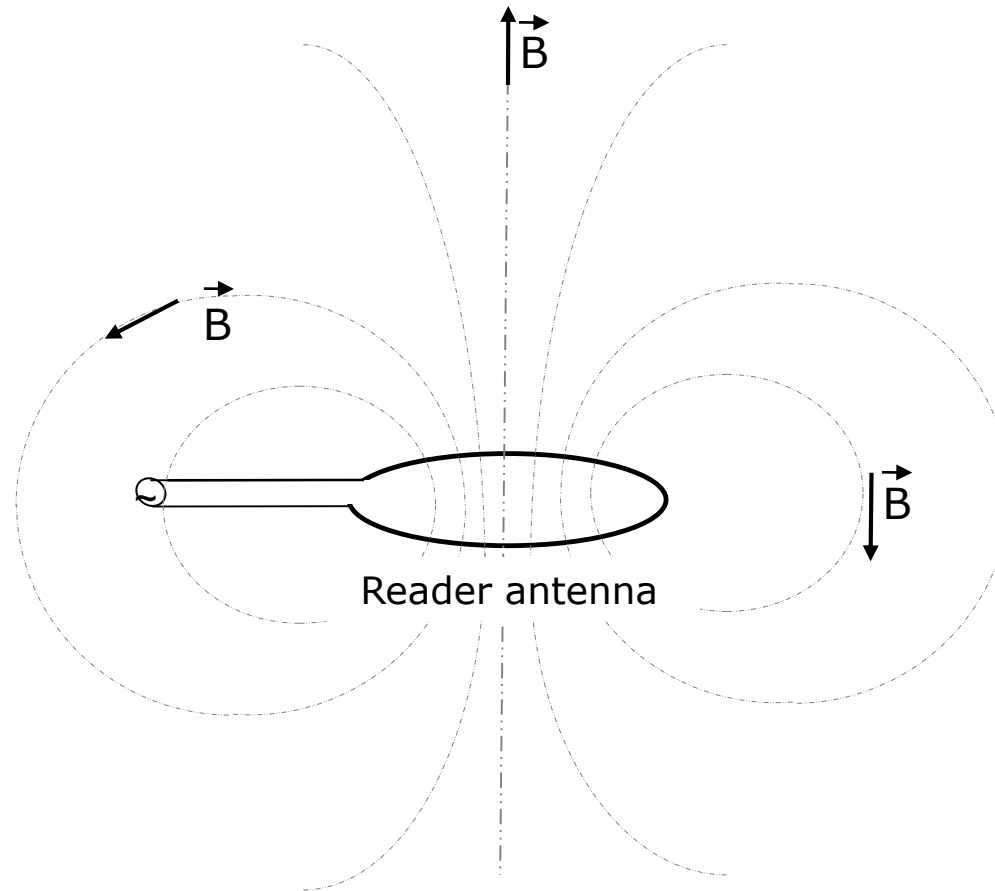


How can we communicate?

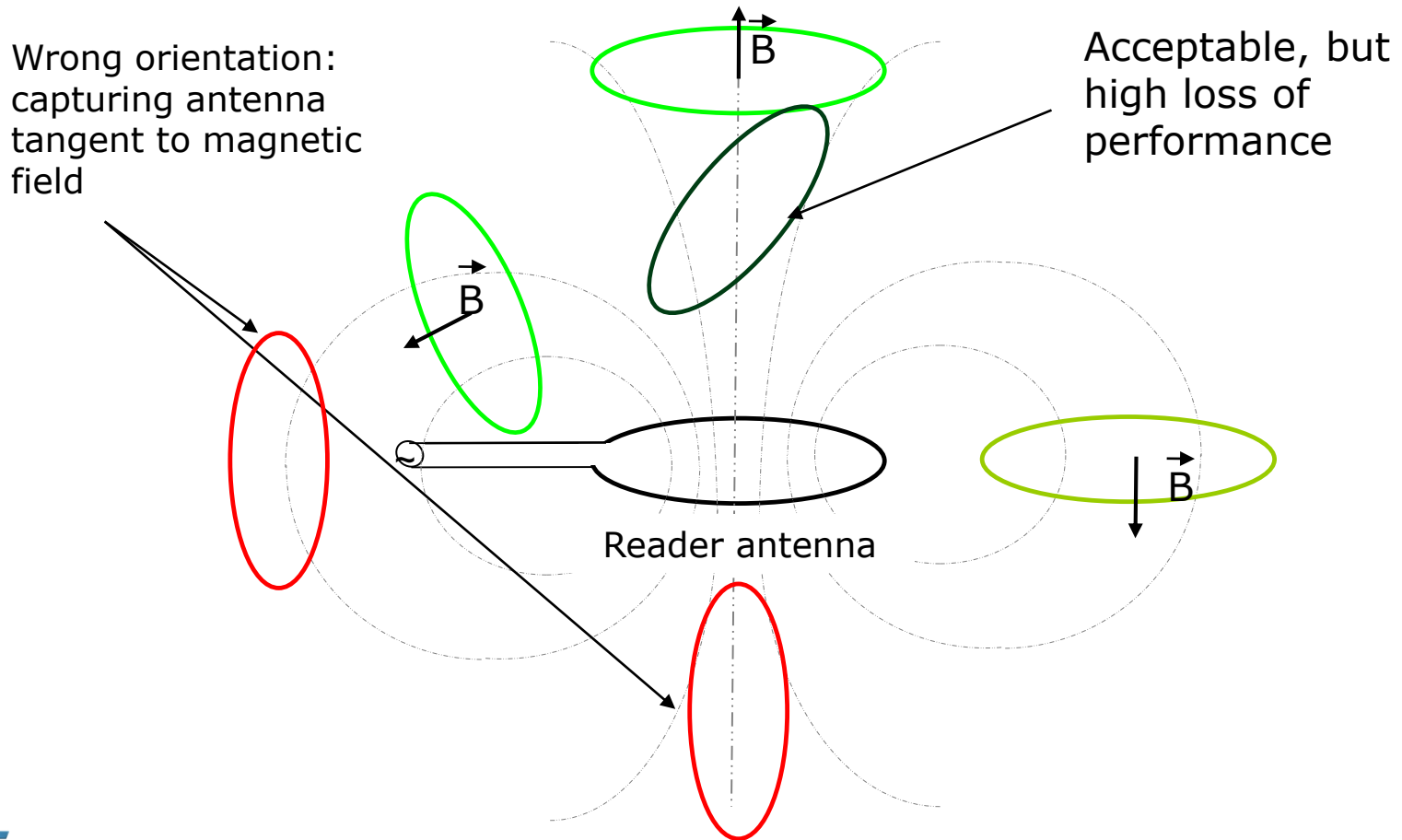
- Communication is based on magnetic field (similar well known circuit is transformer)
- The **reader** generates an alternating magnetic field (carrier frequency) that powers the tag
- The **reader** modulates the carrier frequency to provide information to the tag
- The **tag** modulates reader's field to provide answer to the reader (backscattering concept)



Magnetic field generation



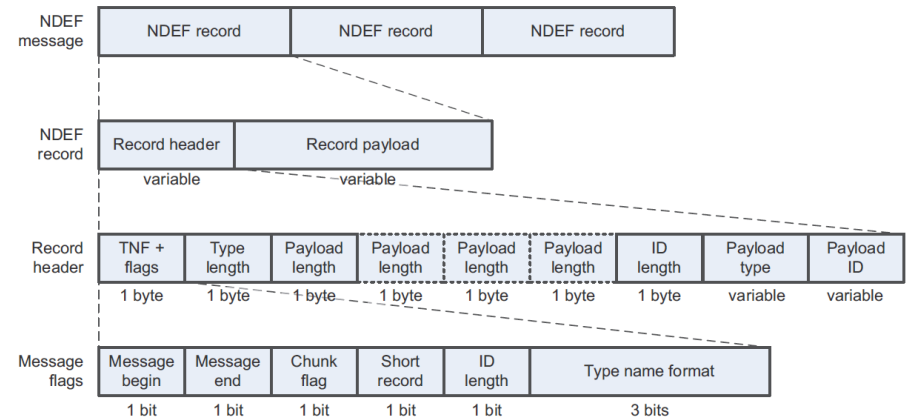
- Energy capture depends on antenna orientation in magnetic field



- ITU standards
 - Frequency and power limits
- ISO standards
 - HF RFID standards, originally for contactless cards
 - Standardize physical interface, frames, anti-collision
 - Main standards
 - ISO 14443
 - ISO 15693
 - ISO 18092
- NFC Forum standards
 - Based on existing ISO standards. NFC forum reuse them and add new features
 - Technical specification of protocols
 - Data exchange format
 - NFC forum tag types
 - NFC record type
 - And many more...



- NFC data exchange format
- Used across all NFC devices
 - Regardless of the underlying tag type or NFC device technology
 - Every NFC device know how to interpret them
- Light-weight binary message format
 - Encapsulates one or more NDEF records into a single message
 - NDEF records can be the same or of different type
 - Each NDEF record contains
 - Header
 - Payload

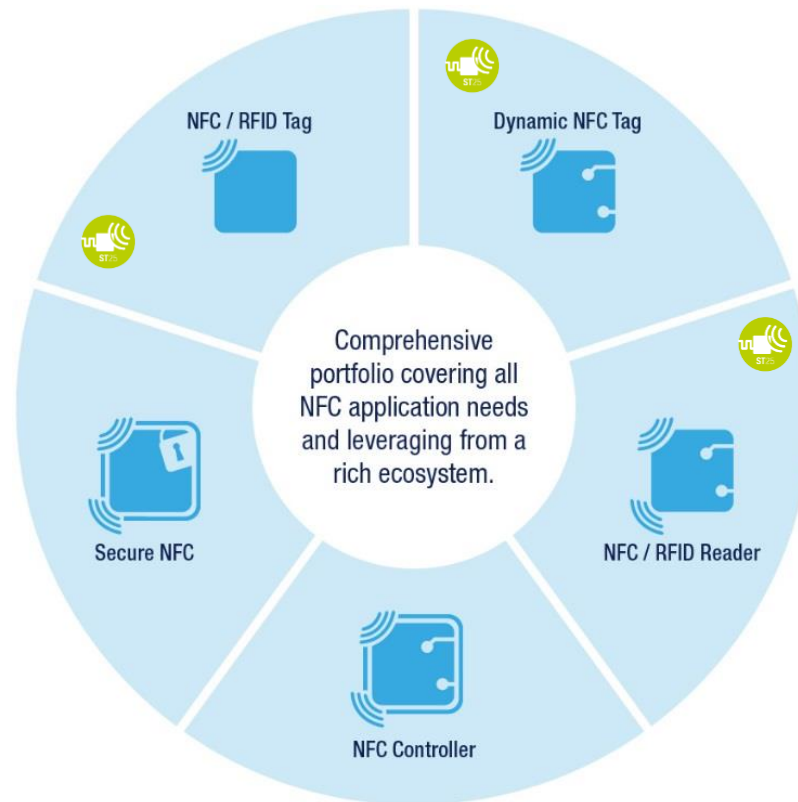


- Examples of NDEF records
 - Simple text record
 - URI
 - vCard (a standard electronic business card format)
 - Pairing Bluetooth or Wi-Fi



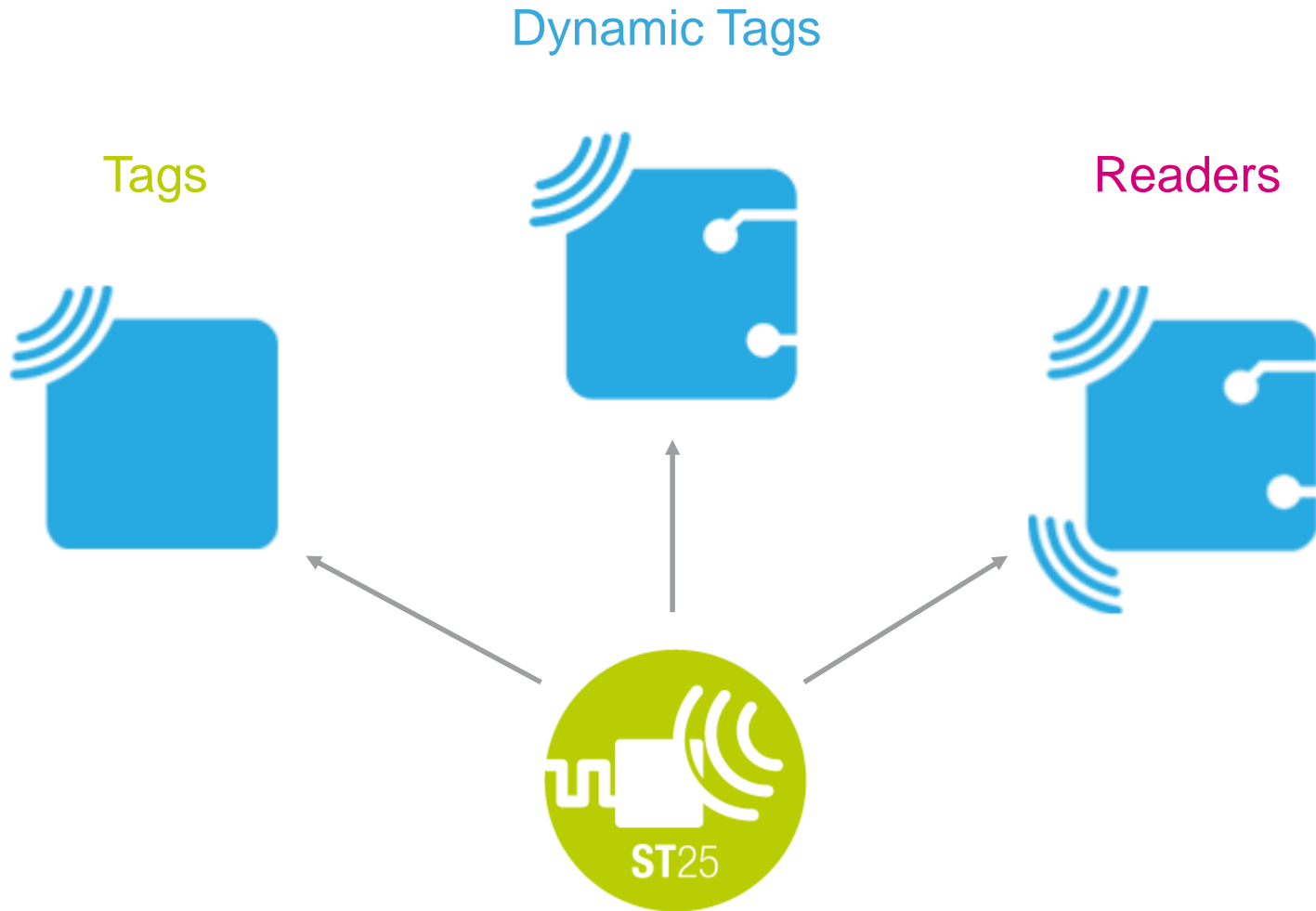
NFC portfolio with focus on ST25DV

Covering all NFC application needs and leveraging a rich ecosystem



www.st.com/nfc

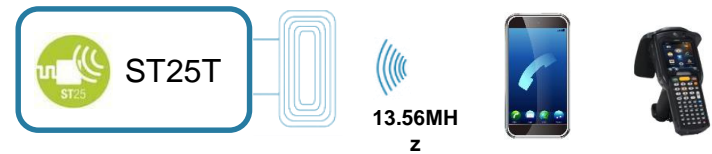
ST25 NFC / RFID elements



ST25: NFC comprehensive solutions

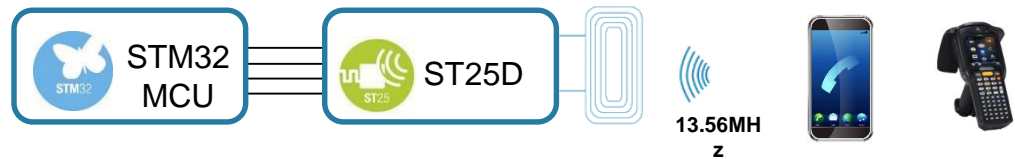
Ticketing, Gaming, Medical, Brand protection, Access control, ...

NFC Tags 



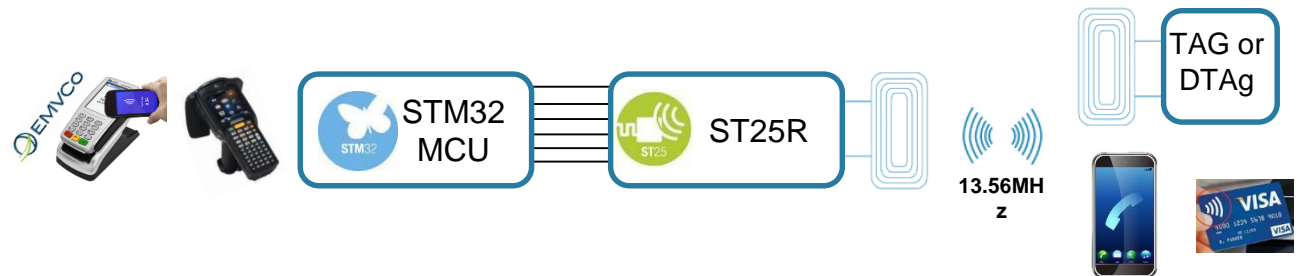
Industrial, Consumer, Metering, Appliance, ...

NFC Dynamic Tags 



POS & mPOS Terminals, Gaming, Medical, Brand protection, Access control, ...

Readers 

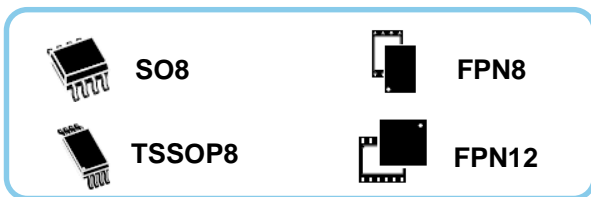
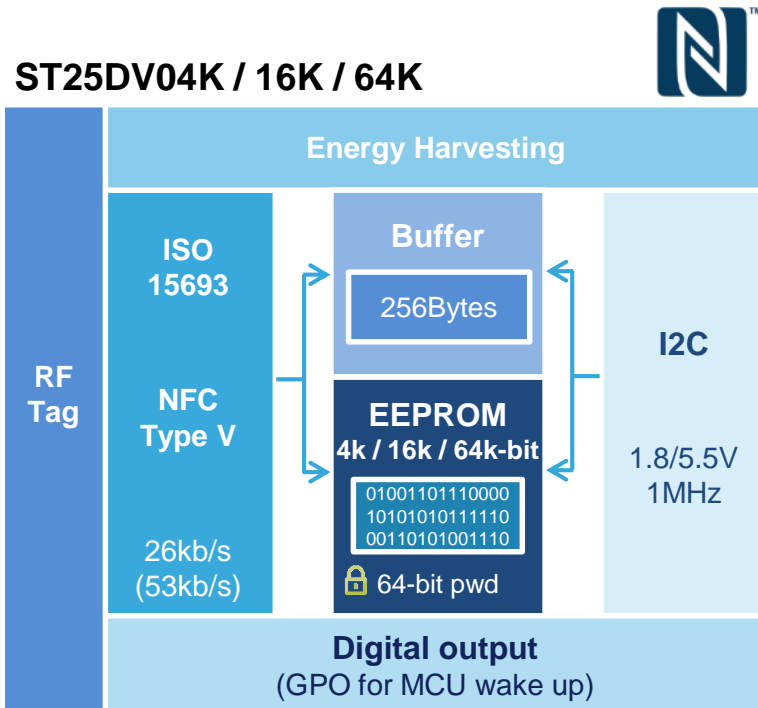


One-stop-shop for tags and readers

Tags			Dynamic tags			HF Readers			UHF Readers	
ST25TA	ST25TB	ST25TV	M24SR	M24LR	ST25DV	CR95HF ST95HF	ST25R3909 * ST25R3910	ST25R3911B - ST25R3915	ST25RU3991 * ST25RU3992 *	ST25RU3993 ST25RU3980
ISO14443-A 106kb/s NFC type 4	ISO14443-B 106kb/s	ISO15693 up to 53kb/s NFC type 5	ISO14443-A 106kb/s NFC type 4	ISO15693 up to 53kb/s	ISO15693 up to 53kb/s NFC type 5	ISO14443-A/B ISO15693	ISO14443-A/B ISO15693 FeliCa	ISO14443-A/B FeliCa ISO15693 ISO18092	ISO18000 6c & b Gen2 Protocol	ISO18000 6c & b Gen2 Protocol
EEPROM 512b-64Kbit 40-year 1Mcycles	EEPROM 512b -Kbit 40-year 1Mcycles	EEPROM 2K & 64Kbit 40-year 1Mcycles	EEPROM 2Kbit to 64Kbit 200-year 1Mcycles	EEPROM 4Kbit to 64Kbit 40-year 1Mcycles	256Bytes buffer EEPROM 4Kbit to 64Kbit 40-year 1Mcycles	Reader / Writer Card Emulation	Reader / Writer Limited P2P	Reader / Writer P2P EMVco & PBOC AECQ100	Reader / Writer -66/86dBm sensitivity Internal VCO	Reader / Writer -90dBm sensitivity Internal VCO
128bit password 20bit counter UID Field Detect	32bit counters Lock OTP bits UID	32bit password UID	128bit password RF disable Field Detect	32bit password E-harvesting Field Detect	Fast transfer mode 64bit password E-harvesting Field Detect	-	AAT	VHBR AAT Multi Antenna Dynamic output power	Low noise VCO DRM compliant	Dense Reader Mode Linear RSSI Automatic PSRR Auto ACK
			I2C 2.7V - 5.5V 1MHz	I2C 1.8V - 5.5V 400kHz	I2C 1.8V - 5.5V 1MHz	2Mbit/s SPI & UART 2.7V - 5.5V 230mW	6Mbit/s SPI 2.4V - 3.6V 700mW max	6Mbit/s SPI 2.4V - 5.5V 1 - 1.4W max	2Mbit/s SPI 4.1V - 5.5V 0/20dBm Output	5Mbit/s SPI 2.7V - 3.6V 0/20dBm Output

(*) NRND: Not Recommended for New Design

ST25DV new dynamic NFC tag



• Use cases

- Fast data exchange with NFC phones / HF readers in long range
 - Fast data transfer for MCU FW upgrade, fast data exchange
 - Parameters settings and update, in the box programming
 - Data log download
- Battery less applications

• Key Features

- **ISO15693** and **NFC Type 5**
- **Fast data transfer** thanks to 256 Bytes buffer
- Low Power mode, < 1µA power consumption in Standby
- **Energy harvesting** function through RF

• Key Benefits

- Smart applications using a **flexible interrupt GPO**
- Enhanced protection with multiple **64-bit passwords**
- Cost optimized discovery kit with Android app
- Same 28.5pF internal RF tuning capacitor, as in M24LR

Easy to use and customer oriented

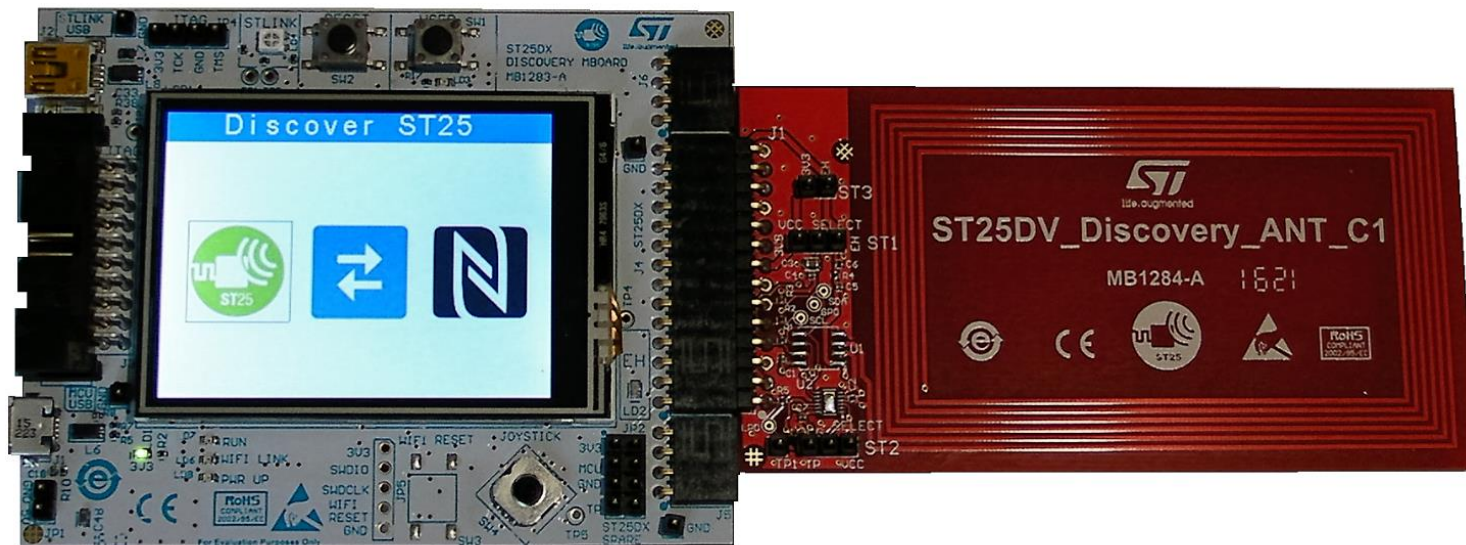




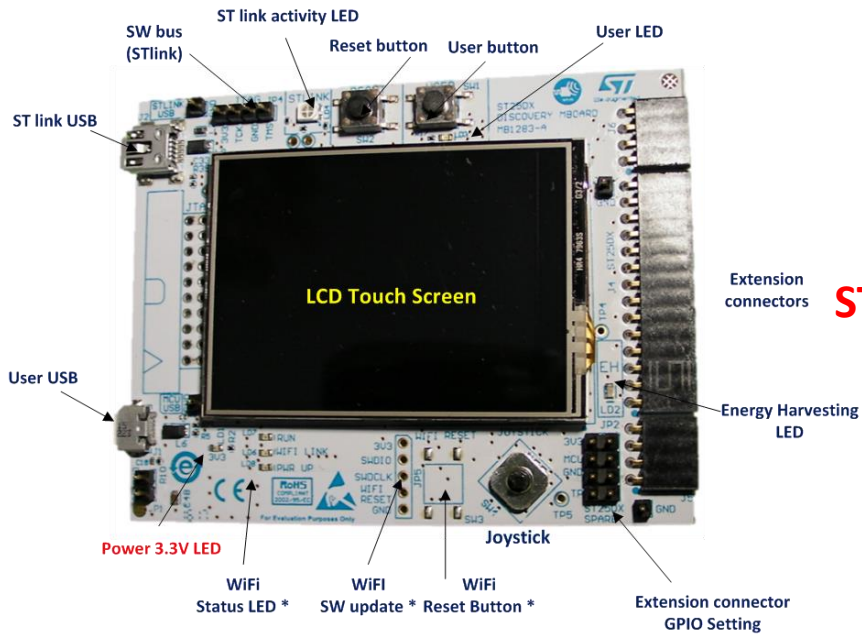
Tools used in this session

- ST25DV-DISCOVERY

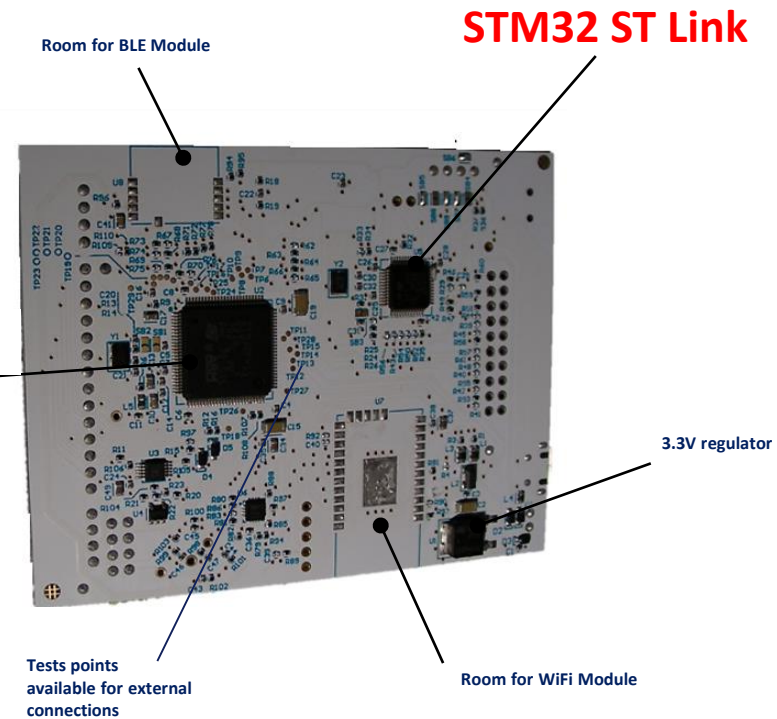
- A demonstration kit to evaluate the features and capabilities of the ST25DV series
- Based on ST25DV04K
- Touchscreen user interface
- <http://www.st.com/en/evaluation-tools/st25dv-discovery.html>



Main board



STM32F415



ST25DV Discovery

Extension board with dynamic tag and antenna

- 1 LPD
- 2 EH
- 3 Gnd
- 4 GPO
- 5 I2C_SCL
- 6 I2C_SDA
- 7 Gnd
- 8 VCC_3V3
- 9
- 10
- 11 Gnd
- 12
- 13
- 14 Gnd

Antenna class-1

Antenna class-5

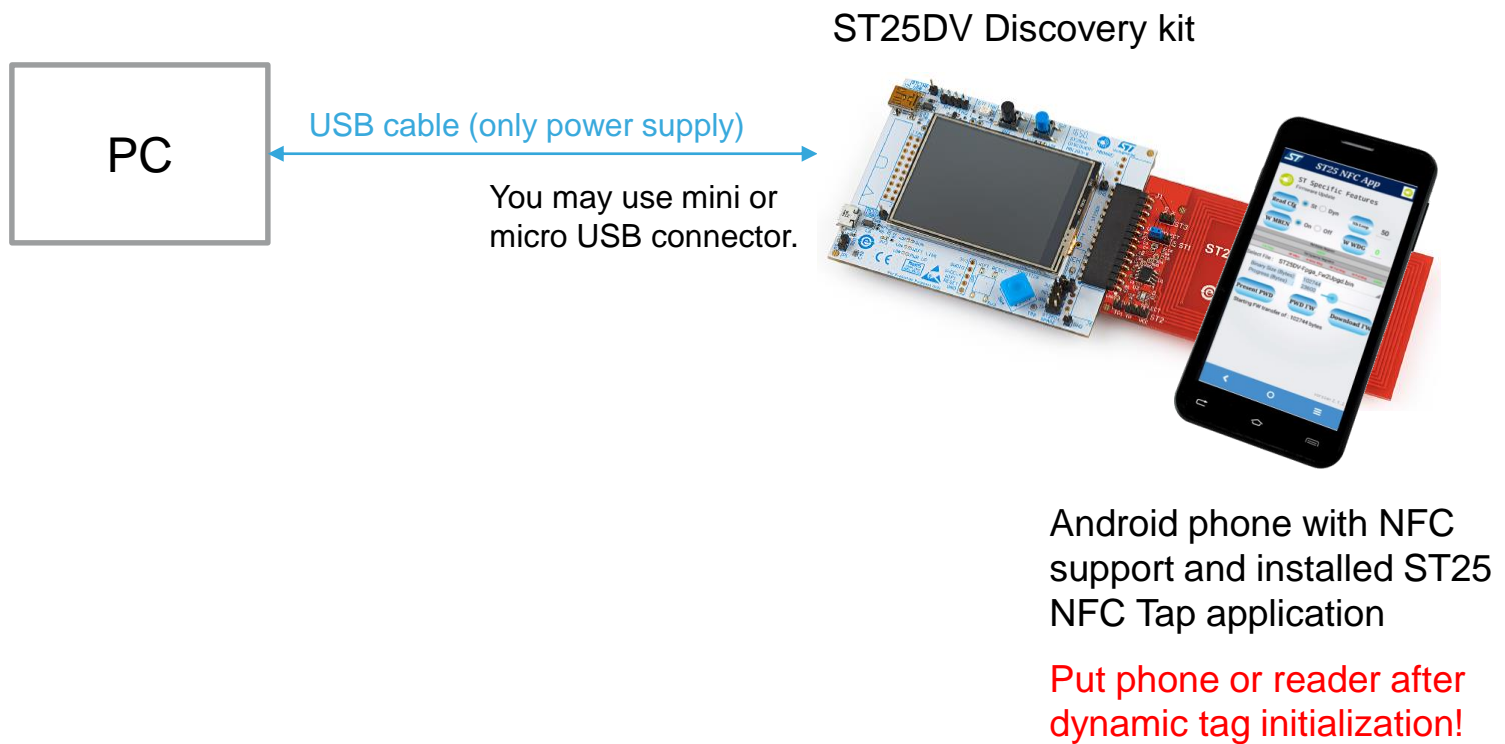
Antenna class-6

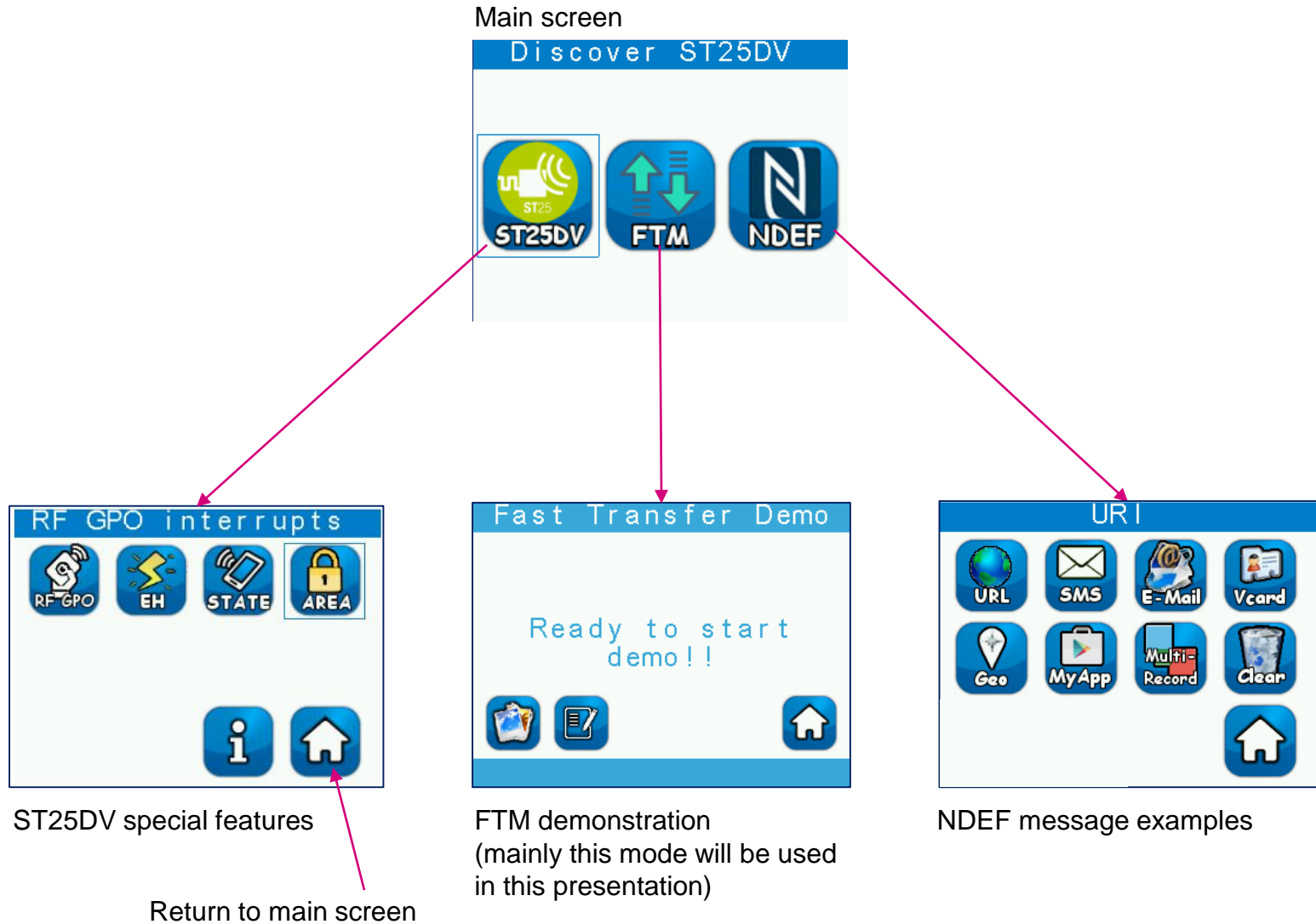


ST25DV04K on all extension boards



- During this session we will be using this board in this configuration





- Android application dedicated to handle
 - NFC tag (ST25TA)
 - Dynamic NFC tags (M24SR, M24LR, ST25DV)
- Key features
 - Read / Write NDEF messages
 - Tag information
 - NDEF, ISO14443 Type A (ISO-DEP), ISO15693
 - Specific functionalities (Counters, GPO control, Memory area and Registers, according to tag found)
 - Password management (Password Authentication, Tag protection)
 - Fast transfer mode (ST25DV series)
- Download
 - [Google Play](#) (use in Android phone)
 - [ST site](#)

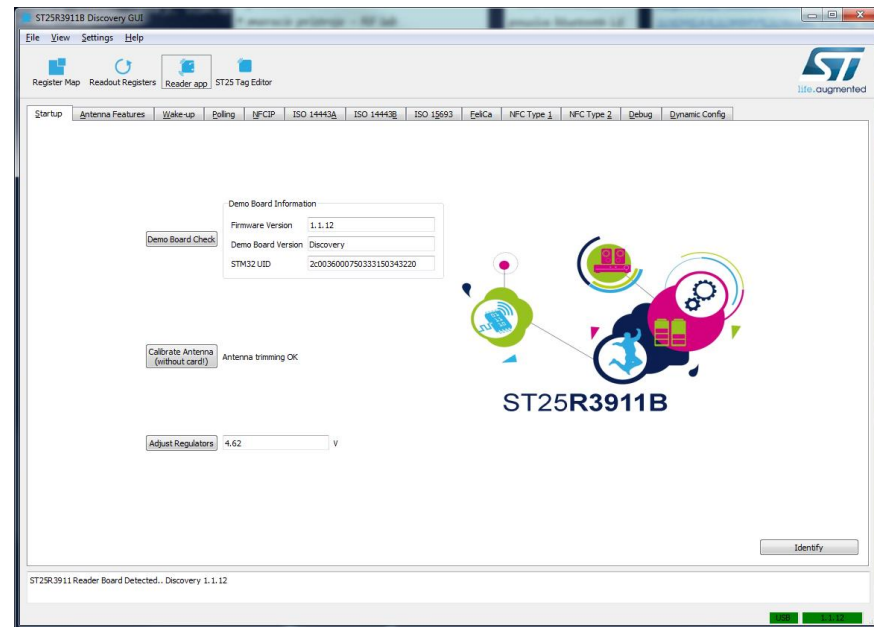


- During the workshop will be used Android phones with preinstalled ST25 NFC Tap app, version 1.0.10



Position of the NFC antenna inside the phone is marked by a label. It is the place with the strongest RF field.

- NFC reader based on ST25R3911B
 - Supports ISO14443, ISO15693, ISO18092, FeliCa™
 - Output power up to 1.4 W, Automatic antenna tuning, inductive & capacitive wake-up



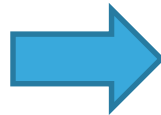
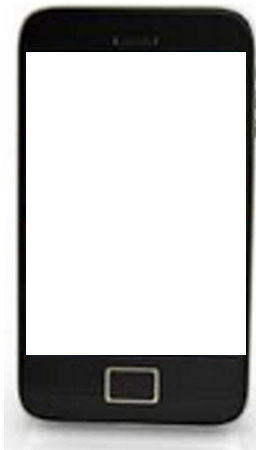


URL NDEF hands-on example

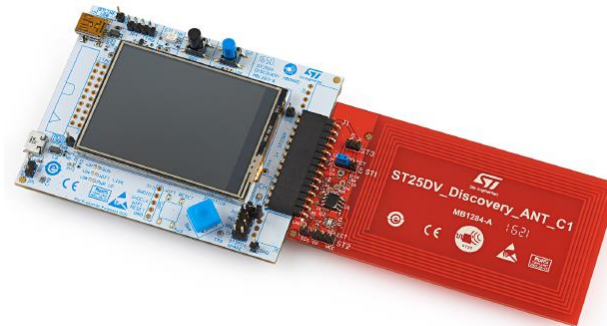
URL NDEF hands-on example

- Goal of this example is to show reading and writing of NDEF message and its native support in mobile phones
 - It can be tested by the tag or the dynamic tag

Mobile phone
with ST25 App



ST25DV Discovery (dynamic tag)



Configuration of ST25DV board



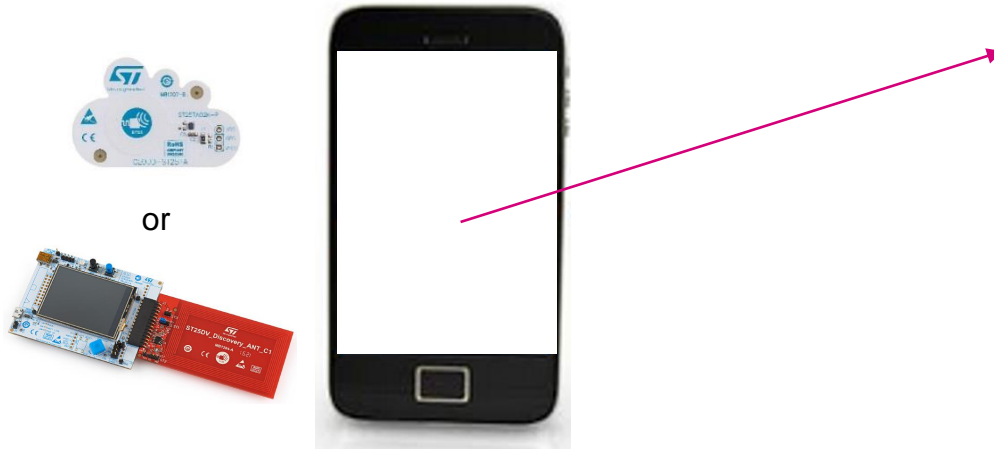
Then from the
menu select
"Store URL"

ST25 App is needed
only for writing of
NDEF message

After this setting in dynamic tag is stored NDEF message
with URL content "<http://www.st.com/st25>"

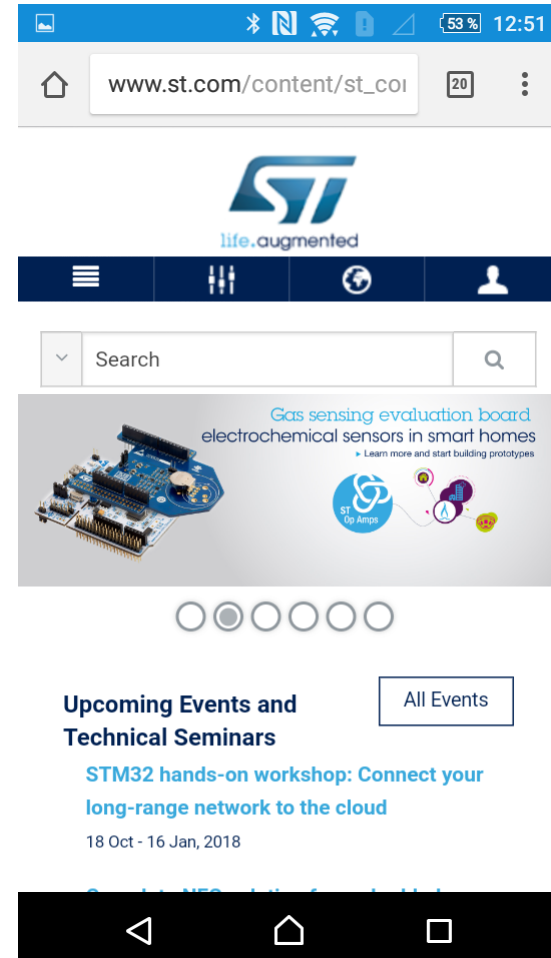
Read NDEF message

1. Make sure that NFC in phone is active and tap NFC tag or configured dynamic tag.



2. Android has native support of reading NDEF messages. NDEF message is automatically processed.

3. URL opened in a browser



Write NDEF message (1/2)

- In these steps is the original NDEF message deleted

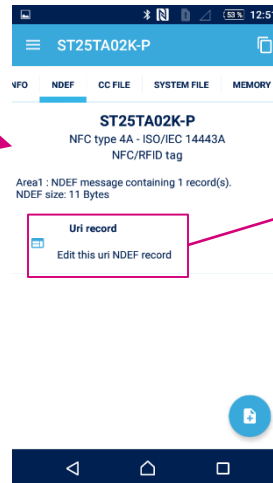
1. Open ST25 NFC Tap app and tap NFC tag



2. In information tab click NDEF



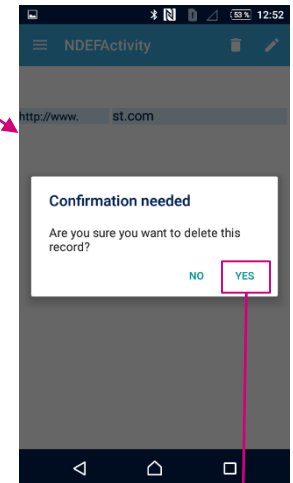
3. Edit current NDEF message



4. Delete current NDEF message



5. Confirm deletion



Now is the current NDEF message deleted

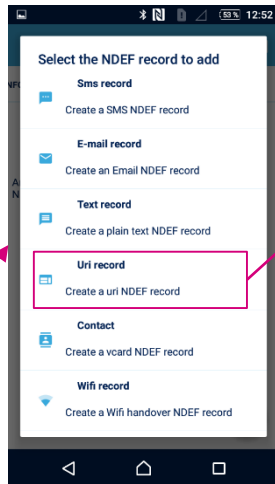
Write NDEF message (2/2)

- In these steps is the new NDEF message created and stored

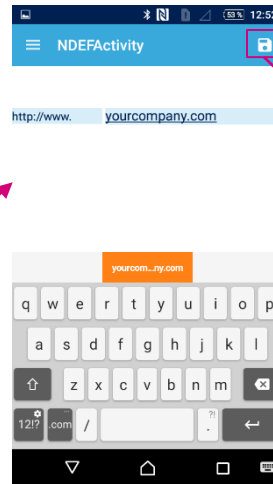
6. Add new NDEF message



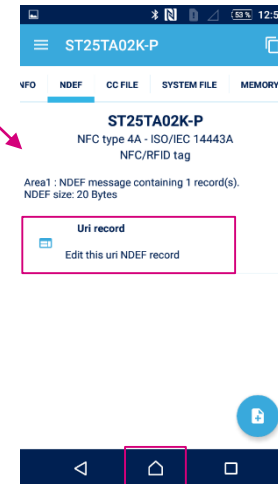
7. Select type (URI record)



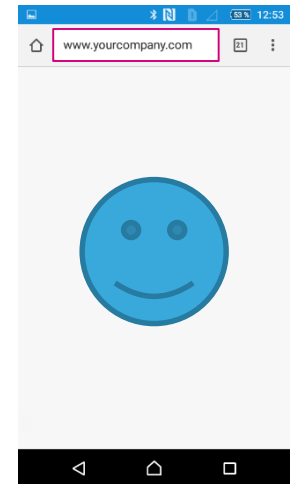
8. Type your URI and click save



9. New NDEF message was added



10. Try to read the tag again

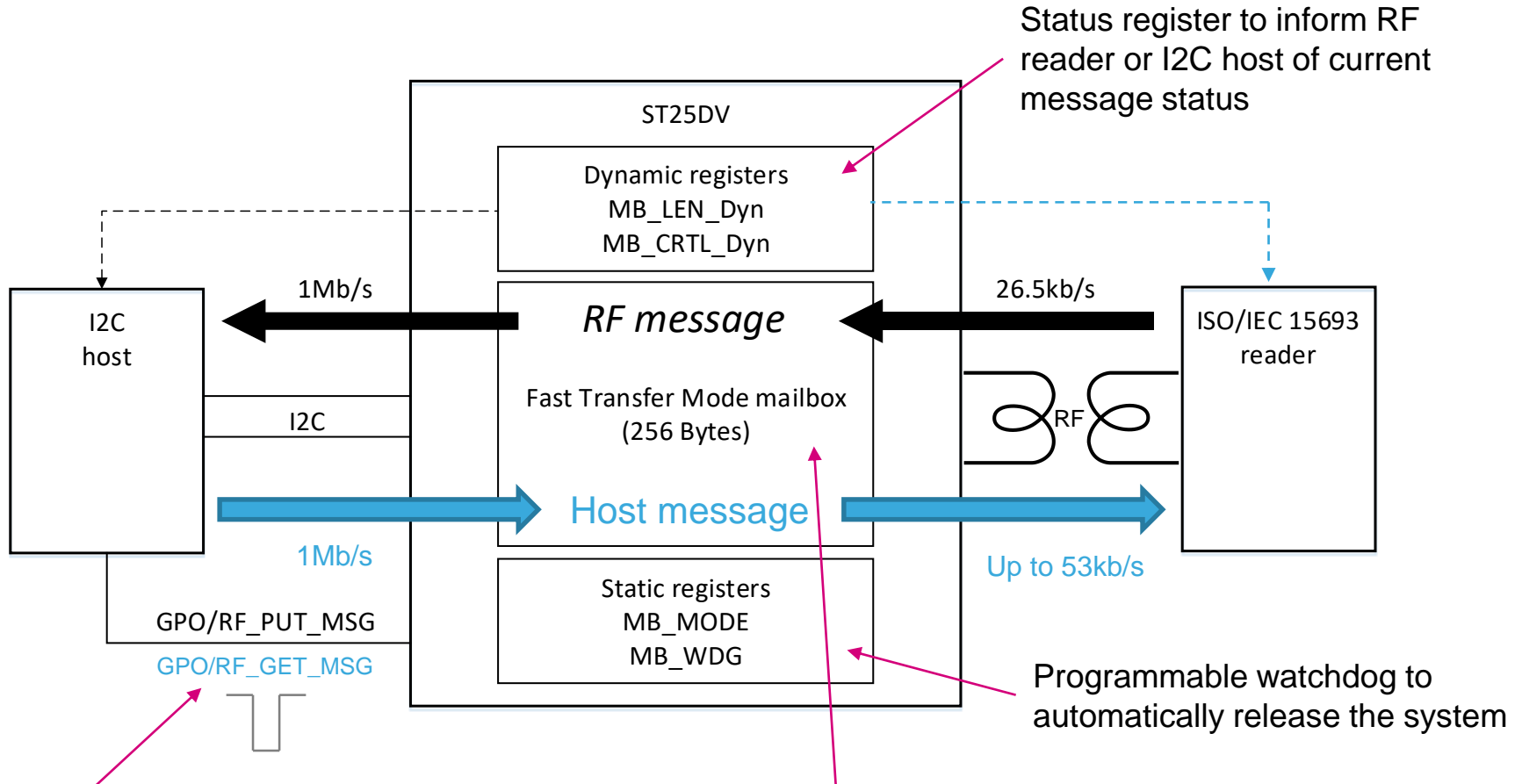


After this step you may exit the ST25 NFC app.



Data transmission by using FTM in ST25DV

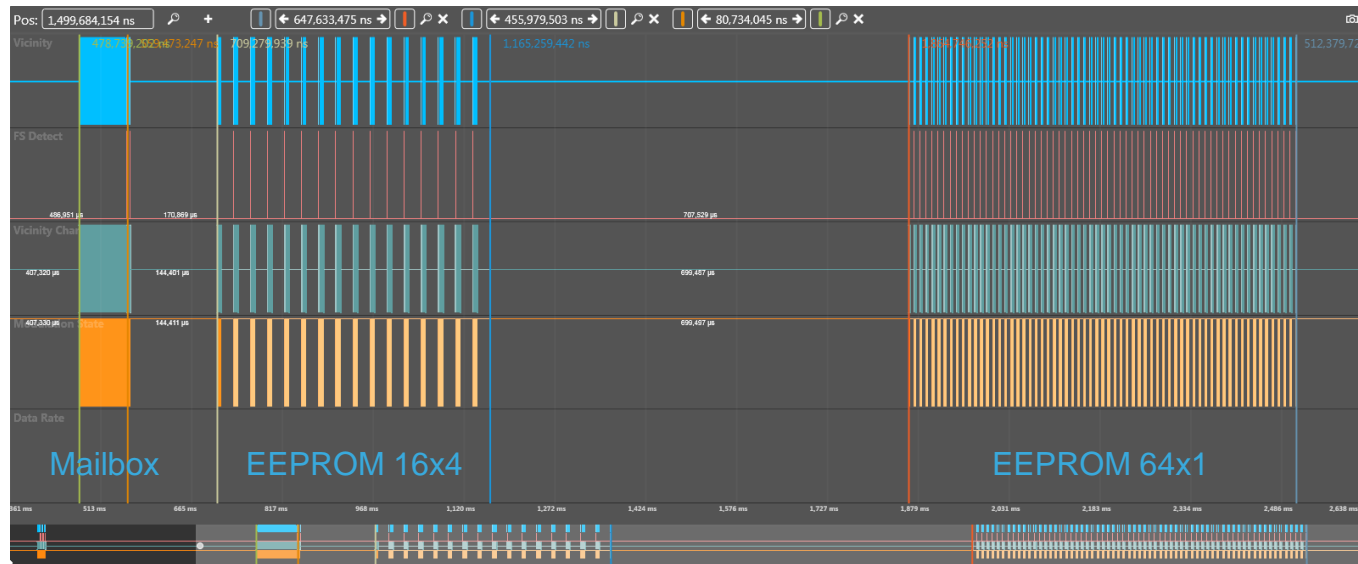
Fast transfer mode (FTM)



Interruption on GPO pin to wake I2C host on message read and/or message write

- 256 bytes half-duplex buffer for fast data transfer
- ST25DV acts as a mailbox between I2C host and RF reader
- Write in mailbox is immediate (as opposed as write in EEPROM)

- Fast transfer mode write advantage over write in EEPROM



- RF (High DR) 256 bytes write:
 - EEPROM (64xWrite Single Block): ~648 ms
 - EEPROM (16xWrite Multi Blocks 4 blocks): ~456 ms
 - Mailbox (1xWrite Message 256 Bytes): ~80 ms
- I2C (1MHz) 256 bytes write:
 - EEPROM: ~320 ms
 - Mailbox: ~2.3 ms
- Read time is equal from EEPROM and from FTM, both in RF and I2C

- Measured use case: 100 KBytes transfer from smartphone to μ C

Smartphone	ST25DV + Nucleo F411
Samsung S6	46s
TC75 Zebra	48s
Samsung S6 Edge	48s
Samsung S5	47s
Galaxy Express	71s
Samsung SHV-e300S	48s
Huawei Nexus 6P	46s
HTC One X+	591s (1/256 only)
Galaxy J7	46s

- M24LR is around 10 minutes for the same transfer through EEPROM

- Communication protocol used in the following examples
- Fast Transfer Mode buffer (Mailbox) is used to exchange:
 - Request Type (R2H transfer, H2R transfer, Password transfer)
 - Part of Data to be transmit (FWU, Picture, Binary Data)
 - Acknowledge of Data transfer
 - CRC value for Transfer Integrity check
- Mailbox data = 256 bytes
 - Single frames (CRC, Acknowledge, FWU Password)

Header (5 bytes)

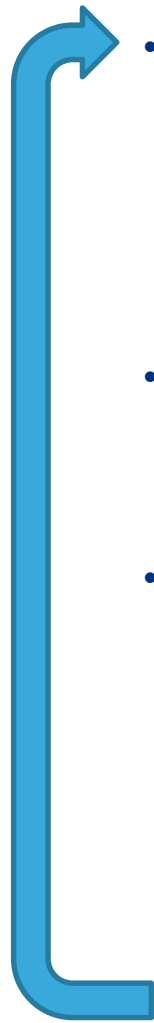
Payload (≤ 251 bytes)

- Multi frames to transmit more than 256 bytes in several frames

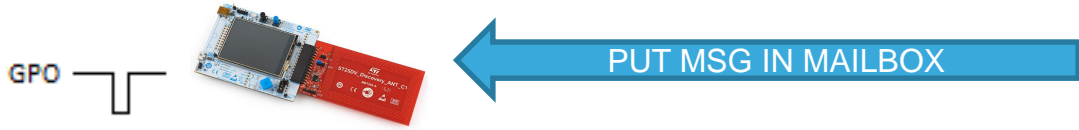
Header (13 bytes)

Payload (≤ 243 bytes)

From reader to host (R2H)



- RF READER put a Message in the Mailbox



- GPO interrupt inform the HOST that a message has been put in Mailbox

- RF READER wait for the HOST to read the message (Polling)



- HOST read the Message in the Mailbox



- MB Register Bit is set to inform the RF READER that the message has been read by the HOST

The RF READER CAN NOW put a new message in the mailbox

From host to reader (H2R)

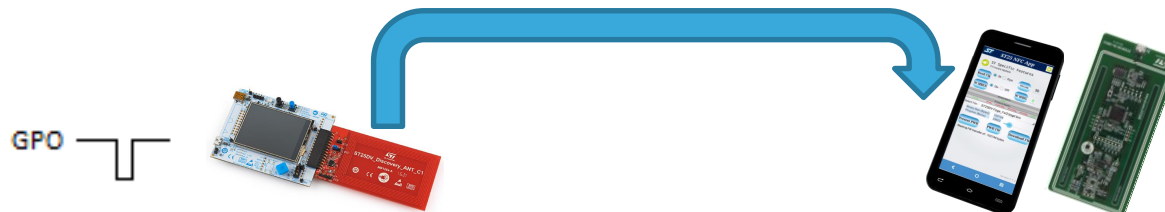
- RF READER wait for the HOST put the message in Mailbox (reading MB register)



- HOST put a Message in the Mailbox



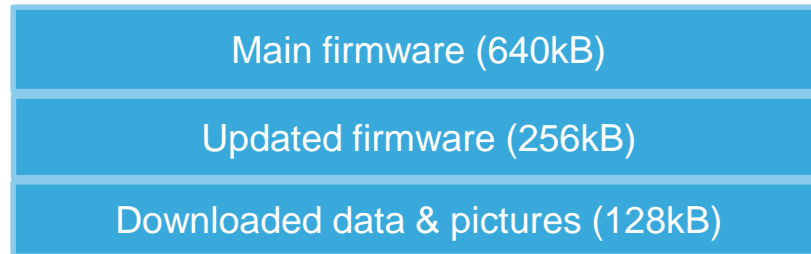
- MB Register bit is set to indicate that a message has been put by the HOST
- RF READER read the Message in the Mailbox



- GPO interrupt indicate the HOST that a message as been read by the RF Reader

The RF READER CAN NOW wait for a new message

- In the Discovery FW, flash memory is used to store data (in addition to the code)
 - 1MB Flash memory is split into 3 areas:



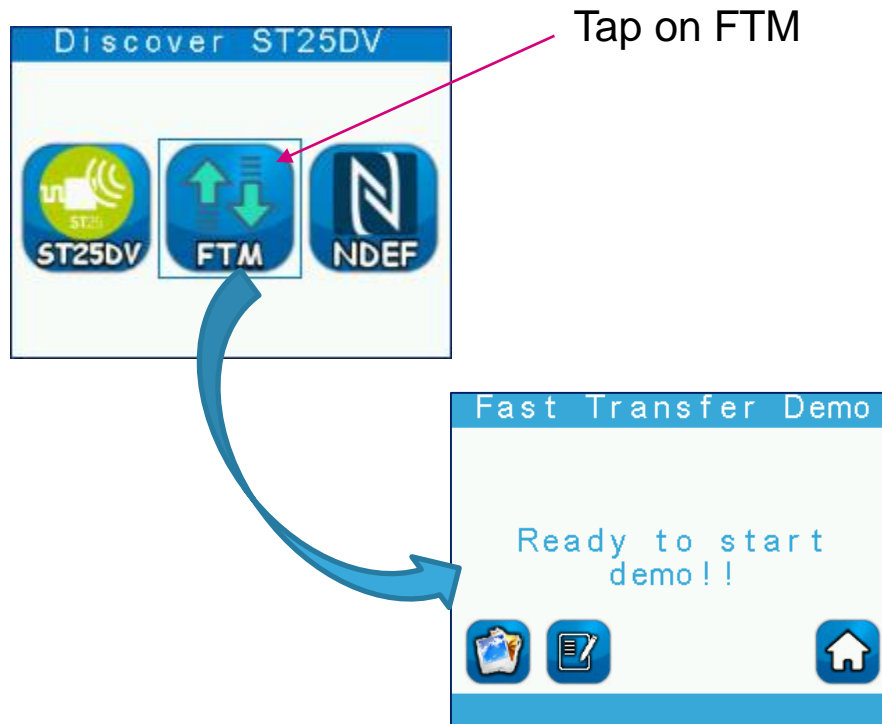
- List of source files used for FTM demo:

- mailbox.c
 - mailboxfunc.c
 - commonfunc.c
 - BSP nfctag drivers
 - ST25DV drivers
 - flash_if.c
 - fw_command.c
- } Mailbox functions, FTM protocol
 → GPO functions
 } ST25DV driver & BSP
 } Flash functions, firmware update



FTM example: Stopwatch

- Example demonstrates time synchronization between devices
- Setting of ST25DV board



Now is the ST25DV board configured to FTM demo.

You can tap mobile phone on the board's antenna.

- Settings in ST25 NFC Tap app

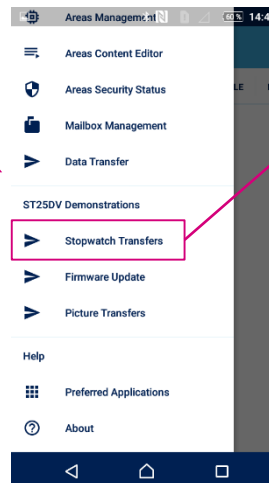
1. Open "ST25 NFC Tap" app and tap ST25DV board



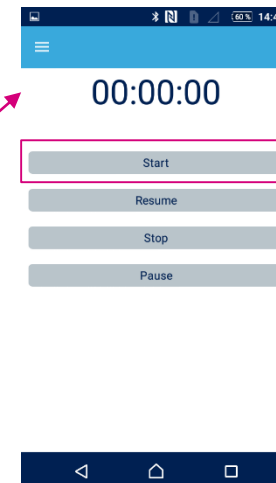
2. Click to menu



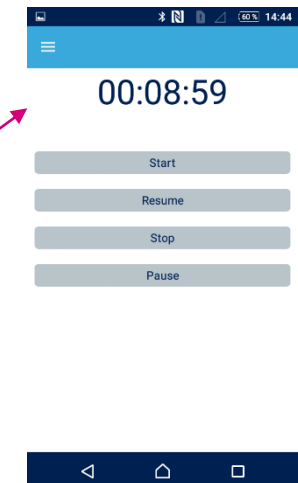
3. Scroll down and select "Stopwatch Transfers"



4. Start stopwatch

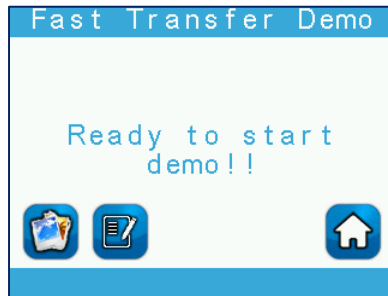


5. Times in the app and demo board should be synchronized



- Demo in ST25DV Discovery board

1. Default screen
in FTM mode



If stopwatch is started in
the ST25 NFC Tap app

2. Demo shows time value
aligned with ST25 NFC Tap app

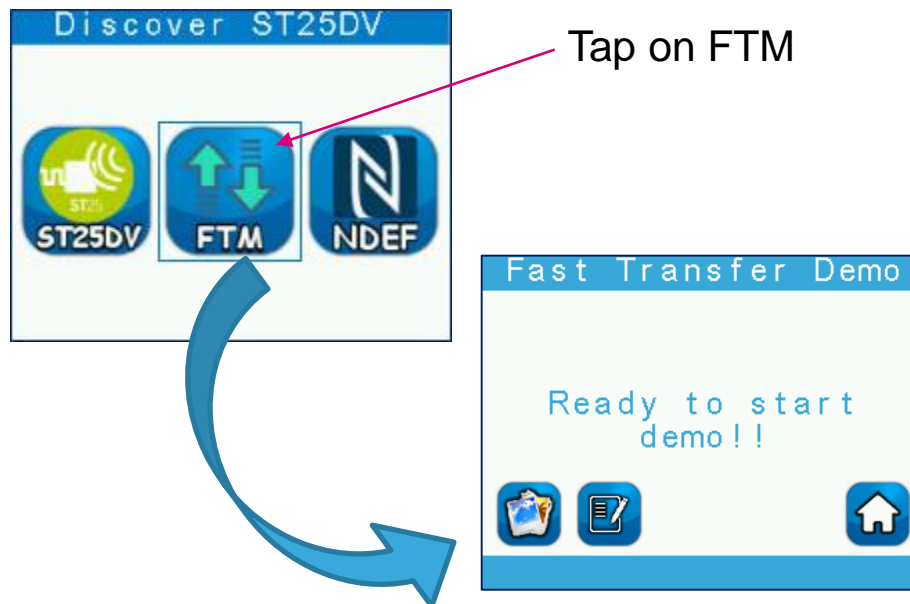




FTM example: Picture transfer

Picture transfer demo

- Example demonstrates transfer of picture between the ST25DV Discovery board and a mobile phone
 - Transfer from mobile phone to ST25DV Discovery board
 - Transfer from ST25DV Discovery board to mobile phone
- ST25DV Discovery board setting



Now is the ST25DV board configured to FTM demo.

You can tap mobile phone on the board's antenna.

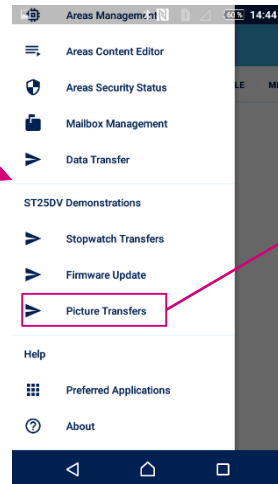
Picture transfer: phone → board

- Settings in the ST25 NFC Tap app

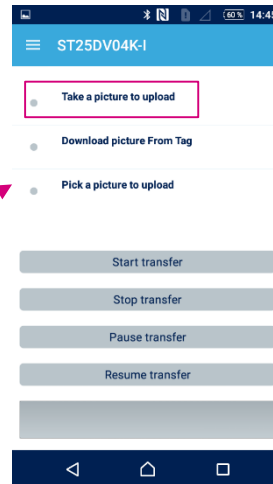
1. If there is the board in connection with the phone click to menu



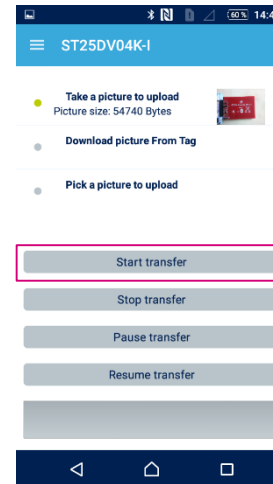
2. Scroll down and select "Picture Transfers"



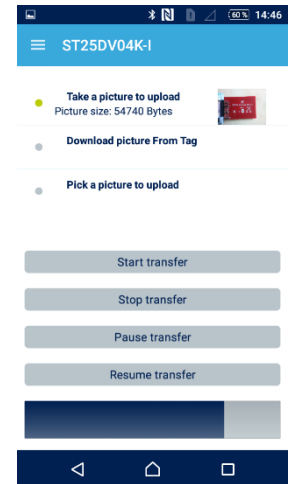
3. Click to "Take a picture to upload" and take a picture by camera



4. Click "Start transfer"



5. Picture is being transferred to the board

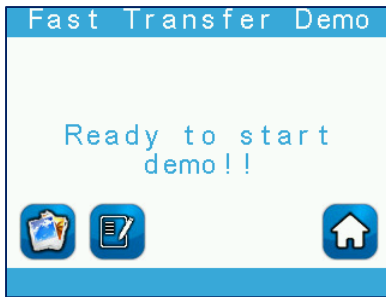


Take the picture!

Picture transfer: phone → board

- Settings in the ST25DV Discovery board

1. Board in FTM demo mode



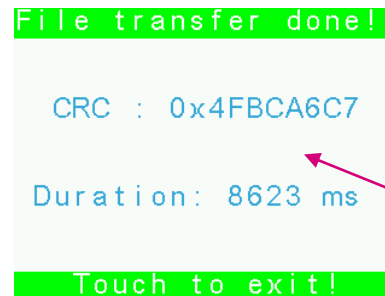
Transfer starts after settings in the mobile phone app



2. Transfer of picture



3. CRC and overall transfer time.



Tap for continue

4. Display of transferred picture

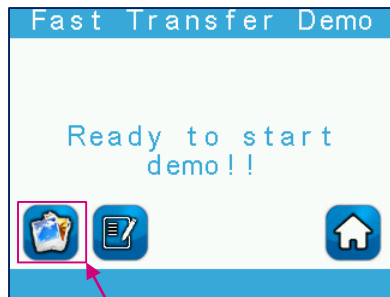


Tap for continue

Picture transfer: board → phone

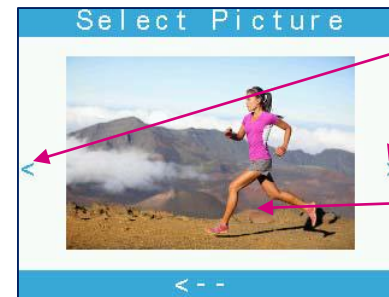
- Settings in the ST25DV Discovery board

1. Board in FTM demo mode



Select picture for the transfer

2. Select picture for transfer



Browse pictures

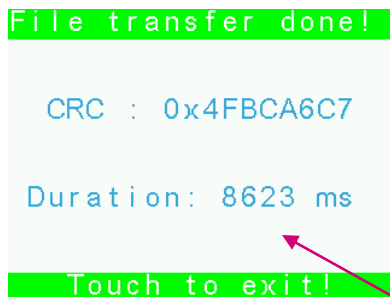
Tap on picture you want to transfer

Transfer starts after settings in the mobile phone app

3. Transfer of picture



4. CRC and overall transfer time.



Tap for continue

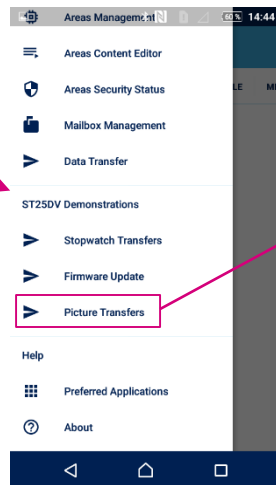
Picture transfer: board → phone

- Settings in the ST25 NFC Tap app

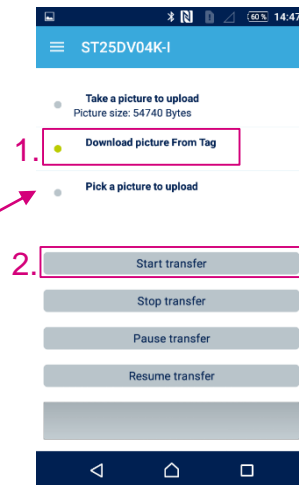
1. If there is the board in connection with the phone click to menu



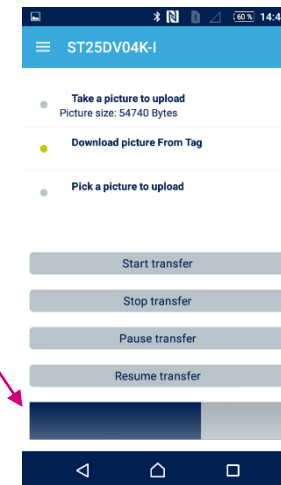
2. Scroll down and select "Picture Transfers"



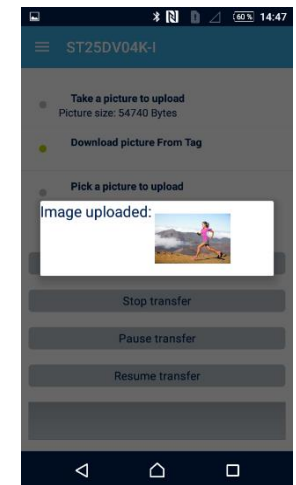
3. Click to "Download picture from a Tag" and then "Start transfer"



4. Picture is being transferred from the board



5. Display of transferred picture





IAP on STM32

Embedded Flash Features Overview

- F4 family has Up to 2 Mbytes . STM32F415 has only 1 MB
- 128 bits wide data read
- Byte, half-word, word and double word write
 - 32-bit Word Program time: 12µs (Typ)
- 512 Bytes One Time Programmable (OTP)
- Sector and mass erase
 - Sector Erase time:
 - 16KB: 400ms(Typ)
 - 64KB: 700ms(Typ)
 - 128KB: 1s(Typ)
 - Mass Erase time:
 - 1MB: around 2s(Typ)
- 10K Cycles by sector / 20 years retention

Block	Name	Block base address	Size
Main Memory	Sector 0	0x0800 0000 - 0x0800 3FFF	16 Kbyte
	·	·	·
	·	·	·
	·	·	·
	Sector 3	0x0800 C000 - 0x0800 FFFF	16 Kbyte
	Sector 4	0x0801 0000 - 0x0801 FFFF	64 Kbyte
	Sector 5	0x0802 0000 - 0x0803 FFFF	128 Kbyte
·	·	·	·
·	·	·	·
·	·	·	·
·	·	·	·
	Sector 11	0x080E 0000 - 0x080F FFFF	128 Kbyte
System memory		0x1FFF 0000 - 0x1FFF 77FF	30 Kbyte
OTP		0x1FFF 7800 - 0x1FFF 7A0F	528 Bytes
Option bytes		0x1FFF C000 - 0x1FFF C00F	16 bytes

- STM32 has different programming of the flash depending on MCU
 - Some MCU have dual back flash to avoid stole while programing from flash and to keep old version in the MCU
 - Example of STM32L4 Bank flash selection from bootloader

- STM32 flash consumption

- STM32F405 :

Table 39. Flash memory characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{DD}	Supply current	Write / Erase 8-bit mode, V _{DD} = 1.8 V	-	5	-	mA
		Write / Erase 16-bit mode, V _{DD} = 2.1 V	-	8	-	
		Write / Erase 32-bit mode, V _{DD} = 3.3 V	-	12	-	

- STM32L476xx

Table 63. Flash memory characteristics⁽¹⁾ (continued)

Symbol	Parameter	Conditions	Typ	Max	Unit
I _{DD}	Average consumption from V _{DD}	Write mode	3.4	-	mA
		Erase mode	3.4	-	
	Maximum current (peak)	Write mode	7 (for 2 μs)	-	
		Erase mode	7 (for 41 μs)	-	

1. Guaranteed by design.

- This SW assume there is not power interruption.
 - No recovery system on STM32F405 Demonstration FW
 - A hardware reset of the application will come back to previous version (for demo effect)
- The code of programing is executed from flash.
 - The MCU core is stalled (blocked) during flash programing but this is not an issue for the timing. (only IAP function, no other real time task)
 - The programing of the new FW is in the MCU flash directly (no external Flash) .
 - At the end of the programing , the jump to the new FW is done.
- Read out protection of the flash can be set and is not blocking the IAP.

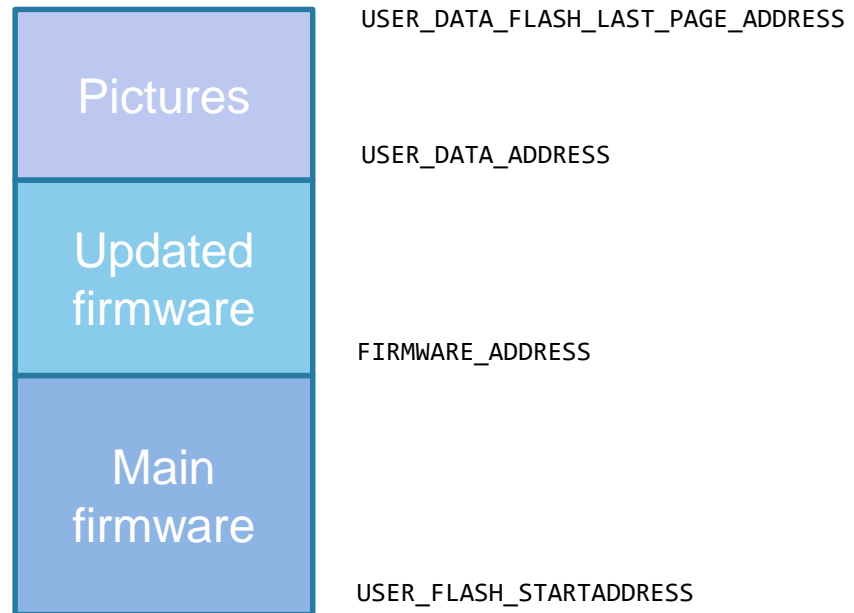


Firmware update demo

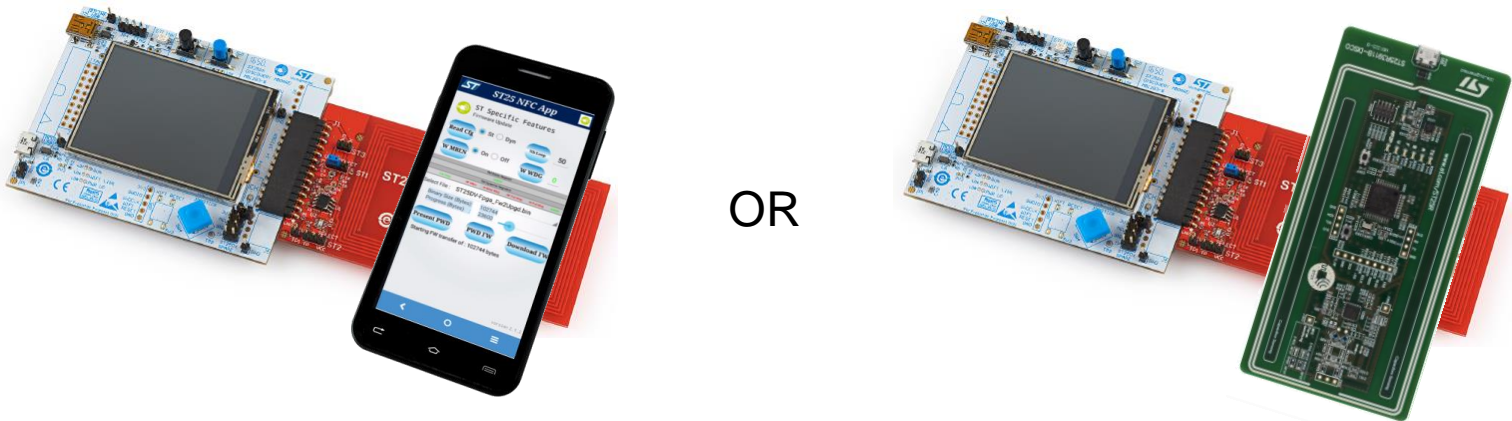
Firmware update

- Example demonstrates STM32 firmware update by using NFC interface
 - Downloaded demo firmware has limited functionality!
 - Smaller size ~ 115 kB
 - If you reset the board, original firmware will be loaded
- Flash memory in ST25DV Discovery board

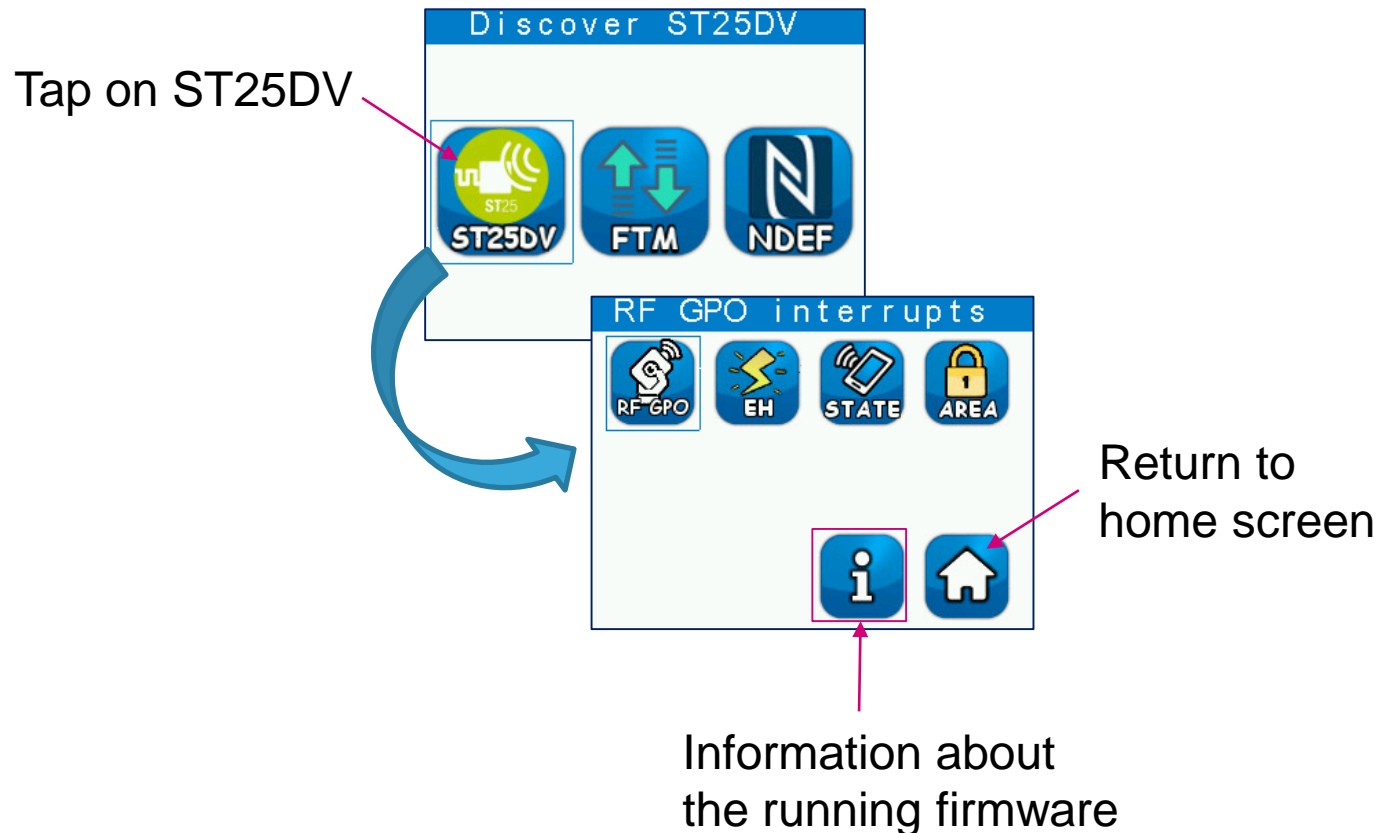
After firmware transfer to the “updated firmware” memory area, new firmware will be executed



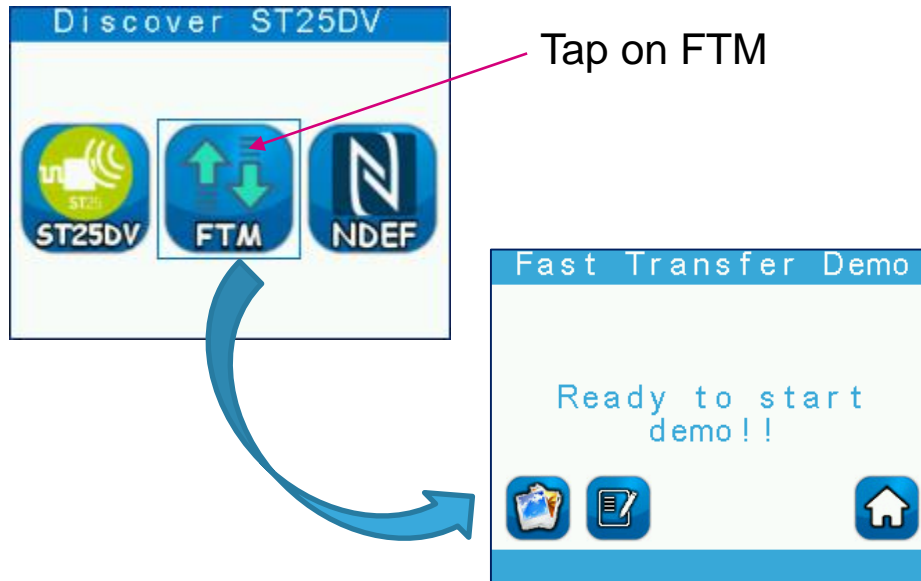
- In this demo with ST25DV Discovery board you can use:
 - Android mobile phone with ST25 NFC Tap app
 - ST25R3911B-DISCO board



- Check version of running firmware
 1. Screen during firmware boot process (after reset)
 2. In the menu:



- ST25DV Discovery board setting for firmware update



Now is the ST25DV board configured to FTM demo.

You can tap mobile phone on the board's antenna.

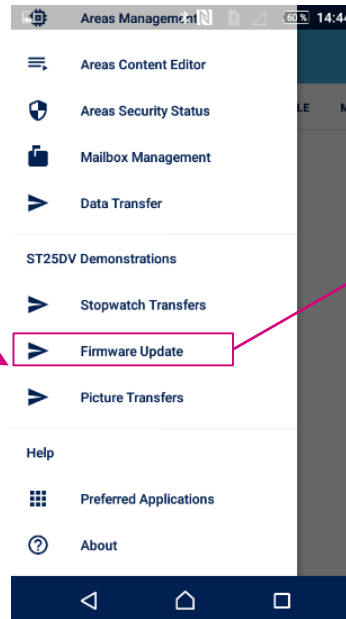
By using ST25 NFC Tap app

- Settings in the ST25 NFC Tap app

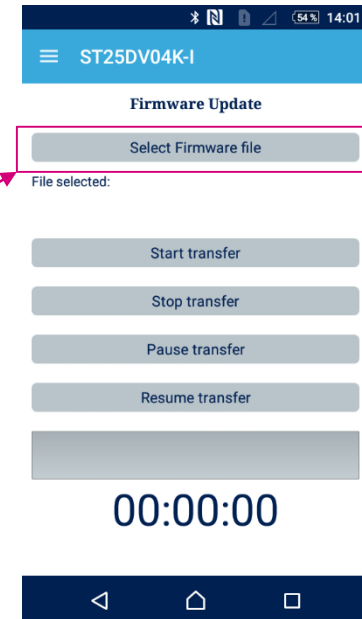
1. If there is the board in connection with the phone click to menu



2. Scroll down and select "Firmware Update"



3. Select firmware to upload



Firmware update

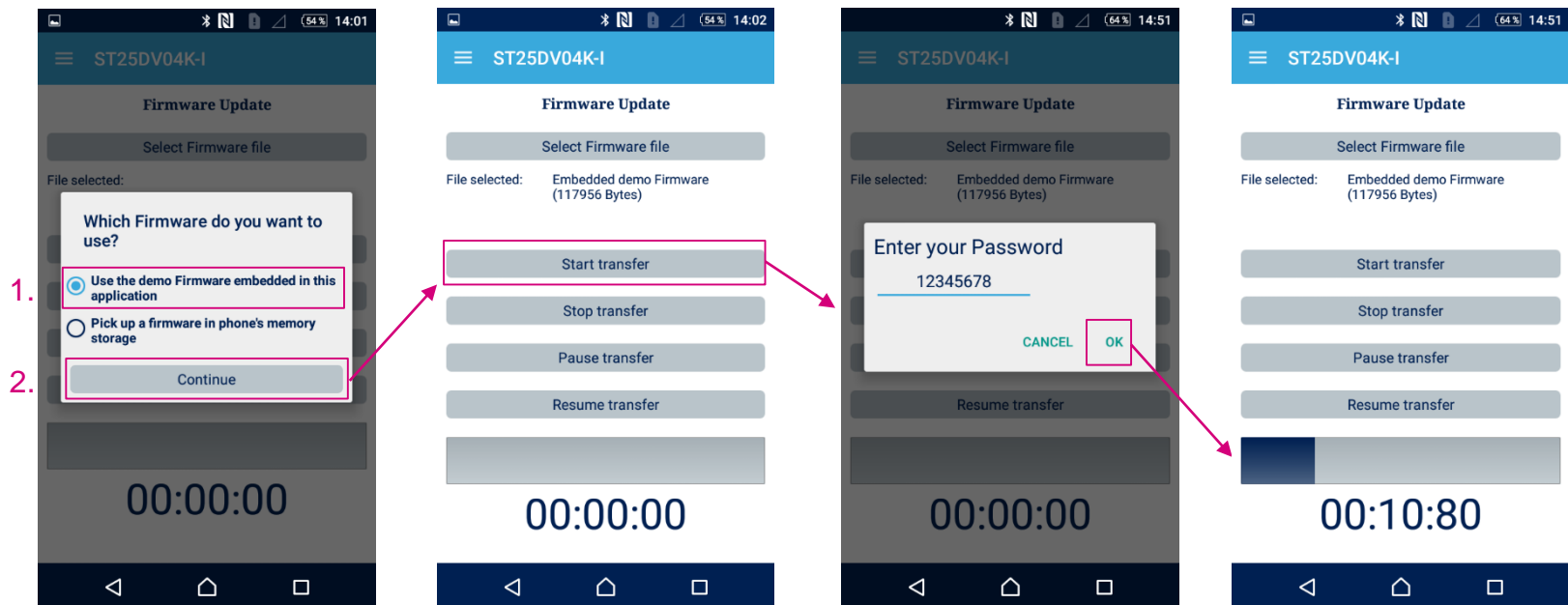
By using ST25 NFC Tap app

4. Select firmware. Use default **embedded firmware**

5. Start transfer

6. Confirm default password

7. Firmware is being transferred to the board

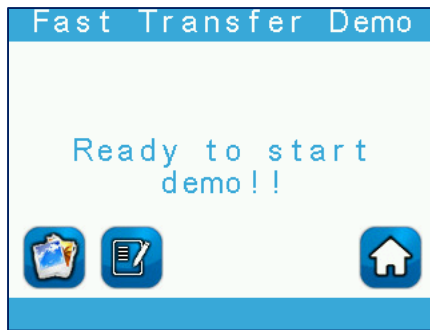


Firmware update

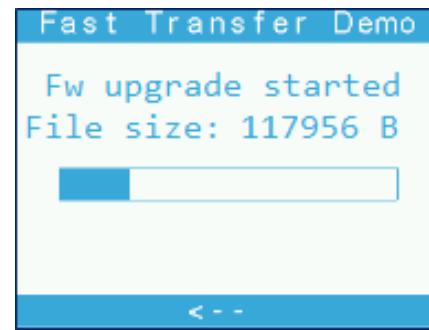
By using ST25 NFC Tap app

- Progress in the ST25DV Discovery board

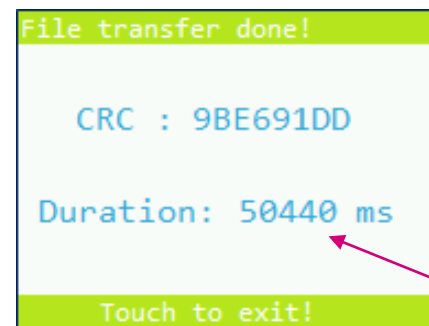
1. FTM demo mode



2. Firmware transfer



3. CRC and overall transfer time



Tap for continue

4. New firmware is loaded



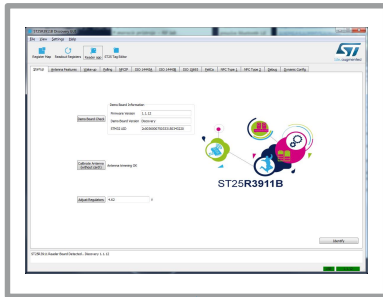
New firmware has smaller icons

5. Check new firmware version

Firmware update

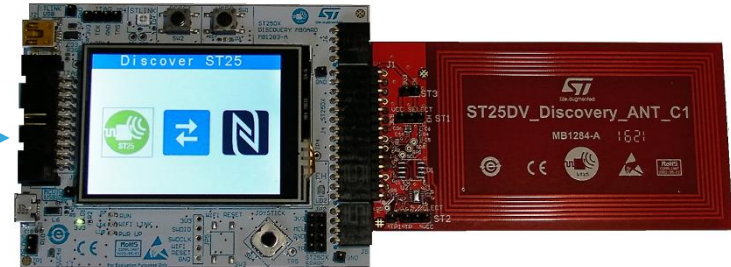
By using ST25R3911B reader

PC with ST25R3911B GUI



USB cable (only power supply)

ST25DV Discovery kit (dynamic tag)



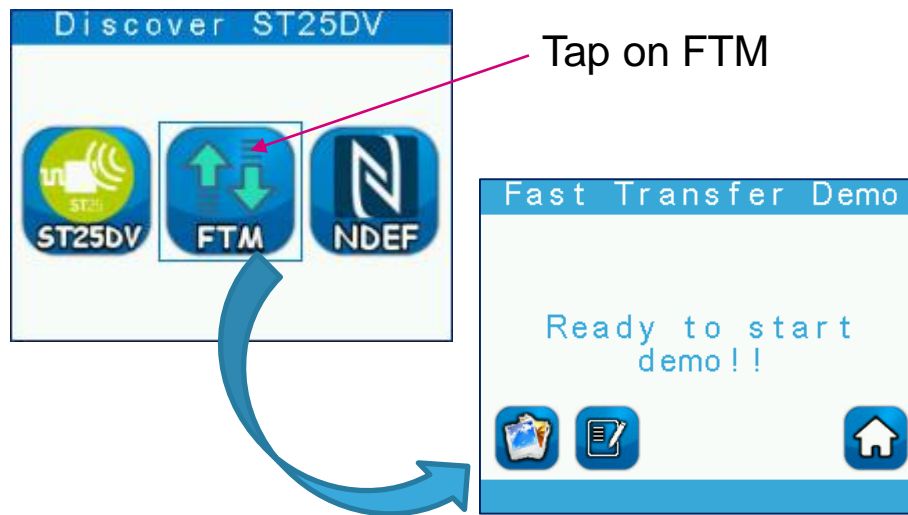
ST25R3911B Discovery (reader)



USB cable

By using ST25R3911B reader

- **Reset** ST25DV Discovery board
 - To be sure that the original firmware is running
- Set FTM mode



Now is the ST25DV board configured to FTM demo.

You can tap reader on the board's antenna.

- Firmware update progress in ST25DV Discovery board is the same as by using previous variant with Android phone

Firmware update

By using ST25R3911B reader

1. Connect ST25R3911B-DISCO board
 - Micro USB cable
 - Drivers will be loaded automatically



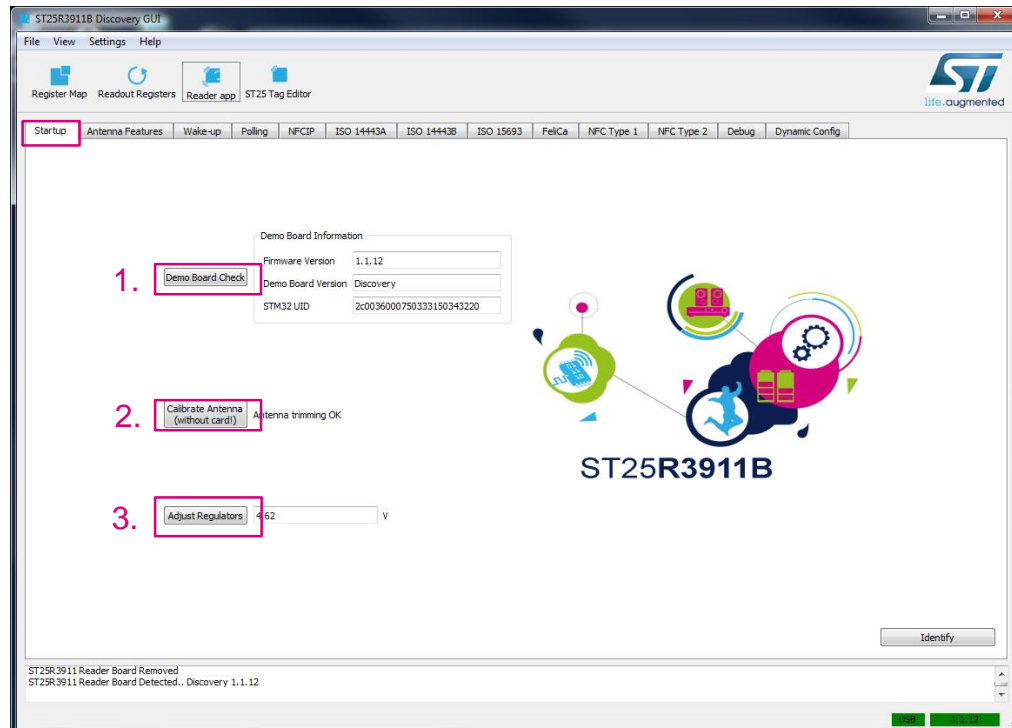
ST25R3911B-DISCO

2. Run installed ST25R3911B GUI

Firmware update

By using ST25R3911B reader

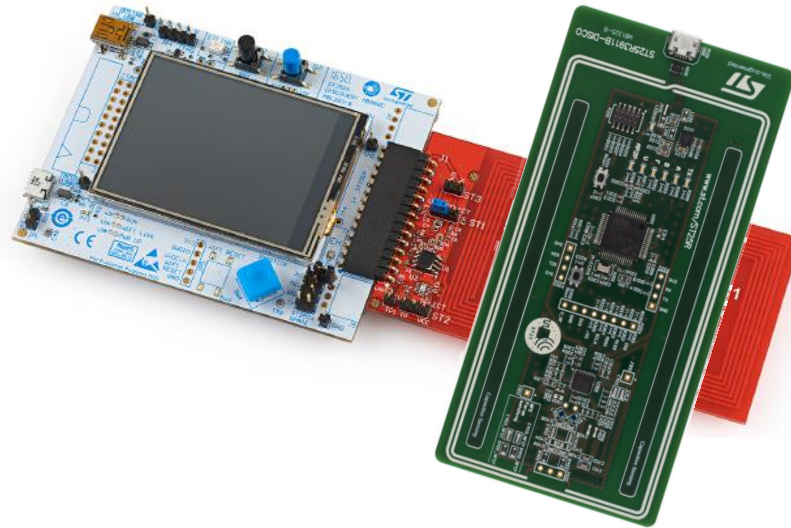
- Initialize ST25R3911B evaluation board **before each use!**
 - In tab “Startup” click to buttons:
 1. Demo Board Check
 2. Calibrate Antenna (**without tag or dynamic tag**)
 3. Adjust Regulators



Firmware update

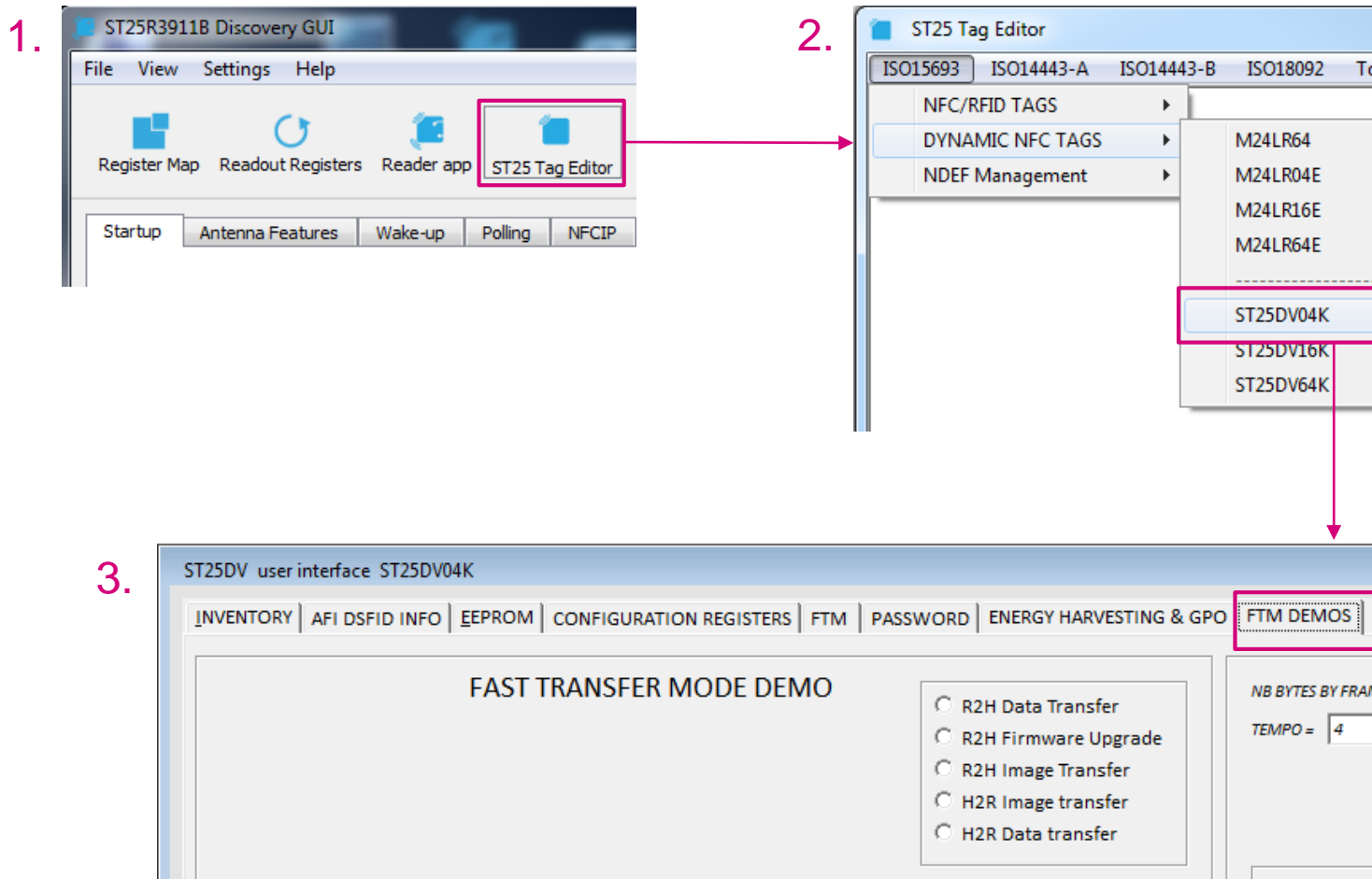
By using ST25R3911B reader

- Make physical connection



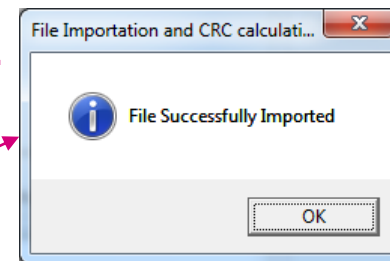
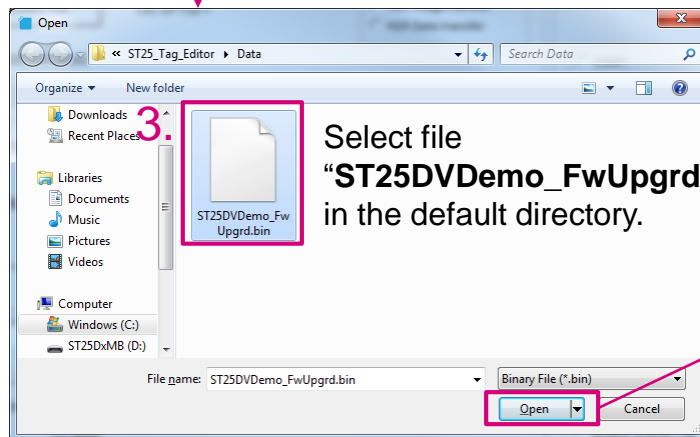
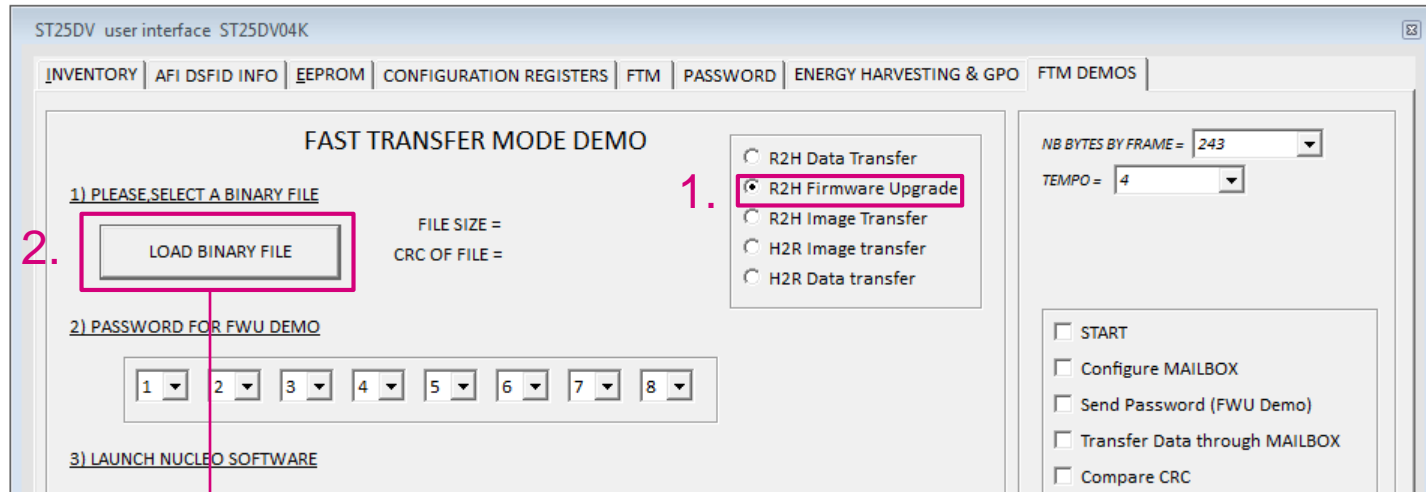
By using ST25R3911B reader

- Settings in the ST25R3911B GUI



Firmware update

By using ST25R3911B reader



Import of file may take some time!

By using ST25R3911B reader

ST25DV user interface ST25DV04K

INVENTORY | AFI DSFID INFO | EEPROM | CONFIGURATION REGISTERS | FTM | PASSWORD | ENERGY HARVESTING & GPO | FTM DEMOS

FAST TRANSFER MODE DEMO

1) PLEASE SELECT A BINARY FILE

LOAD BINARY FILE

FILE SIZE = 110580 BYTES
CRC OF FILE = DCD4DD0B

2) PASSWORD FOR FWU DEMO

1. [1] [2] [3] [4] [5] [6] [7] [8]

Use default password.

3) LAUNCH NUCLEO SOFTWARE

4) CLICK TO LAUNCH FIRWARE UPGRADE DEMO

2. START R2H DATA TRANSFER

With polling on Dynamic Register

request = [] answer = 0000

10-30-2017 14:56:38 ST25R3911B CONFIGURATION : ISO15693 100% HIGH DATARATE ONE SUBCARRIER
>>> ST25R3911B_PROTOCOL_SELECT, 0109
<<< 0000

10-30-2017 14:56:57 FILE SELECTED
>>> C:\Program Files (x86)\STMicroelectronics\ST25R3911B_Discovery_GUI\ST25
_Tag_Editor\Data\ST25DVBdemo_FwUpgrd.bin

10-30-2017 14:57:13 FILE CRC
>>> DCD4DD0B

NB BYTES BY FRAME = 243
TEMPO = 4

START
 Configure MAILBOX
 Send Password (FWU Demo)
 Transfer Data through MAILBOX
 Compare CRC
 END

Tag information
Detected Tag : TRANSPONDER UID
 Select Flag
 Address Flag Option flag

Data Rate
 High 100%
 Fast data rate

Launch RF POR

LOG MANAGEMENT
 Always display Log
 Displayed Log at the end of the demo.
 Do not display log

Save Log Clear Log

3. After firmware transfer, new firmware will be executed



Battery-Less Firmware Upgrade

Battery-Less Firmware Upgrade

ST25DV Combining NFC, Energy Harvesting and 256B Fast Transfer Mode

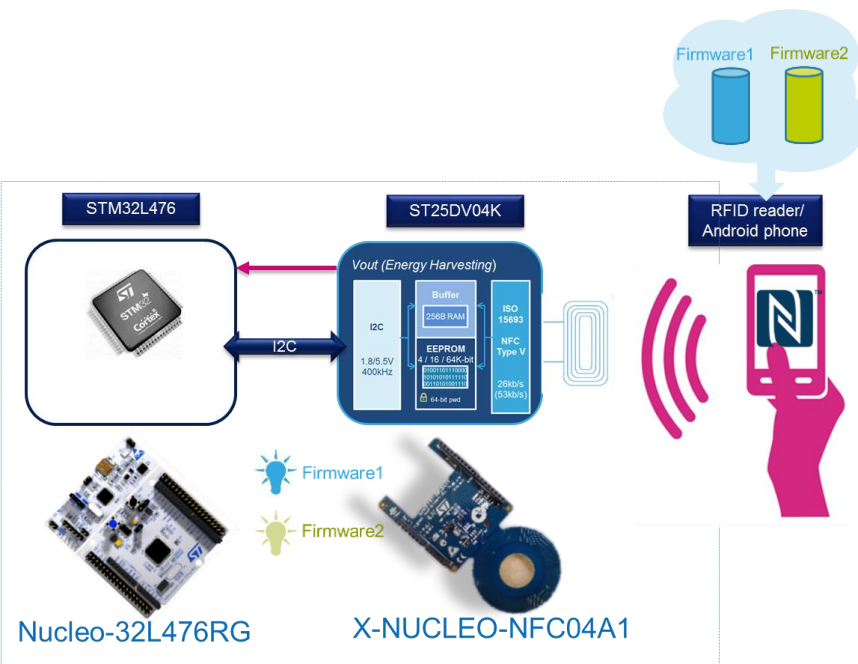
Showcasing breakthrough in-the-box firmware upgrade with ST technology

- Connectivity & energy harvesting : ST25DV NFC dynamic tag
- Computing : STM32L4 Low Power MCU
- NFC phone or RFID reader

Demo features

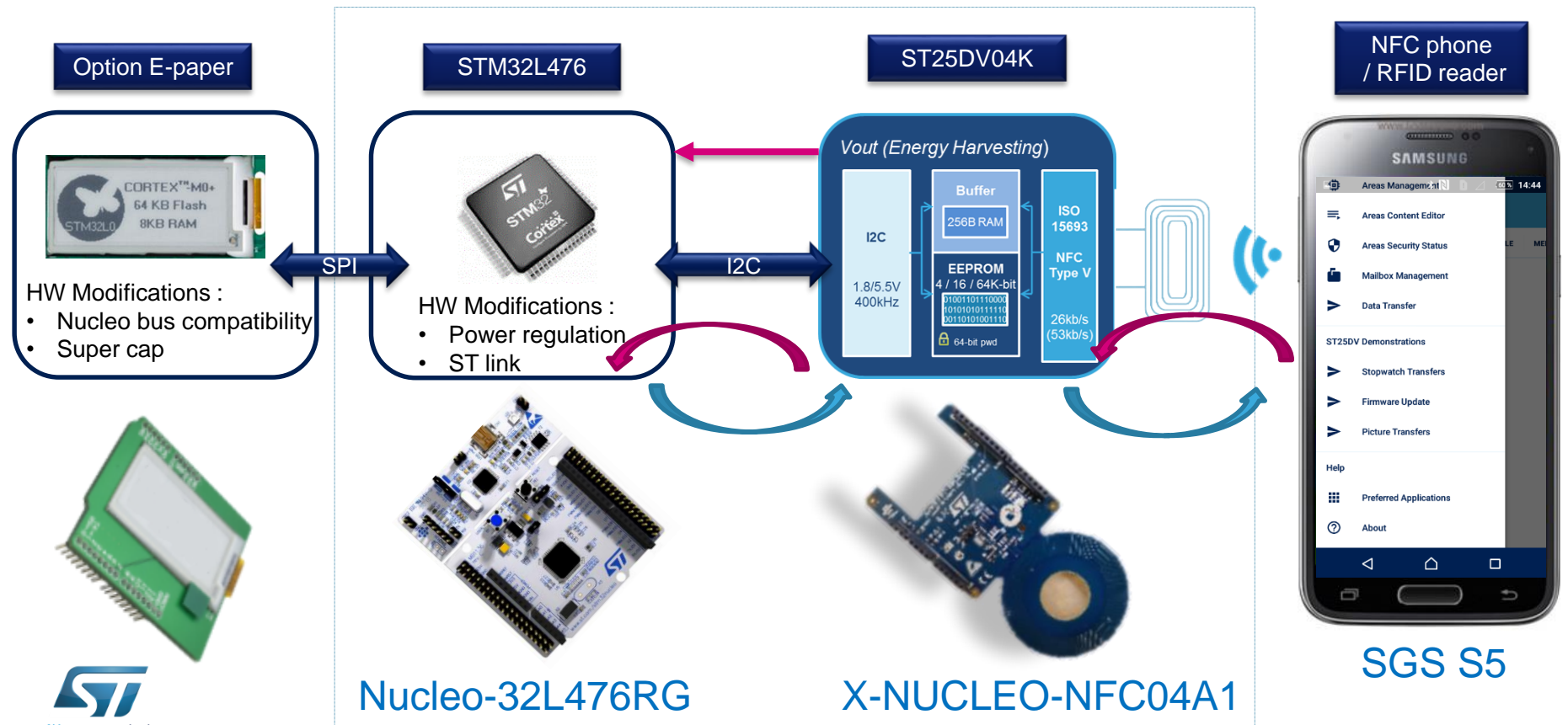
NFC android phone or an RFID reader

- Target Application Board with ST25DV and STM32L4
- The ST25 Android App
 - With Firmware Upgrade Module
- Optional epaper display



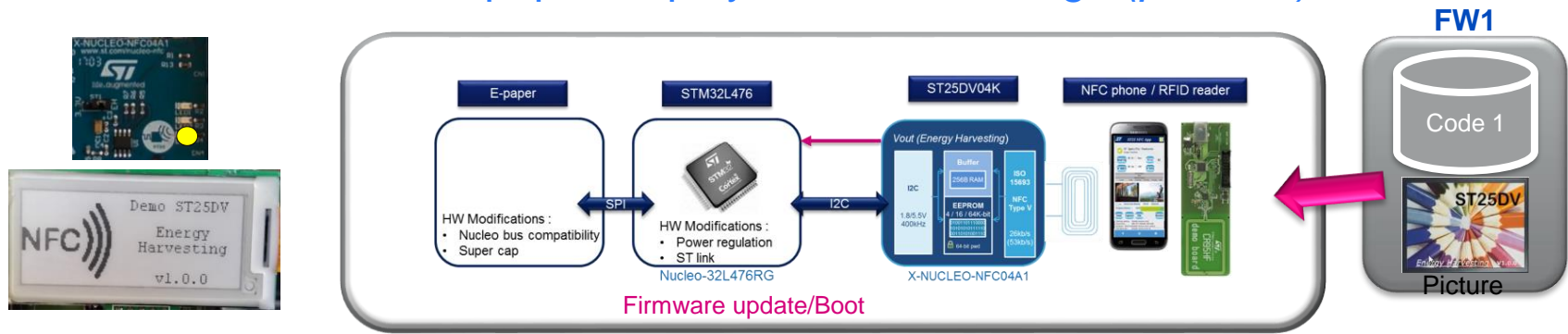
Data transfer & FW upgrade with EH

- An NFC android phone or an RFID reader drives via an application the exchanges.
- The ST25DV supplies power by Energy Harvesting.
- Fast data transfer from air to STM32 I2C thru the ST25DV 256 bytes buffers
 - Transfer of data: in STM32 embedded flash memory, from STM32 embedded flash memory
 - STM32 Firmware upgrade and boot process available
 - E-paper management

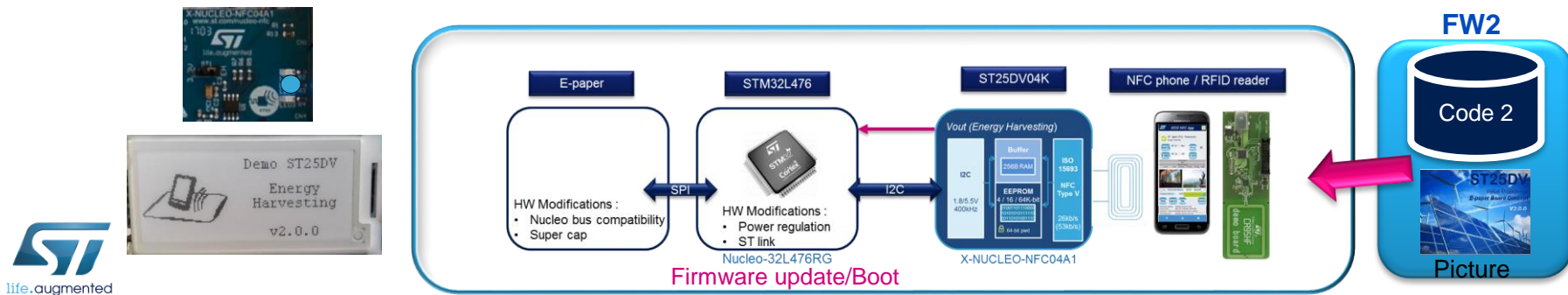


- The ST25DV powers the system with EH received from an RF device
 - Firmware update** (FW1 or FW2) from an external RF device (phone, Reader, Feig)
 - Code update verification: Led, E-paper display, console.

FW1 : Size1 and code1, E-paper display1, LED1, Data log1 (picture1) in Flash



FW2 : Size2 and code2, E-paper display2, LED2, Data log2 (picture2) in Flash



Did we meet the pay off expectations?

- At the end of this workshop you be able to explain NFC technology and limits and demonstrate it to your customer so key usage included the IAP.
- Please leave the 3911b boards on the table!!!



Thank you!