iOS NFC application for ST25 products

Introduction

This document describes the functionalities of the ST25 NFC iOS application, helping the user to understand the application features and how to use them.

The ST25 NFC iOS App is an Apple iOS application for reading ST25 NFC/RFID tags and ST25 Dynamic NFC tags that contain data in the NFC Data Exchange Format (NDEF). It allows the user to read or display NDEF messages such as URL, text, SMS, Email, vCard (including picture), phone call, calendar event, geolocation, and any kind of URIs. Depending on the option(s) chosen, the user can automatically run iOS applications according to NDEF messages, whose individual content is displayed in both raw and decoded formats.

A Bluetooth® pairing NDEF demonstration is also included in the application, that allows the user to pair with an iPhone and ST25DV Discovery kit, and to display in real time the battery and RSSI levels of the ST25DV Discovery kit. The Bluetooth® pairing demonstration requires specific firmware and discovery kits.

The ST25 NFC iOS application is based on the STSW-ST25IOS001 (binary package) and STSW-ST25IOS002 (source code), both available on *www.st.com*, and operates with ST25 NFC/RFID tags and ST25 Dynamic NFC tags.

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1 List of acronyms

Table 1. List of acronyms

Acronym	Description
BLE	Bluetooth® Low Energy
FW	Firmware
ISO	International Organization for Standardization
NDEF	NFC Data Exchange Format
PICC	Proximity Integrated Circuit (IC) Card
RFID	Radio Frequency IDentification
Tag	PICC in form of a patch, key fob or similar, without autonomous power source and not generating RF electromagnetic field, but capable of communicating with a reader / writer
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
URN	Uniform Resource Name

2 References

- DB3357 "iOS NFC application for ST25 products" databrief (available on *www.st.com*)
- Datasheets of ST25 devices (available on *www.st.com*)

3 Overview

This section describes the main features of the ST25 NFC iOS application, available on *www.st.com*, as well as the prerequisites to use it.

3.1 Prerequisites

To run the application (available on www.st.com/st25 and https://itunes.apple.com) the user needs an iPhone7 or higher iPhone Mobile with iOS11 latest version.

Note: *Pictures used in this document illustrate the firmware features. They are based on version 1.0.0 of the application. Some discrepancies can appear between the documentation and the application.*

Figure 1. ST25 NFC iOS application
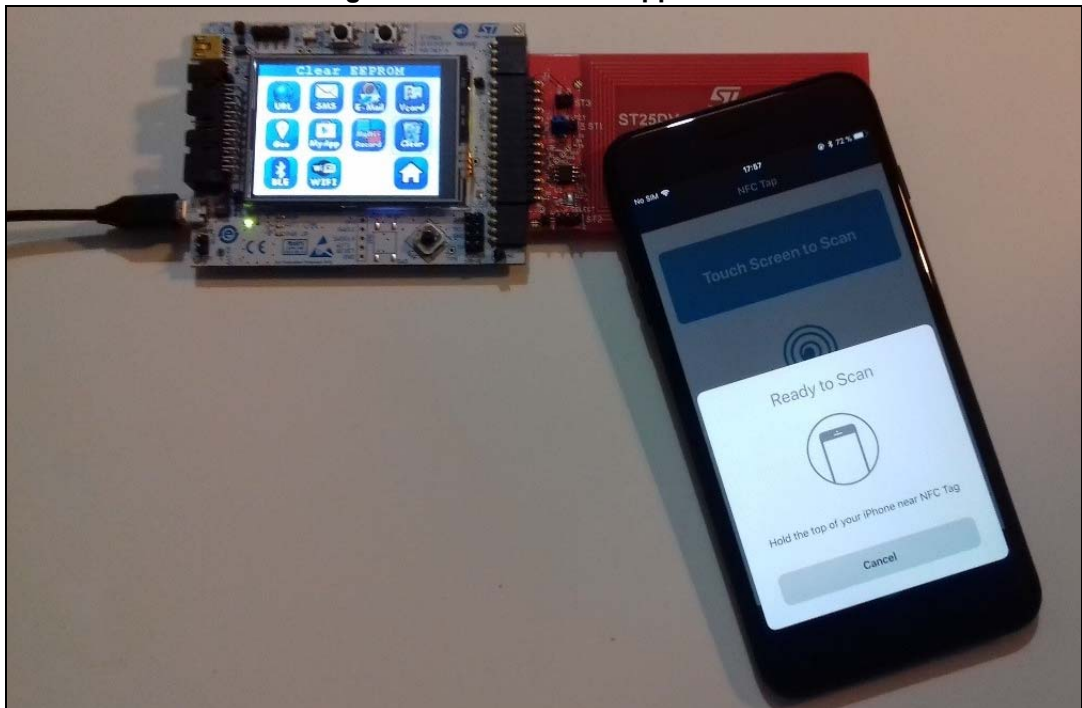
3.2 Functionalities overview

The ST25 NFC iOS application allows to handle the following STMicroelectronics products:
- ST25 NFC / RFID Tags
- ST25TA series NFC tags (with CLOUD ST25TA02K-P board)
- M24SR series Dynamic NFC Tags (with X-NUCLEO-NFC01A1 and M24SR Discovery boards)
- LRIxx NFC tags
- M24LR series Dynamic NFC Tags
- M24LR04E products, X-NUCLEO-NFC02A1 and M24LR Discovery kits

It supports reading of ST25 NFC/RFID tags and ST25 Dynamic NFC tags of types 1 through 5, containing data in the NFC Data Exchange Format (NDEF).

Writing mode is not supported in iOS11.

The ST25 NFC iOS application features are:

- Starting NFC session on demand
- Running NFC session (in foreground mode only)
- Reading NDEF messages that are NFC forum compliant:
    – URL
    – Text
    – SMS
    – Email
    – vCard with picture
    – Phone call
    – Bluetooth® pairing
    – Wi-Fi® information
    – Geolocation
    – URIs
    – Custom URL "nfctap://"
    – Mime and External records
- Support of ST25 NFC/RFID tags and ST25 Dynamic NFC tags
- Automatic run of iOS applications according to NDEF message type
- Bluetooth® pairing demonstration with ST25DV Discovery kit
- Maximum 60 seconds of scanning per session
- Handling protocol for loading resources with custom URL "nfctap://"
- Introduction of an augmented NDEF URL: the user can choose to add the tag identifier and/or a timestamp and/or a GPS location to the URL, so, by scanning a tag, contextual and relevant data can be sent to a web server.
- Custom App URL scheme "nfctap://": this allows the user to open the app from any other iOS app or from the Safari browser using the custom URL scheme "nfctap://"
- History of NDEF records messages.
- Saving/Loading NDEF records for future access.
- Sharing individual NDEF records.

3.3 Installation

This section describes how to install the ST25 NFC iOS App.

1. Open the App Store on your iPhone
2. Tap "nfc tap stmicroelectronics" in the search bar to find the app
3. The app is referenced with an icon

4. When you find the app, download it to your device:
   a) Tap on the app to view its product page
   b) Tap "Get"
5. You can be asked to enter your password to complete the download
6. The app will be installed on your iOS device, and you can use it.

*Note:* *The app can be installed by entering the specific ID in the Safari browser of your iPhone.*

4 Application description

The application is composed of the following main activities:

- Home screen, to run NFC sessions on-demand
- History editor, with a list of NDEF records that contain:
    - NDEF icon type
    - NDEF message, whose individual content is displayed in both raw and decoded format
    - Button action to run iOS application according to NDEF type
    - Actions to share, save or delete individual/all NDEF records
- Download editor, with the list of saved NDEF records
- Bluetooth® pairing demonstration with ST25DV Discovery kit:
    - Scan Bluetooth® devices
    - Connect via Bluetooth® to BLE device.
    - Display RSSI and battery levels of ST25DV Discovery kit
- Setting menu, allowing the user to:
    - enable/disable automatic run of iOS application whenever NDEF is detected
    - run NFC Scan on App launch or Home Screen display
    - configure an NDEF augmented by adding TimeStamp and/or GPS location to the URL
    - review and rate the App

The following sections describe the main activities and the associated functionalities, with use cases included in each section.

Figure 2. ST25 NFC iOS application overview
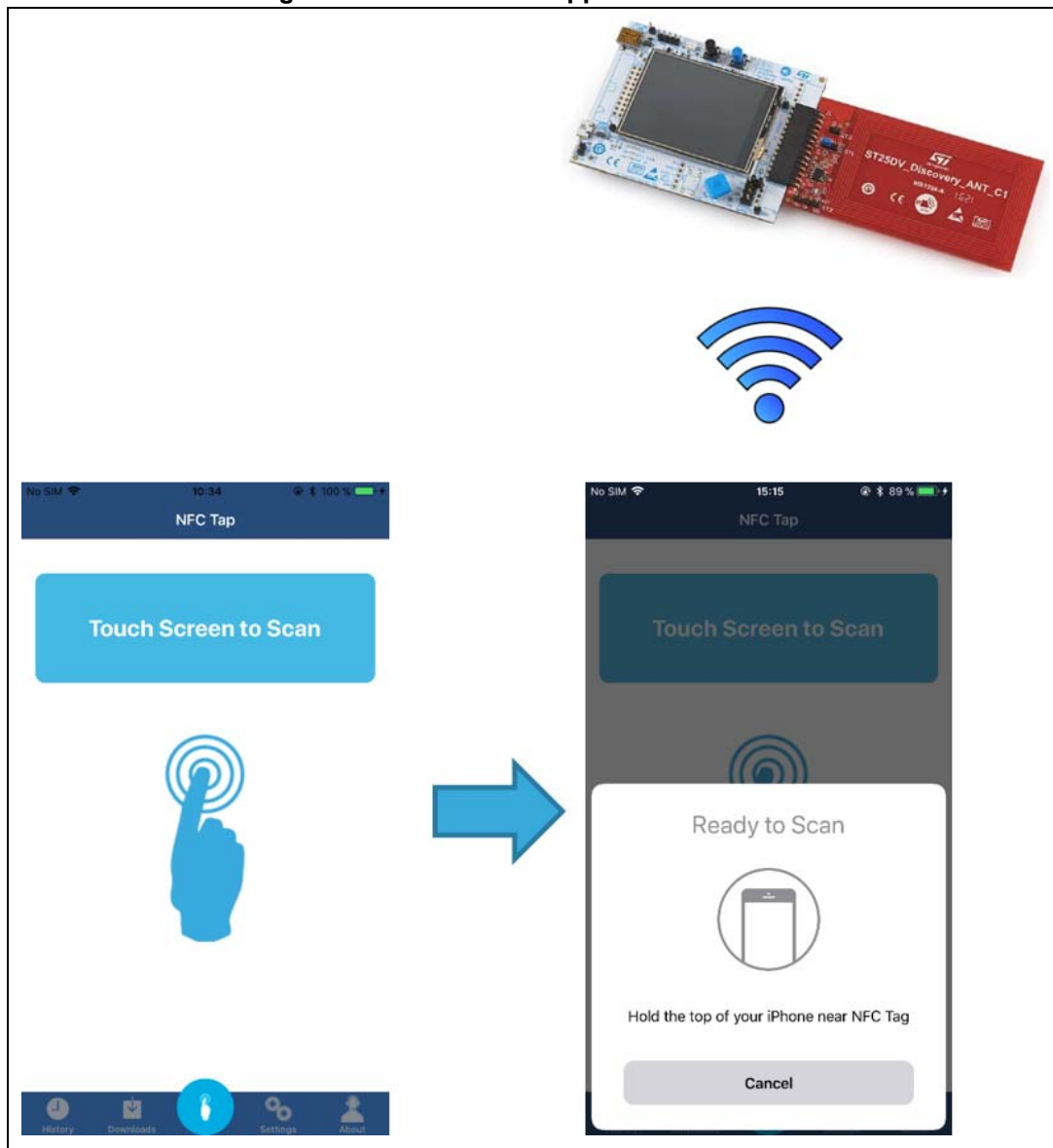
4.1 Application startup

NFC Tap application is based on tab bar navigation to allow the user to quickly switch between different screens of the app.

In addition, NFC Tap has a URI scheme allowing the user to create a link that will open the NFC Tap app, and to get the result of scan on webpage or app. To just open the NFC Tap, enter the URI "nfctap://" into Safari browser of your iPhone.

Table 2. Available tabs

Tab	Description
History	Opens the NDEF list of records, displaying a new screen with the NDEF record list read from ST25 tag.
Download	Opens the list of previously saved NDEFs.
Scan	Main entry point of the application, runs the scan of NFC.
Setting	Setting menu, allows the user to change the behavior of ST25 NFC Tap app depending on the option configuration.
About	Provides information about the app, such as main features, version and support link.

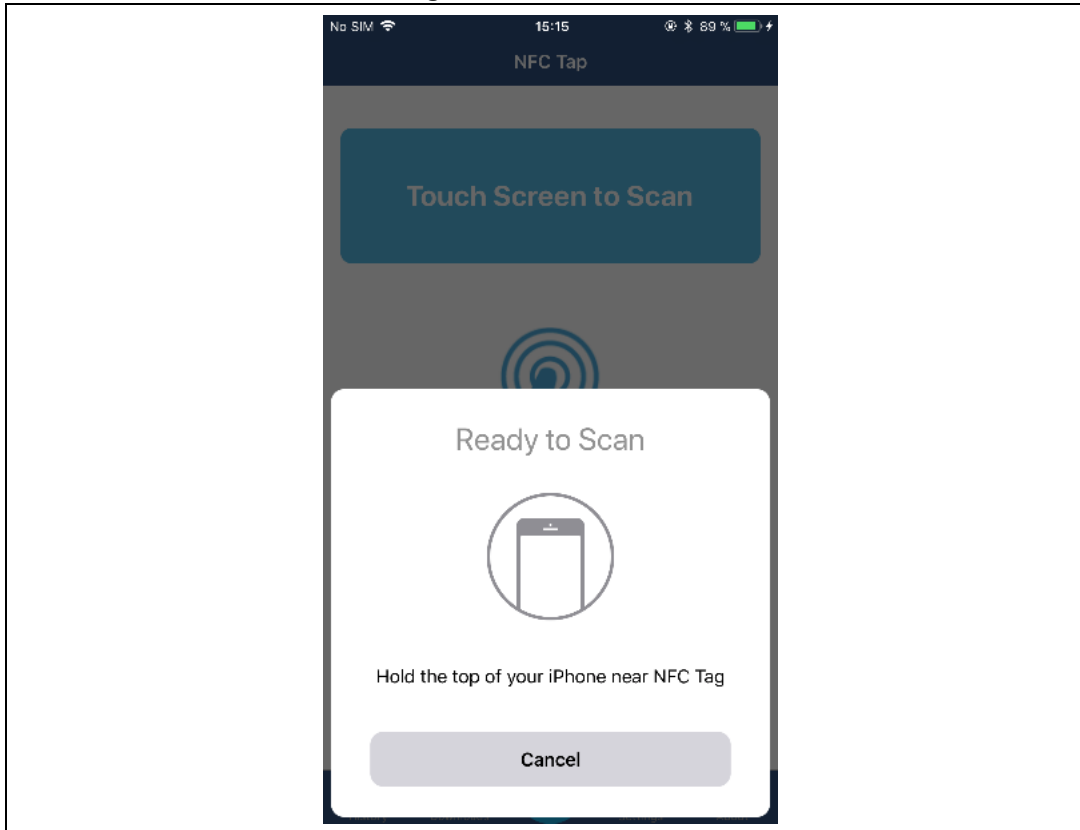**Figure 3. NFC Tap main activities screens**
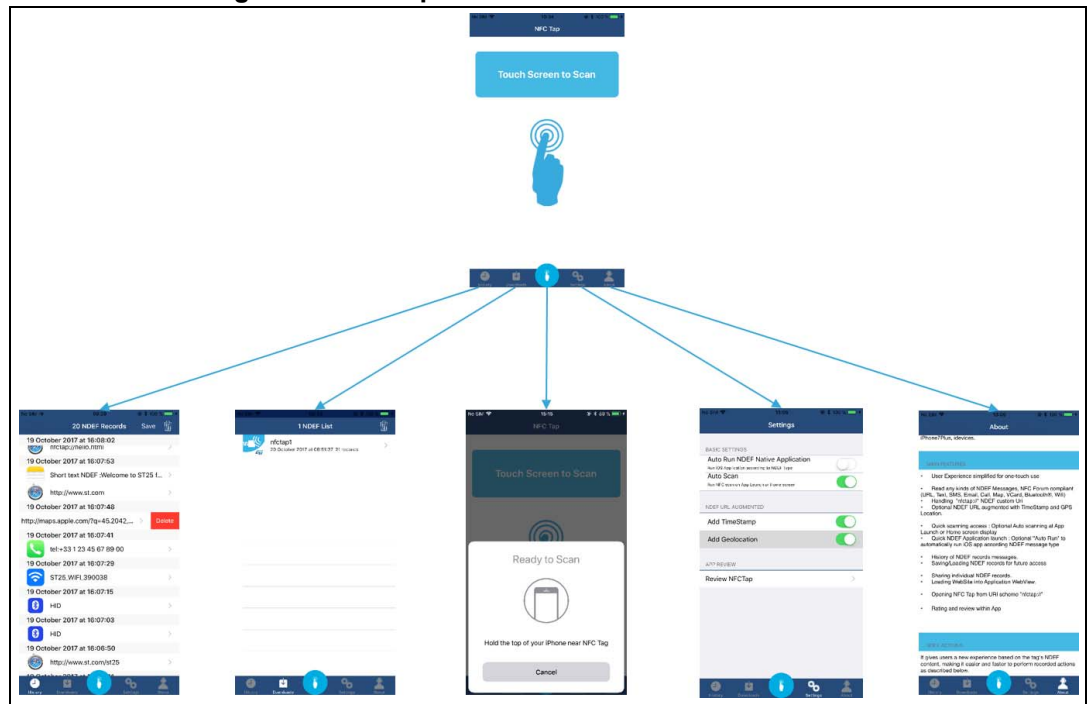
4.2 Home screen

When the application starts, the user is invited to "tap" on the screen to start an NFC session, or on the icon.

Tap on screen, then hold the phone close to a compatible NDEF tag (the actual NFC antenna is in the upper part of the iPhone 7 and 7 Plus), and the overlay shown in *Figure 4* will appear.

Figure 4. Home screen

Once this dialog appears the user has about one minute to detect the iPhone close to the NFC tag to be read. The NFC session will expire after 60 seconds, the user needs to stop and restart it each time.

When an NDEF is detected, a check-mark is displayed on screen, then the ST25 NFC iOS App runs automatically the iOS "native" application according to NDEF type.

Figure 5 shows that the Safari browser of iPhone is launched automatically with the URL read from the ST25 tag.

Figure 5. Home Screen Tag detected
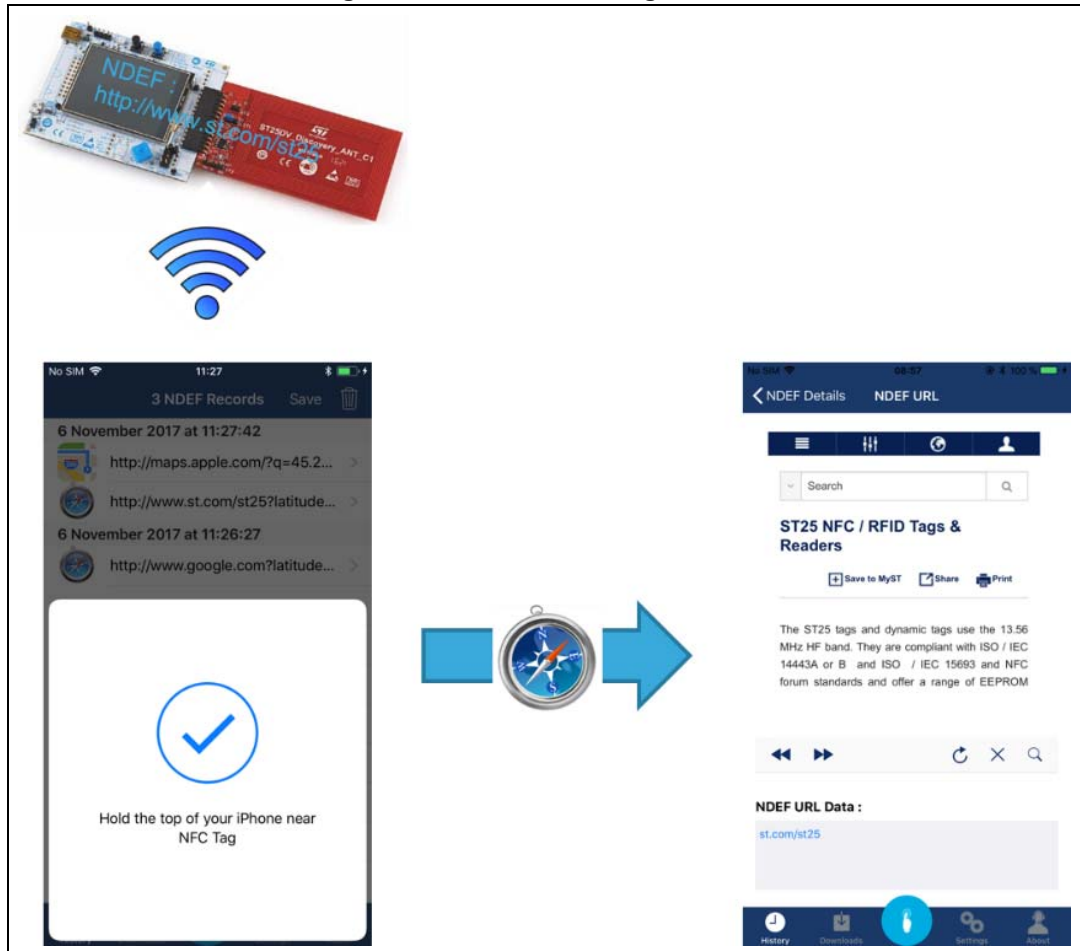
Depending on NDEF message type, the ST25 NFC iOS App is able to run iOS native applications:

*   URL: opens a web page to the URL contained in the tag NDEF record.
*   Text: displays the text message contained in the tag being tapped.
*   SMS: launches Messages app and composes SMS with phone number and message contained into NDEF.
*   Email: launches Mail app and opens the email compose sheet.
*   vCard: displays and saves contact information (including ID picture) by tapping a tag containing a business card (vCard) message.
*   Phone Call: launches the Phone app and starts dialing of the specified phone number.
*   Bluetooth® pairing: facilitates the pairing with Bluetooth® Low Energy (BLE) devices. After tapping a tag with the phone, the NFC Tap iOS App will recognize any Bluetooth® pairing NDEF record and connect the phone directly to the specified device (see *Section 4.5*).
*   Geolocation: launches the Map app, and shows geographical locations specified into NDEF. NFC Tap supports both Android® and iOS Map formats (native map app URL

string is http://maps.apple.com/?q= latitude>,<longitude>).

- Custom URI "nfctap://": launches WebKit view and displays NFC Tap icon.
- Mime and External Records: launches WebKit view and displays Mime or External contents.

4.3 NDEF history

The ST25 NFC iOS App allows the user to display detailed NDEF messages in both raw and decoded formats, then to run the iOS native application if needed.

The feature is enabled only when the option "NDEF Run Native Application" in "Setting Menu" is turned off (see *Section 4.4*).
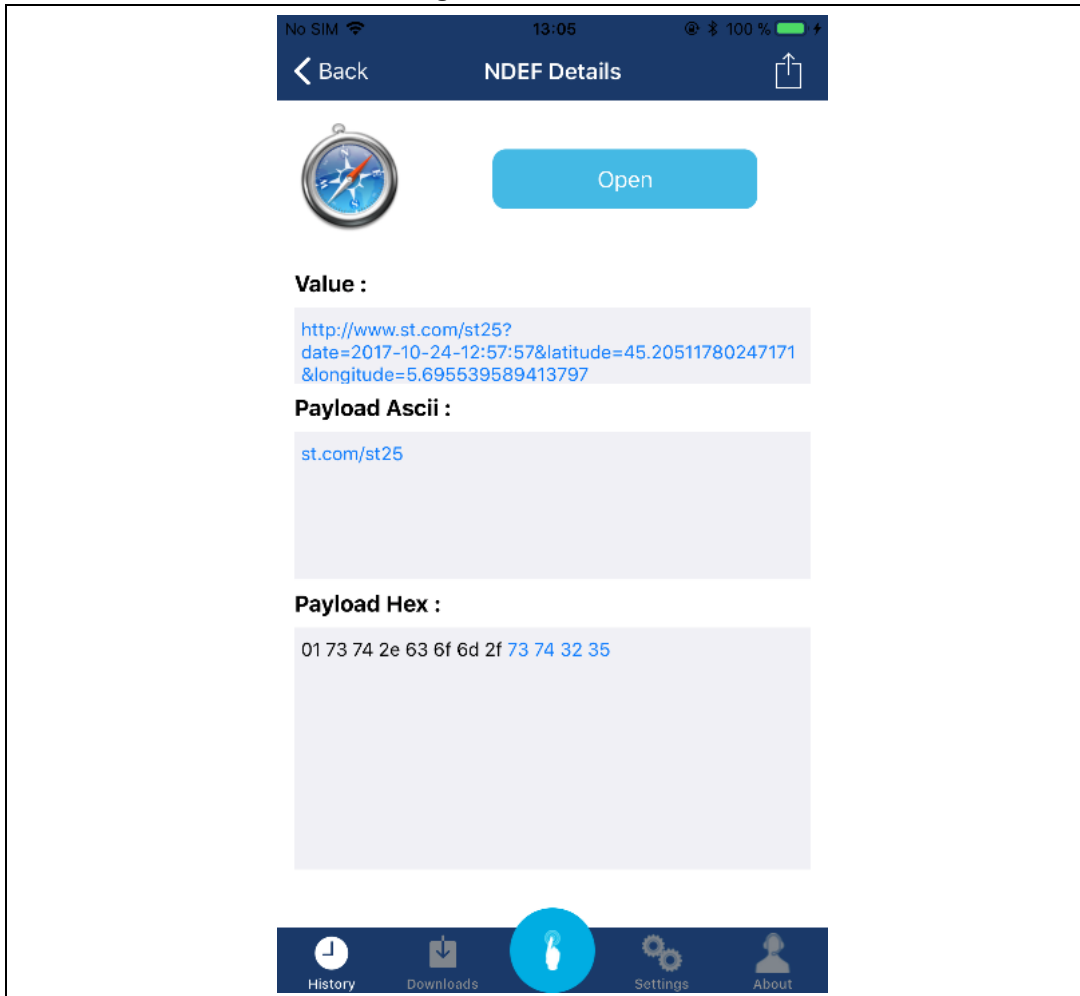
4.3.1 NDEF details

- Select "History" item into Tab bar list: this displays a new screen with the NDEF record list read from ST25 tag.

Figure 6. NDEF records menu
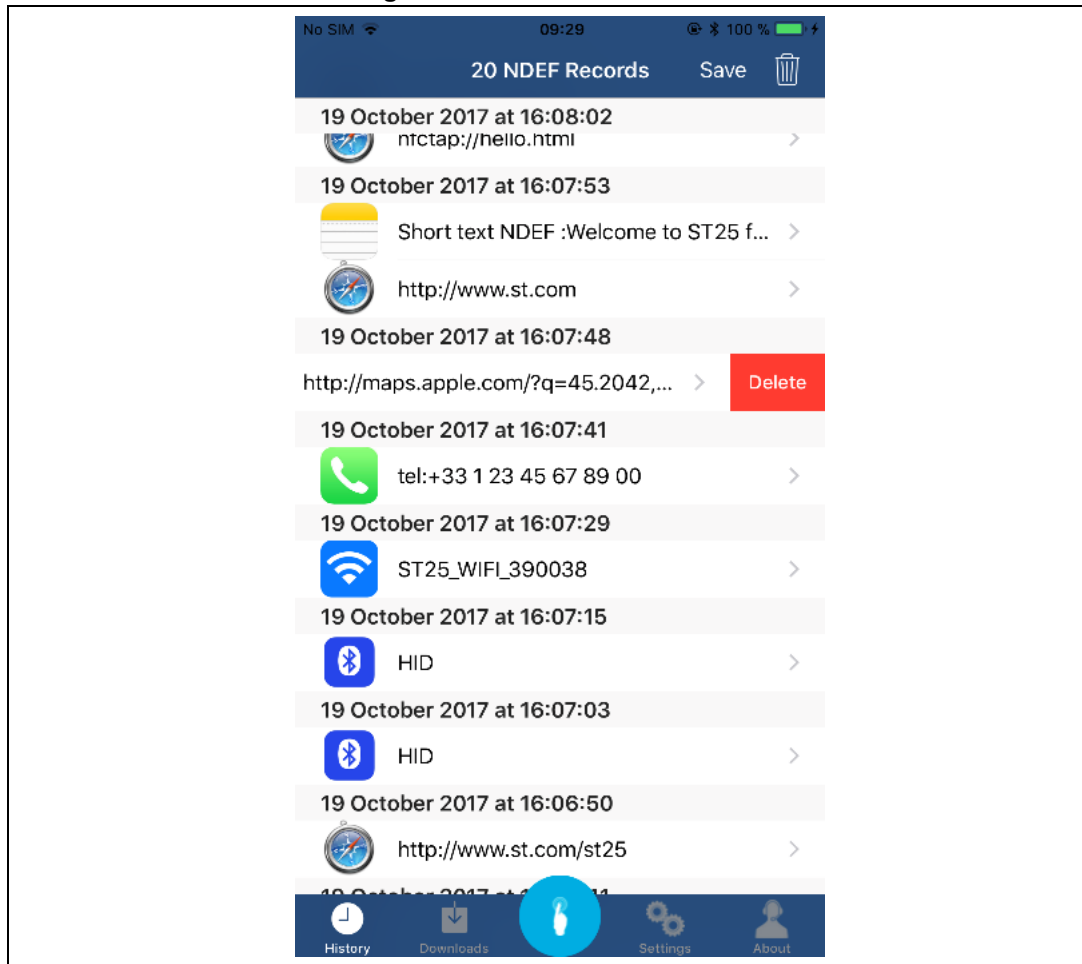
- Select one entry of the table to display the discovered messages. A pop-up dialog box (*Figure 7*) will display the message in both decoded and raw formats.

Figure 7. NDEF detail

• If the user acknowledges it (by tapping on the "Open" button), the ST25 NFC Tap iOS application will launch the iOS native application corresponding to the selected NDEF (*Figure 8*).

Figure 8. NDEF records selection
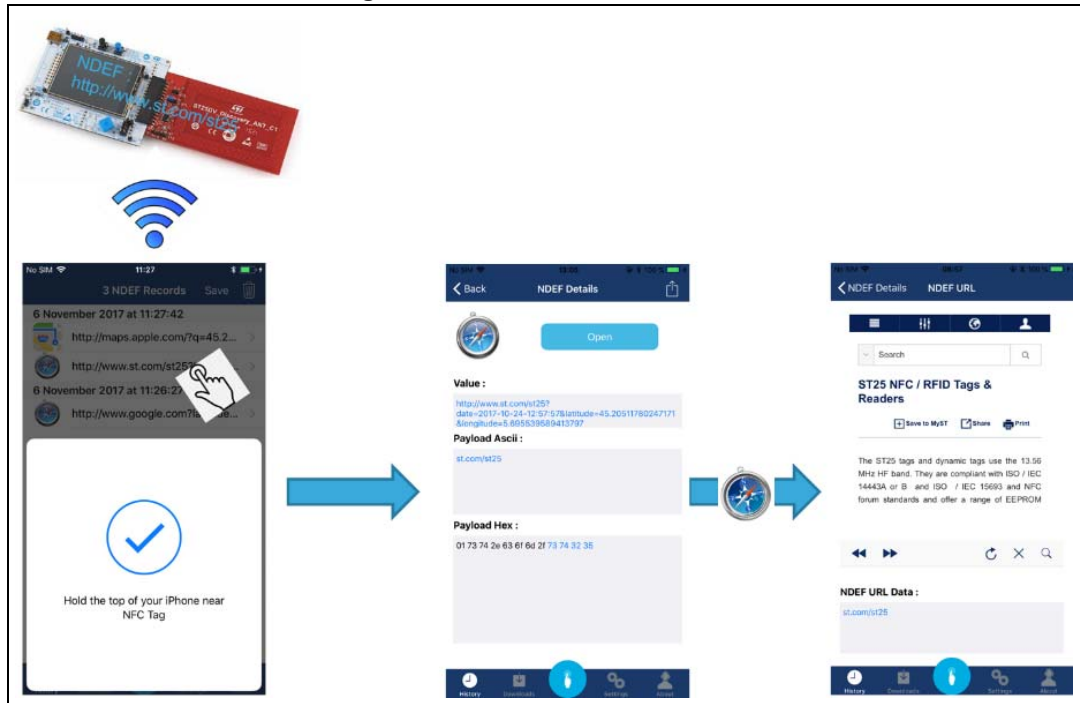
4.3.2 NDEF management

The ST25 NFC Tap allows user to delete individual/all NDEF records and provides a convenient way to share information from the current context with apps, social media accounts, and other services.

In addition, NDEF records could be saved for future use.

Deleting records

Each individual record can be deleted swiping the selected cell to the left (*Figure 9*), the whole list of NDEF records can be deleted by hitting on "Trash" button (*Figure 10*).

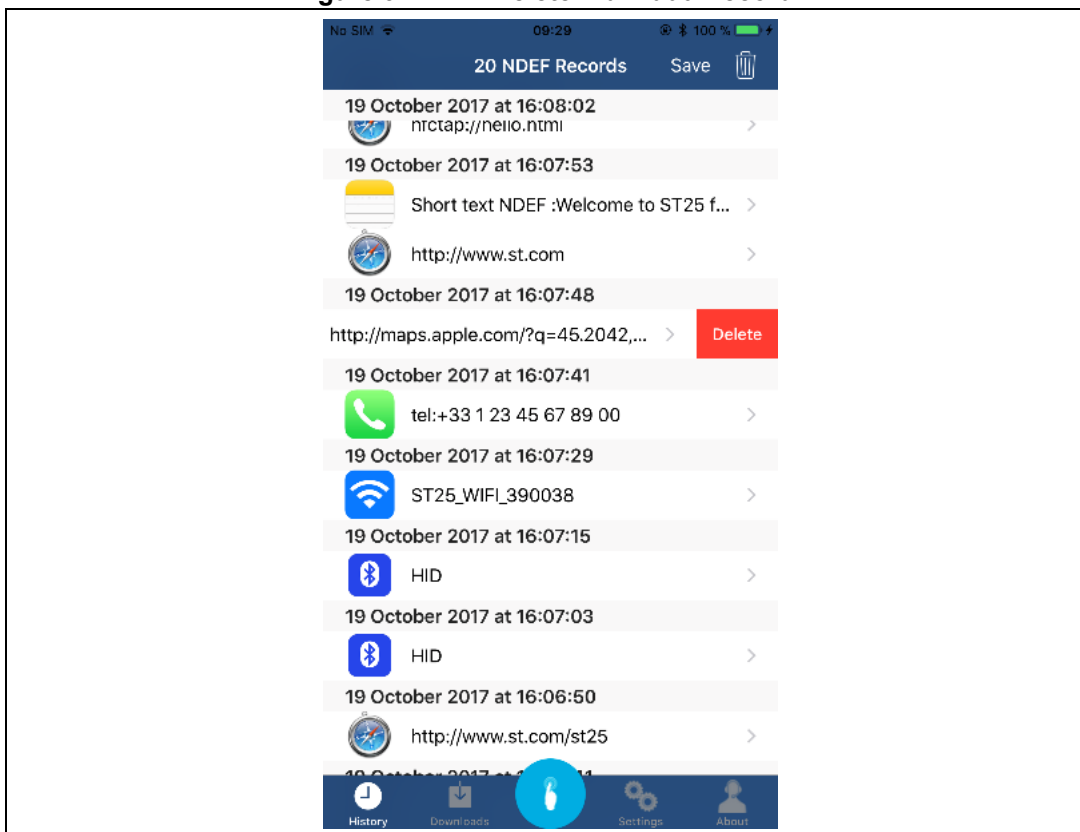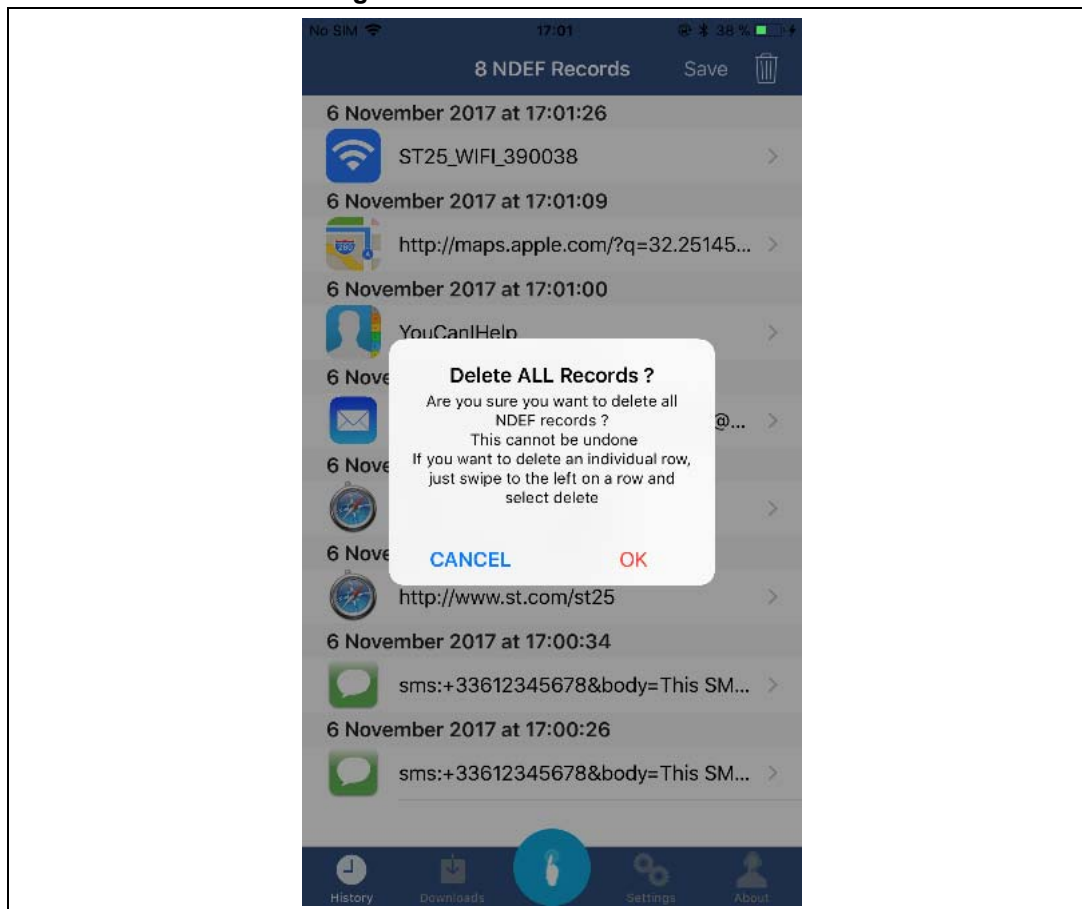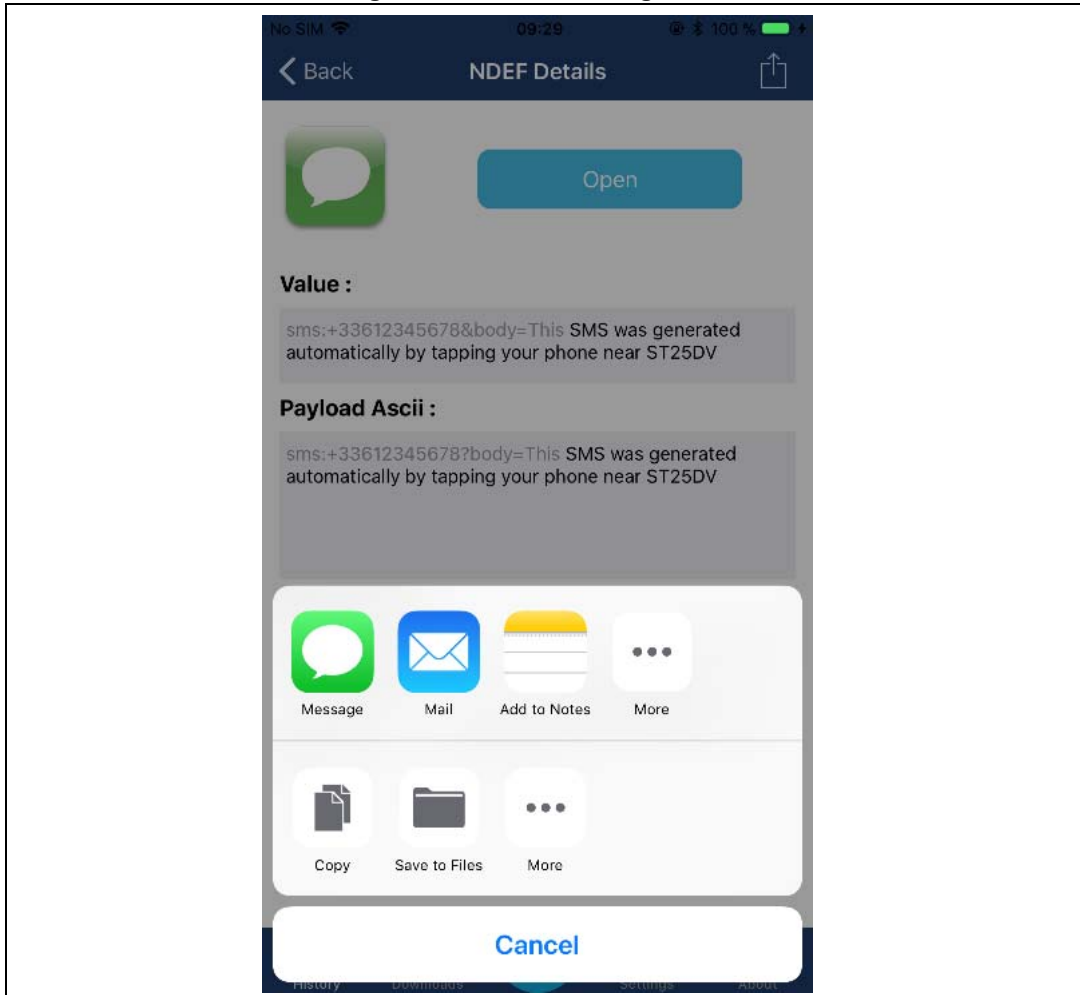**Figure 9. NDEF Delete individual record**

Figure 10. NDEF Delete all records

Sharing NDEF records

The app includes a Share button, positioned in the top right corner of the NDEF Details screen. Thus, users can choose a Share extension that represents a social sharing website and then use it to post a comment or other contents.
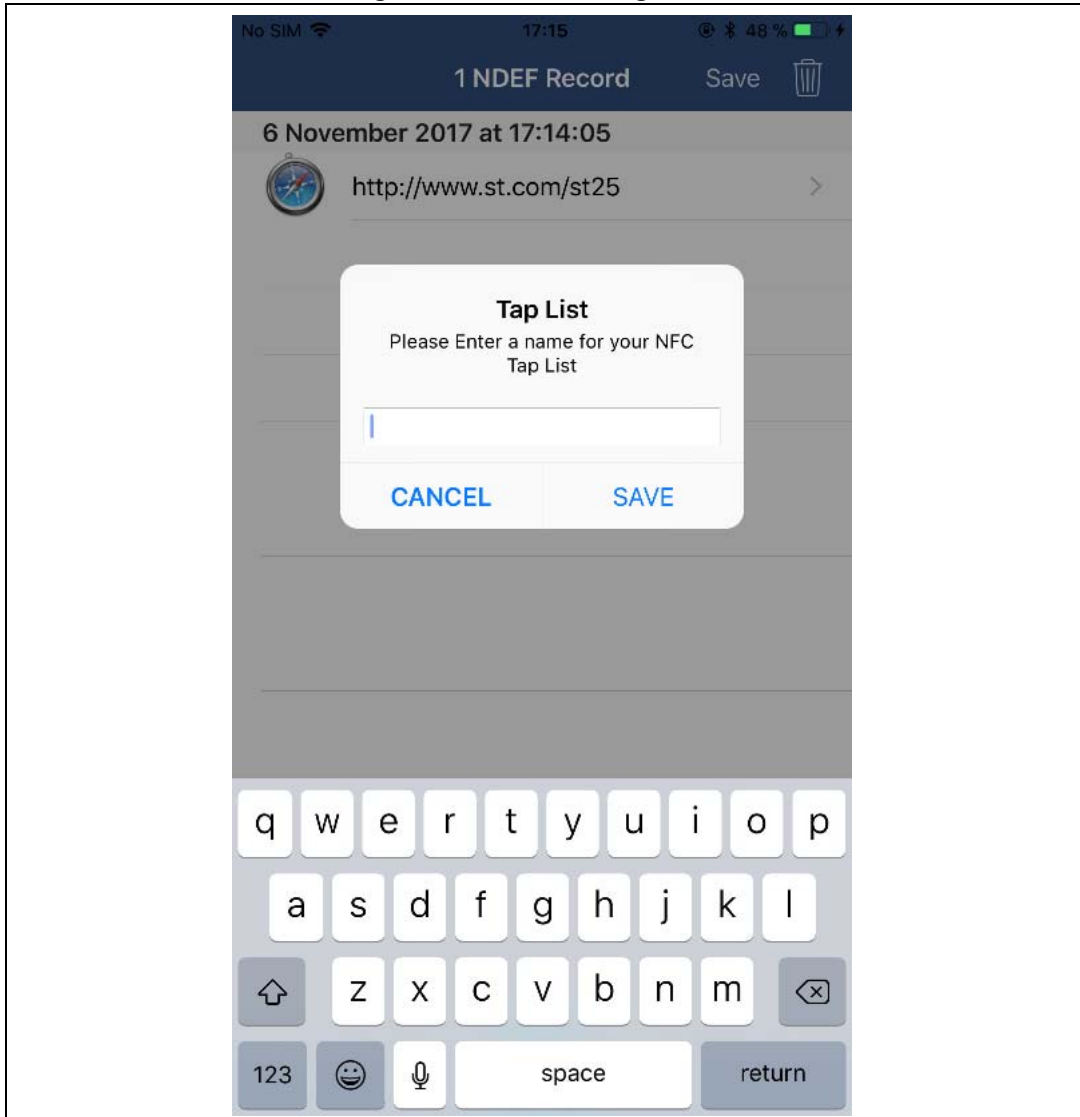
Figure 11. NDEF Sharing record

Saving / Loading NDEF records

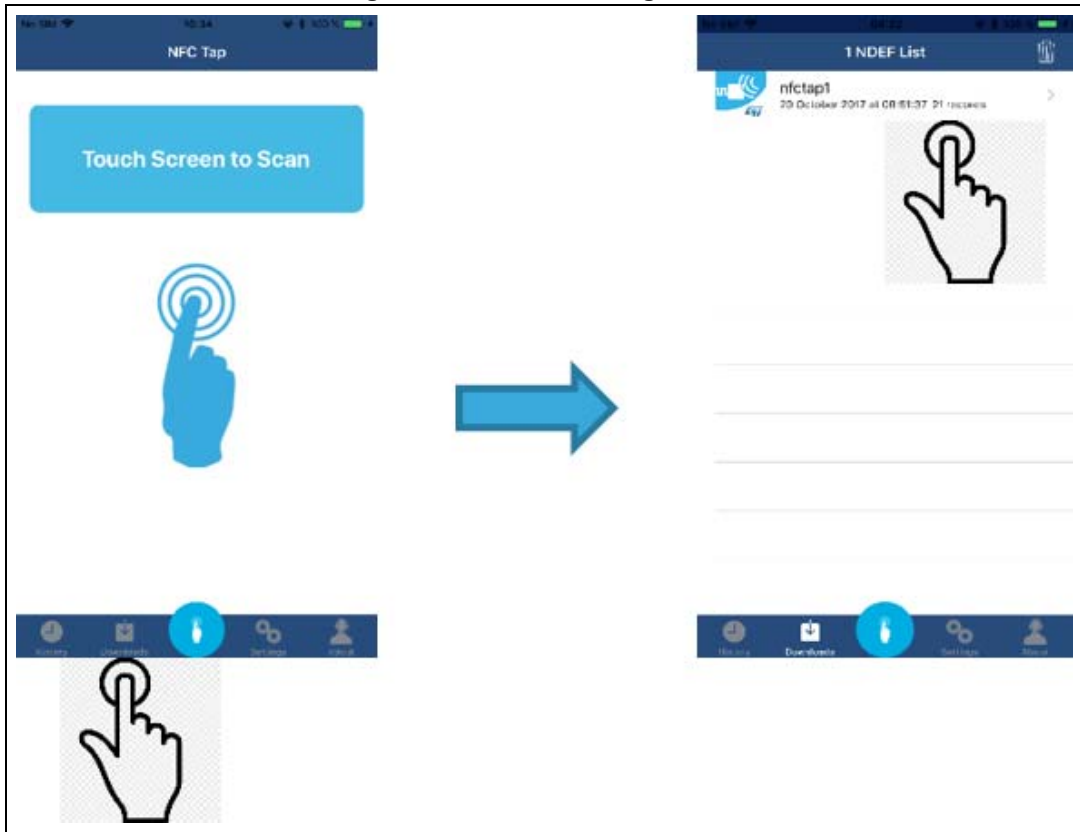NFC Tap allows user to save/load the NDEF record list for future access.

When saving NDEF records, user is asked to enter a name for the list to be saved.

Figure 12. NDEF Saving record

To load an NFC record list, hit "Download" icon on Tab bar, then select list of NDEF record to be loaded.
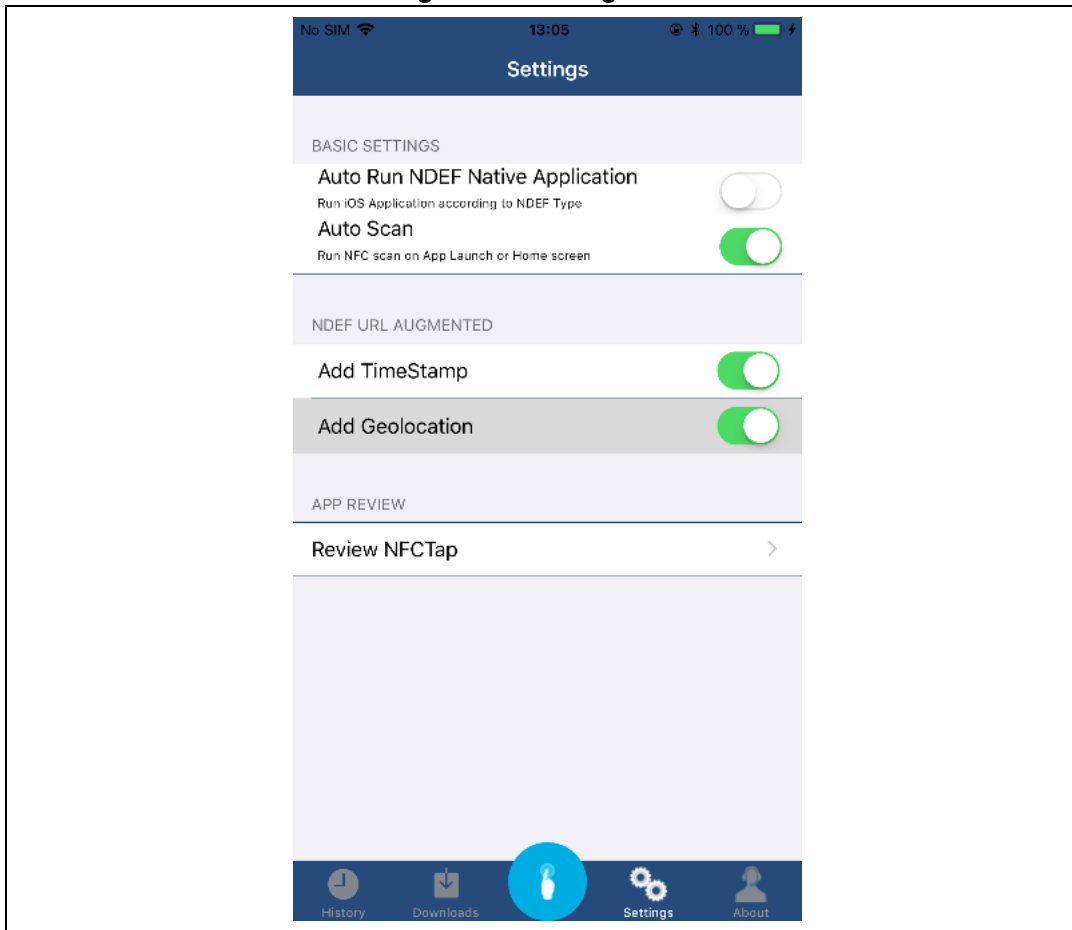
Figure 13. NDEF Loading record

4.4 Setting menu

The Setting menu allows the user to change the behavior of the ST25iOS NFC application depending on the option configuration.

Select "Setting" item in the Menu list: this displays a new screen with the different configurations for the application (*Figure 14*).

Figure 14. Setting menu

The available options are summarized in *Table 3*.

Table 3. Options in the Setting menu

Option	Default setting	Description
Auto Run NDEF Native Application	Set	Enables to launch automatically iOS native app whenever NDEF is read. When the option is disabled, the application reads NDEF, and opens the NDEF history screen as described in *Section 4.3: NDEF history*.
Auto Scan	Set	Runs the NFC scan on app launch or Home Screen display.
NDEF URL Augmented	Disabled	The user can choose to add a timestamp and/or a GPS location to the URL, so that, by scanning a tag, contextual and relevant data can be sent to a web server.
Review NFC Tap	-	The user can rate the app on a scale from 1 to 5 stars, and also choose to add a written review.

4.5 Bluetooth® pairing

A Bluetooth® pairing NDEF demonstration (*Figure 15*) is also included in the application, it allows the user to pair with iPhone and ST25DV Discovery kit, and to display in real time the battery and RSSI levels of the ST25DV Discovery kit.

The Bluetooth® pairing demonstration requires specific firmware (version 1.0.6 or higher) and Discovery kits.

Figure 15. Bluetooth® pairing demonstration setup
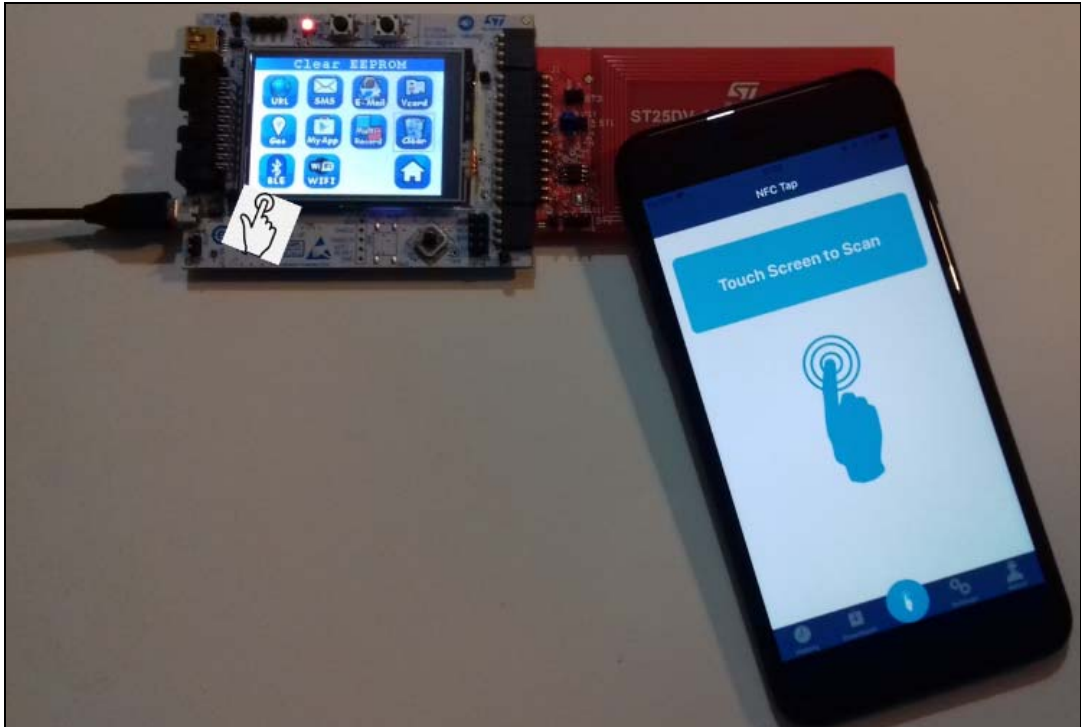
- "Auto Run NDEF Native Application" should be "on" under "Settings" menu.
- Storing a NDEF Bluetooth® with the ST25DV discovery kit. The NDEF message Bluetooth® contains BLE device name "HID".
- Run ST25 NFC iOS app, then start NFC scanning session.
- The iPhone starts the NFC scan, then detects and reads NDEF Bluetooth® message. According to the information contained in the NDEF record, the ST25 NFC iOS app runs an NFC connection handover with the BLE device of the ST25DV discovery kit. When connection is established, the iPhone requests (every second) data such as RSSI and battery levels to the BLE devices (*Figure 16*).

Figure 16. Bluetooth® pairing data exchange
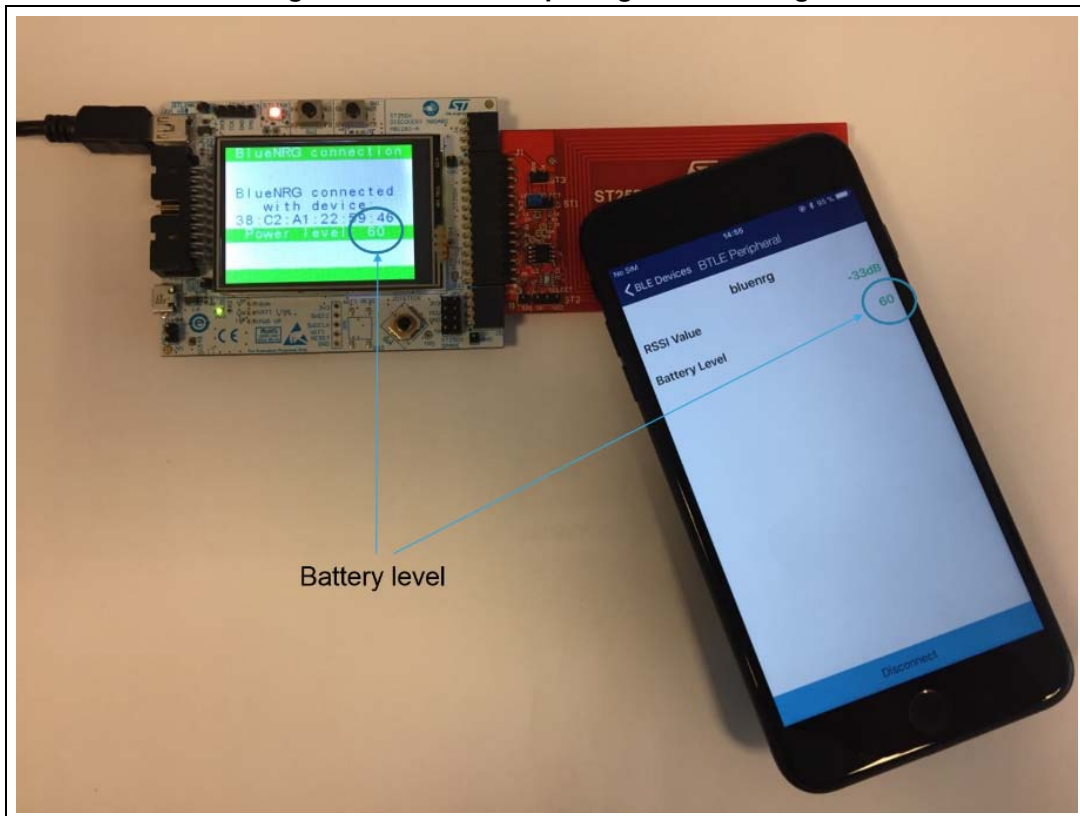
• Click on "Disconnect" button to stop the demonstration.

5 Revision history

Table 4. Document revision history

Date	Revision	Changes
05-Sep-2017	1	Initial release.
15-Sep-2017	2	Updated *Introduction*, *Section 3: Overview*, *Section 3.2: Functionalities overview*, *Section 3.3: Installation*, *Section 4.3: NDEF history* and *Section 4.5: Bluetooth® pairing*. Updated *Note:* in *Section 3.1*. Updated captions of figures from *1* to *4*.
13-Nov-2017	3	Updated *Section 3.1: Prerequisites*, *Section 3.2: Functionalities overview*, *Section 3.3: Installation*, *Section 4: Application description*, *Section 4.2: Home screen*, *Section 4.4: Setting menu* and *Section 4.5: Bluetooth® pairing*. Updated *Figure 2: ST25 NFC iOS application overview*, *Figure 4: Home screen*, *Figure 14: Setting menu* and *Figure 15: Bluetooth® pairing demonstration setup*. Added *Section 4.1: Application startup*, and *Section 4.3: NDEF history* with its subsections. Added *Table 2: Available tabs* and *Table 3: Options in the Setting menu*. Added *Figure 1: ST25 NFC iOS application*, *Figure 3: NFC Tap main activities screens* and *Figure 5: Home Screen Tag detected*, Removed former *Section 4.2: NDEF tag details* and former figures *2*, *3* and *4*.

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