RM00231

NTAG 5 iOS development quickstart guide

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613410 COMPANY PUBLIC

Document information

Information	Content
Keywords	NTAG 5, NTAG 5 link, iOS application
Abstract	This document describes how to start with the development of an NTAG 5 capable iOS application

Revision history

Rev	Date	Description
1.0	20200507	Initial version

1 Introduction

1.1 Objective

This document is a quick guide for start of developing an iOS NFC application - NTAG 5 capable. This document aims to describe main implementation points that demonstrate some features of the NTAG 5 tag.

1.2 Target audience

This document is intended for iOS developers who are working with the NTAG 5. Thus Swift or Objective C knowledge is needed in order to have a complete understanding of the document.

2 NTAG 5 overview

2.1 General description

NTAG 5 is an ISO/IEC 15693 and NFC Forum Type 5 Tag compliant IC with an EEPROM, SRAM and I^2C host interface. This ensures information exchange with all NFC Forum Devices with a tap. With this ability, the tag offers a long-reading range and privacy due to close proximity with mobile devices.

2.2 Features and applications

NTAG 5 is equipped with a reliable and robust memory. It has a 2048-byte EEPROM for the user memory and a 256-byte SRAM for frequently changing data and Pass-through mode.

Regarding security there are several ways to protect the IC:

- 32-bit password to access the memory from NFC and I^2C interfaces.
- Optional 64-bit password only to read/write the tag from NFC perspective.
- 128-bit AES mutual authentication from NFC perspective before doing memory operations.

The NTAG 5 has a configurable contact interface with an I^2C standard slave mode (with 100 kHz and fast 400 kHz operating frequencies) and a transparent I^2C master channel. Other interesting features in the contact interface are the configurable event detection pin, two GPIO channels, two PWM channels and energy harvesting for low-power budget applications.

Apart from these features, NTAG 5 has several innovative features such as Active Load Modulation, NFC and I^2C Disable, Privacy mode and DESTROY command.

Taking into account the IC features, it can be used in quite different applications: Lighting, Smart home, Consumer, Industrial, Gaming or Smart metering.

Recommended additional documentation:

- NFC Forum Type 5 Tag configuration: [NFC Forum specification, Type 5 Tag]
- NFC Forum NDEF: [NFC Forum specification, Tag NDEF Exchange Protocol - Technical Specification Version]
- I^2C Master: [AN12368 - NTAG 5 Link I2C Master mode]
- I^2C Slave: [AN12364 - NTAG 5 Bidirectional data exchange
- Pass-through mode: [AN12364 - NTAG 5 Bidirectional data exchange]
- PHDC data transfer: [AN12364 - NTAG 5 Bidirectional data exchange], [NFC Forum Personal Health Care Devices (PHDC) specification]
- Energy harvesting: [AN11201 - NTAG 5 How to use energy harvesting]
- GPIO: [AN11203 - NTAG 5 Use of PWM, GPIO and Event detection]
- PWM: [AN11203 - NTAG 5 Use of PWM, GPIO and Event detection]
- Event detection: [AN11203 - NTAG 5 Use of PWM, GPIO and Event detection]
- Protecting User memory and features, Security: [AN12366 - NTAG 5 Memory Configuration and Scalable Security]

3 Development guide

Copy the NTAG5_NFC_LIB folder into your project.

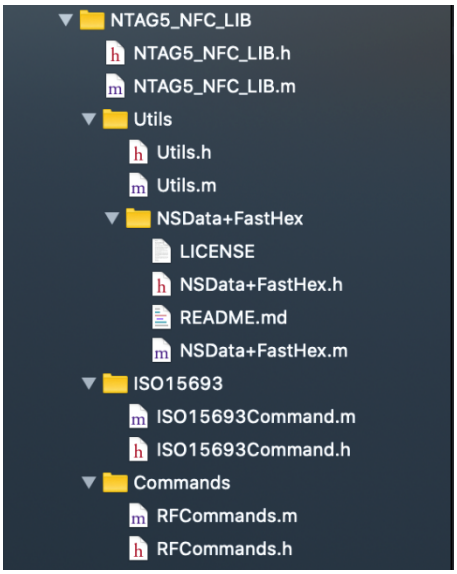

Figure 1. Project structure

[Swift only] If the new project is Swift-based, create a Bridging Header.

Create a new .h file in the project directory and name it AppName-Bridging-Header.h

Import your Objective-C class names inside the Bridging header file.

```
//
//  Pressure-Sensor_BridgingHeader.h
//  NTAG5 pressure sensor
//
//  Created by CAS Engineer on 03.03.20.
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//

#ifndef Pressure_Sensor_BridgingHeader_h
#define Pressure_Sensor_BridgingHeader_h

#import "Utils.h"
#import "NSData+FastHex.h"
#import "NTAG5_NFC_LIB.h"
#import "ISO15693Command.h"
#import "RFCommands.h"

#import "I2CMasterChannelUseCase.h"


#endif /* Pressure_Sensor_BridgingHeader_h */
```

Go inside the Project Build Settings → Swift Compiler – General → Objective-C Bridging Header or type “Bridging header” into the search. Add the path of the Bridging Header file, that you created.

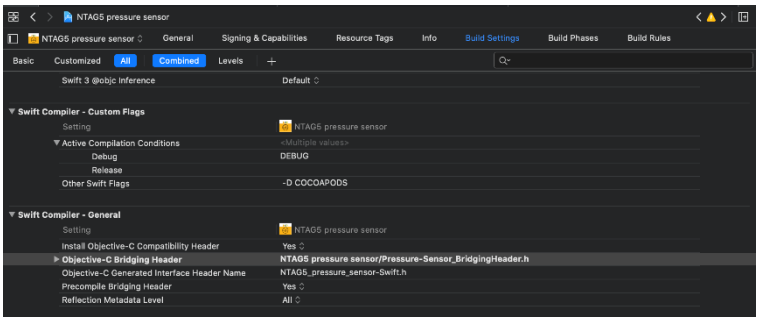

Figure 2. Bridging header

Using the code:

- Swift

Create an instance of the NTAG5_NFC_LIB.

```
let ntag5NfcLib = NTAG5_NFC_LIB()
```

We then use this instance to make calls to the methods.

First call the initSession to initialize an NFC session through the NFC Core API.

```
ntag5NfcLib.initSession({ (data) -> Void in
        print("Success")
    }, onFailure: { (error) -> Void in
        print("Failure")
    })
```

Then wait for the reader session to connect to a tag.

```
while (ntag5NfcLib.isConnect() == 0){}
```

After that you can send commands to the NTAG 5, where data contains the response. Create and ISO15693Command from a HEX string.

```
let cmdString = "12C0A700";
let cmd = ISO15693Command.init(data: cmdString)

ntag5NfcLib.send(cmd, onSuccess: { (data) -> Void in
  print("Success")
}, onFailure: { (error) -> Void in
  print("Failure")
})
```

To finish the reader session with success use close.

```
self.ntag5NfcLib.close({ (data) -> Void in
            print("Success")
        }, onFailure: { (error) -> Void in
          print("Failure")
        })
```

And to finish the reader session with a failure use errorMessage.

```
    self.ntag5NfcLib.errorMessage({ (data) -> Void in
                print("Success")
            }, onFailure: { (error) -> Void in
                print("Failure")
            })
```

- Objective-C

Similar to Swift, described in the previous section. Using Objective-C calls like the next example.

```
    NSString * cmdString = @"12C1A709A5A5A5";
    ISO15693Command *cmd = [[ISO15693Command alloc]
initWithData:cmdString];

    [[NTAG5_NFC_LIB sharedInstance] sendCommand: cmd
onSuccess:^(NSData *aData) {
      //success
    } onFailure:^(NSError *error) {
      //failure
    }];
```

4 References

[1] NFC Forum specification, Type 5 Tag - Technical Specification Version 1.0 2018-04-27 [T5T] NFC Forum™
https://nfc-forum.org/product-category/specification/

[2] NFC Forum specification, Tag NDEF Exchange Protocol - Technical Specification Version 1.0 2019-04-24 [TNEP] NFC Forum™
https://nfc-forum.org/our-work/specifications-and-application-documents/specifications/nfc-forum-candidate-technical-specifications/

[3] NFC Forum Personal Health Care Devices (PHDC) specification
https://nfc-forum.org/product-category/specification/

[4] AN11203 - NTAG 5 Use of PWM, GPIO and Event detection, doc.no. 5302xx
https://www.nxp.com/docs/en/application-note/AN11203.pdf

[5] AN12364 - NTAG 5 Bidirectional data exchange, doc.no. 5303xx
https://www.nxp.com/docs/en/application-note/AN12364.pdf

[6] AN11201 - NTAG 5 How to use energy harvesting, doc.no. 5304xx
https://www.nxp.com/docs/en/application-note/AN12365.pdf

[7] AN12366 - NTAG 5 Memory Configuration and Scalable Security, doc.no. 5305xx
https://www.nxp.com/docs/en/application-note/AN12366.pdf

[8] AN12368 - NTAG 5 Link I^2C Master mode, doc.no. 5306xx
https://www.nxp.com/docs/en/application-note/AN12368.pdf

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