NFC Application with HANI board

Revision 1.2, 7.1.2019

Guide
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Overview

This guide will show an example how to demonstrate a NFC application with HANI board.

Description

HANI is a board focused on HMI (Human Machine Interface) supporting multiple display sizes and connectivity protocols with a multi-protocol wireless module, a Wi-Fi module, a NFC reader, CAN, and Ethernet and USB interfaces. On-board sensors make the HANI board a robust IoT kit.

Kit contents

The following items are included in the box:

- 1x HANI board
- 1x 5V 2A power wall adapter (input: 100-240 V, 50/60 Hz)
- 4x 10mm plastic spacers mounted on the board, 8x additional 20mm plastic spacers
System overview

Block diagram

An overview of the functional blocks of HANI board is shown in the figure below.
Main devices

HANI board main features are summarized in the picture below.
NFC basic information

NFC (Near Field Communication) is a fast, intuitive technology that lets you interact securely with devices with a simple touch. NFC wireless proximity technology is available in smartphones, tablets, consumer and industrial electronics.

The HANI board is equipped with the CLRC663 plus NFC Reader ICs from NXP. It is a high-performance NFC Frontend with low power consumption for applications with high-performance requirements like access control, payment, gaming.

Supported protocols:

- ISO/IEC 14443A/MIFARE
- ISO/IEC 14443B
- JIS X 6319-4 (comparable with FeliCa1 scheme)
- ISO/IEC 15693 (ICODE® SLIX family, ICODE® DNA)
- ISO/IEC 18000-3 mode 3/ EPC Class-1 HF (ICODE® ILT family)
- Peer-to-Peer Mode: ISO/IEC 18092 passive initiator
Demo description

The Discovery Loop is the entry point when starting to communicate with an NFC tag or device. It scans the close environment for tags and devices of different technologies. Example is implemented to work in POLL and LISTEN mode of the discovery loop. Information (like UID, SAK, and Product Type for MIFARE product-based cards) of the detected tags are printed out. Similarly, information is printed when it gets activated as a target by an external initiator/reader. Whenever multiple technologies are detected, the demo selects the first detected technology and resolves it.

In passive poll mode, Low Power Card Detection (LPDC) is enabled.

The core function of this example is `BasicDiscoveryLoop_Demo()`, where initialization of the NFC Reader library and polling for NFC technologies is implemented. After each polling loop, application is checking polling result and printout information about the detected tags or devices. This example is using default DiscoveryLoop configuration, which enables all supported technologies.
Requirements

Hardware

- HANI board
- 5V 2A power wall adapter (input: 100-240 V, 50/60 Hz)
- Segger J-link with USB cable
- Proximity card compliant with NFC (e.g. credit card supported contactless payment), or mobile phone with NFC enabled

Software

- MCUXpresso Integrated Development Environment (IDE) v10.1.0 or later release
  http://www.nxp.com/mcuexpresso/ide
- MCUXpresso SDK for LPC54618J512 v2.3.0 or later release
  https://mcuxpresso.nxp.com/en/welcome
- Segger J-link driver
- Application source code: hani_nfc.zip

Configuration

Download and install MCUXpresso
Download and install MCUXpresso Integrated Development Environment (IDE)
(http://www.nxp.com/mcuexpresso/ide). It requires to create an account on NXP web page.

Debug probes
An external debug probe is required to flash and debug the software. Any device supported by NXP MCUxpresso should work properly.
During the lab Segger JLink will be used.
1. Please download JLink V6.33f or later release and install. The software is available on Segger website:
https://www.segger.com/downloads/jlink/

⚠️ J-Link Software and Documentation Pack

- All-in-one debugging solution
- Can be downloaded and used free of charge by any owner of a SEGGER J-Link, J-Trace or Flasher model. Not all features of it may be available on all J-Link / J-Trace / Flasher models.
- Updated frequently
- Release Notes
- More Information

Click for downloads
2. After installation is complete, please open **Window → Preferences** menu in **MCUXpresso** and select the proper **path for J-link Server executable**:

![J-Link Options]

3. Check also that discovery of **Segger J-Link probes** is enabled in **Window → Preferences → MCUXpresso IDE → Debug Probe Discovery**.

![Debug Probe Discovery]
Preparing HANI board application

Prerequisites

The following development tools should be installed before trying to either create a project or use any example based on HANI board:

- MCUXpresso Integrated Development Environment (IDE) v10.1.0 or later release
  http://www.nxp.com/mcuxpresso/ide
- MCUXpresso SDK for LPC54618J512 v2.3.0 or later release
  https://mcuxpresso.nxp.com/en/welcome

1. Click “Select Development Board”!
2. Type “LPC54618” in the Search by Name field and select processor LPC54618J512! Click on “Build MCUXpresso SDK”!

3. Click on “Add software component”!
4. **Open** the “items selected” drop-down menu, **scroll** to the bottom and **make sure** that “Amazon-FreeRTOS Kernel” is selected! **Click** on “Save Changes”!

5. **Click** on “Request Build” button!

6. Once built, **click** on the “Download SDK archive” button!
7. The SKD has to be installed from within MCUXpresso. **Drag and drop** the SDK archive zip file into the `Installed SDKs` view. (See below).
Setting up the HANI board

HANI Board need to be properly configured before starting to use it.

1. Connect Segger J-Link to HANI board J21 connector, pay attention to the cable polarization (see below).
2. Connect power supplier to HANI Board (see below).
Building the application on the HANI board

In the next step you will open the project file of this hands-on and modify certain settings to have the application working with your local WiFi access point, with your Azure IoT Hub and twin device.

1. **Unzip** the “hani_nfc.zip” archive into the work folder you created when opening MCUXpresso IDE.
2. Go to **File → Open Projects from File System...**

![Open Projects from File System](image)

3. **Click** on the “Directory…” button and **select** the extracted “hani_lab_nfc” folder! **Click OK**!

![Select Directory](image)
4. **Verify** that the `hani_lab_nfc\NFC_LAB\NFCrdlibEx1_BasicDiscoveryLoop` project is detected! **Click “Finish”**!

If there is a message that SDK version is not compatible. Accept it.
5. **Connect** your **J-Link probe** to your **laptop** and to the **board's J21 header**, then **provide power** to the board through **J1 power connector**!

6. In order to check the correct behavior of the sample application start the Debug by selecting **debug (blue bug) icon** in the menu.
7. **Select** your J-Link probe then **click OK**!

8. **Click** the **Resume All** button to run the application!
9. Close the NFC card to the NFC reader (marked in red below).

Information of the detected card are printed out on **Console** tab in MCUXpresso IDE.

```
BasicDiscoveryLoop Example:

Card detected and activated successfully...

    Technology : Type A
    Card: 1
    UID : 08 48 91 22
    SAK : 0x20
    Type: Type 4A Tag
```
THE END