AN11758

PN7150 Raspberry Pi SBC Kit Quick Start Guide

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Application note
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Document information

Info	Content
Keywords	OM5578, PN7150, Raspberry Pi, NFC, P2P, Card Emulation, Linux, Windows IoT
Abstract	This document gives a description on how to get started with the OM5578 PN7150 NFC Controller SBC Kit on Raspberry Pi platform.

Revision history

Rev	Date	Description
1.4	20190708	Updated Linux demo part with link to instructions
1.3	20180725	Updated weblinks
1.2	20170222	Updated demo images weblinks
1.1	20160512	• Dedicating document to Raspberry Pi platform quick start guidelines • Security status changed into COMPANY PUBLIC
1.0	20151210	First official release version

Contact information

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1. Introduction

This document gives a description on how to get started with the OM5578 PN7150 NFC-Controller SBC Kit on Raspberry Pi platform. This document provides a step by step guide to the installation procedure of the hardware and the software. Finally, it shows PN7150 NFC Controller functionalities through demonstration application.

1.1 OM5578/PN7150RPI demo kit

OM5578/PN7150RPI kit is a high performance fully NFC compliant expansion board for Raspberry Pi (refer to [1] for more details). It meets compliance with Reader mode, P2P mode and Card emulation mode standards. The board features an integrated high performance RF antenna to insure high interoperability level with NFC devices.

The kit is comprised of an OM5578/PN7150S NFC Controller Board, an OM29110RPI Raspberry Pi Interface Board, and an NFC Sample Card.

Fig 1. OM5578/PN7150RPI demo kit overview

The demo kit is fully described in UM10935 document [6].

1.2 Linux driver support

PN7150 NFC Controller is supported under GNU/Linux system using the NXP Linux libnfc-nci software stack delivered through public GitHub repository https://github.com/NXPNFCLinux/linux_libnfc-nci (for more details, refer to AN11697 [2]).

1.3 Windows IoT driver support

PN7150 NFC Controller is natively supported as Proximity platform device by Win10 IoT OS through the universal NFC device driver model. More details can be found in relative

pages on Microsoft website (refer to [5]). For instructions on how to install this driver refer to AN11767 [3].

The Win10 IoT Raspberry Pi demo image is based on this concept.

2. Quick Startup on Raspberry Pi

2.1 Required items

- Raspberry Pi [1] (only model 2 works with WinIoT demo image)
- Compatible SD or MicroSD card (depending of the Raspberry Pi model) of at least 8Gb memory size
- Micro USB power supply (5V / 1A)
- USB Keyboard
- USB Mouse
- HDMI cable to connect to a Monitor / TV
- Computer (running Windows, Linux or Mac OS X) only for SD/MicroSD card installation

2.2 Hardware setup

First of all assemble the PN7150 NFC Controller Board with the Raspberry Pi Interface Board.

Fig 2. OM5578/PN7150RPI demo kit assembly

Then stacked the boards together with the Raspberry Pi according to below guidelines.

The Raspberry Pi platforms (new versions) have a 40-pin connector allowing to connect an expansion board. The Raspberry Pi Interface Board only make use of the first 26 ones for compatibility reason with the previous Raspberry Pi models. Assemble the boards as shown in figure below:

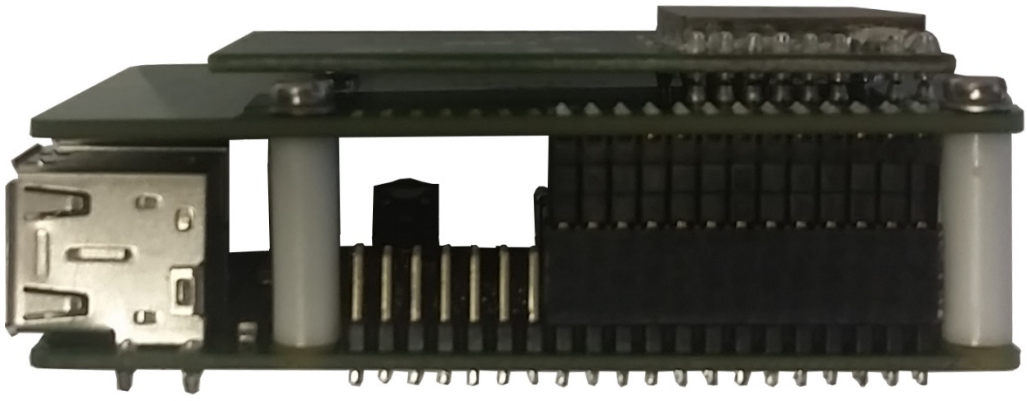

Fig 3. OM5578/PN7150RPI demo kit and Raspberry Pi stacked together

Note: On the old models (A/B series) first remove the 4 white plastic spacers before assembly.

2.3 Linux NFC demo application

2.3.1 Setup

Guidelines to setup this demonstration are provided here https://community.nxp.com/docs/DOC-341231. Just follow the step-by-step procedure to install the demo from Raspbian distribution.

2.3.2 Application details

The demo application is part of the Linux libnfc-nci stack available on public GitHub repository https://github.com/NXPNFCLinux/linux_libnfc-nci. The related source code can then be found there (more details in document AN11697 [2]).

2.3.3 Starting the application

Open a terminal and browse to the Linux libnfc-nci stack directory (refer to chapter 1.2 for more details about the Linux NFC software stack).

```
$ cd ~/linux_libnfc-nci
```

The application requires parameters to run:

```
$ ./nfcDemoApp <OPTIONS>
```

You can get the parameters details by launching the application help menu:

```
$ ./nfcDemoApp --help
```

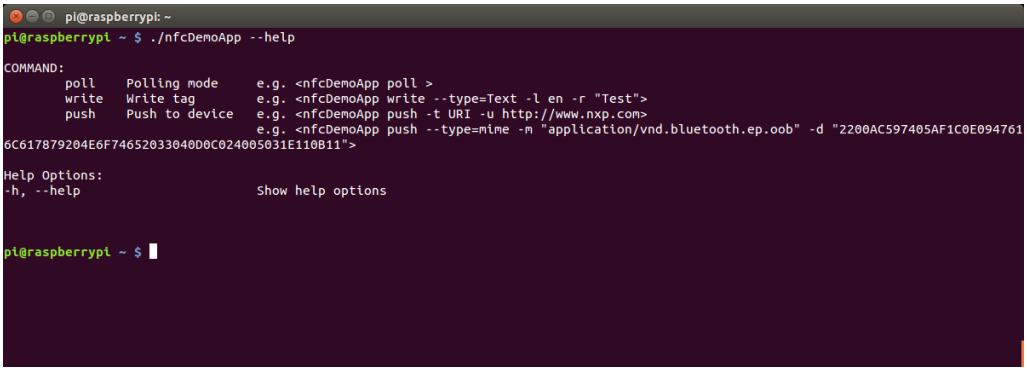

Fig 4. Linux demo application parameters

The demo application offers 3 modes of operation:

- **Polling**: continuously waiting for a remote NFC device (tag or peer device) and displays related information
- **Tag writing**: allows writing NDEF content to a NFC tag
- **Device push**: allows pushing NDEF content to a remote NFC peer device

2.3.3.1 Polling mode

When in this mode, the application will display information of any discovered NFC tags or remote NFC device.

It is reached starting the application with “poll” parameter:

```
$ ./nfcDemoApp poll
```

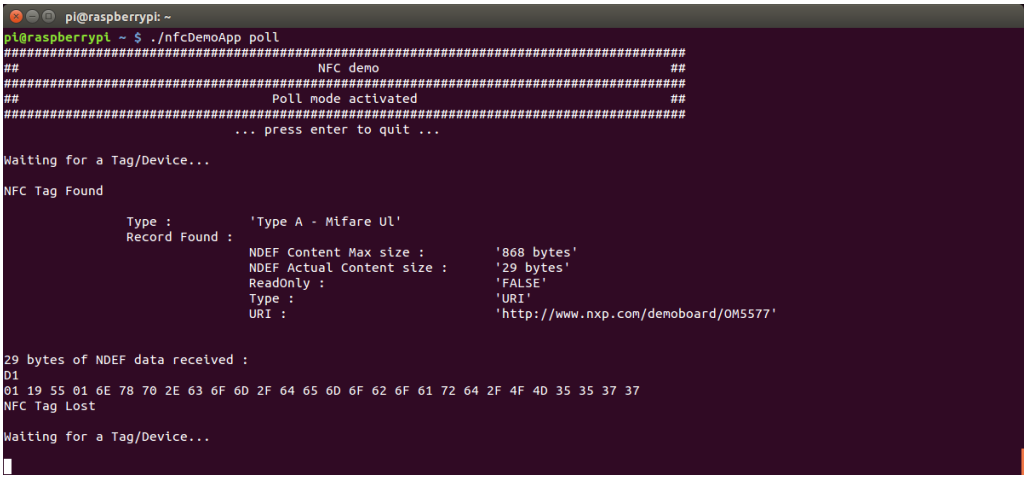

Fig 5. Linux demo application polling mode

2.3.3.2 Device push mode

This mode allows pushing data to a remote NFC device (e.g. an NFC phone). It is reached using “push” parameter:

```
$ ./nfcDemoApp push <OPTIONS>
```

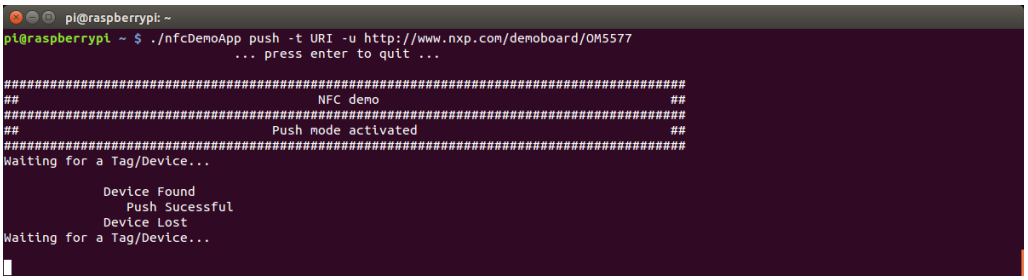

Fig 6. Linux demo application device push mode

You can get more information about the message format using “-h” or “--help” parameter:

```
$ ./nfcDemoApp push --help
```

2.3.3.3 Tag writing mode

This mode allows writing data to an NFC tag. It is reached using “write” parameter:

```
$ ./nfcDemoApp write <OPTIONS>
```

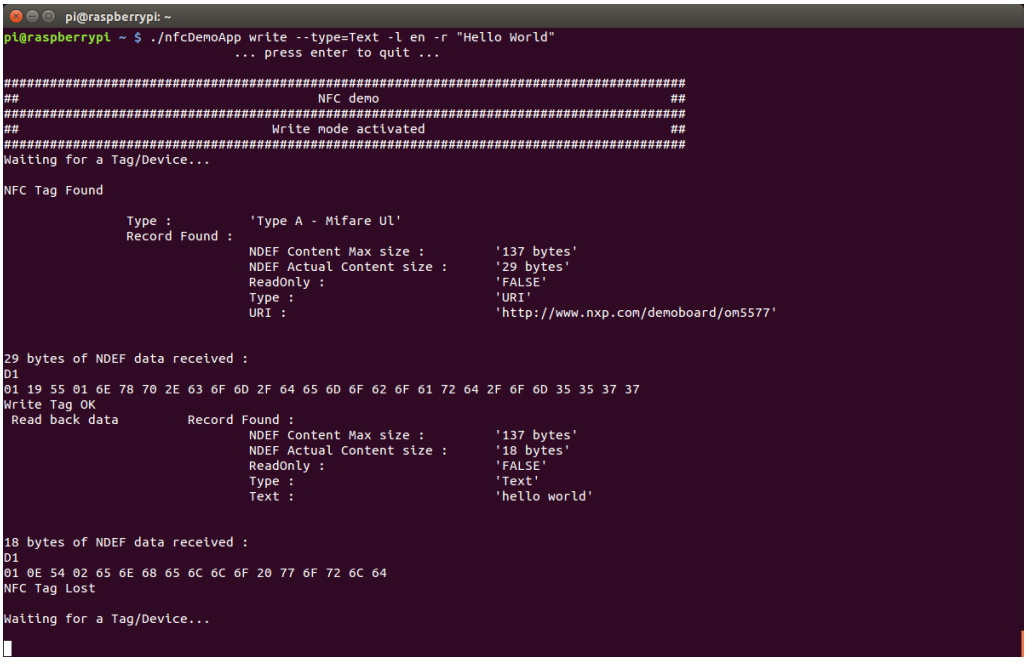

Fig 7. Linux demo application tag writing mode

You can get more information about the message format using “-h” or “--help” parameter:

```
$ ./nfcDemoApp write --help
```

2.4 WinIoT NFC demo

2.4.1 Setup

Prepare a SD or MicroSD card, with the downloaded Raspberry Pi demo image (see [4]), following the installation guidelines:

- On Windows: https://www.raspberrypi.org/documentation/installation/installing-images/windows.md
- On Linux: https://www.raspberrypi.org/documentation/installation/installing-images/linux.md
- On MAC OS X: https://learn.adafruit.com/beaglebone-black-installing-operating-systems/mac-os-x

2.4.2 Starting the application

Insert the SD or MicroSD card in the Raspberry Pi 2, connect HDMI Display, and then power-up the Raspberry Pi by plugging the USB power cable.

The Raspberry Pi boots and displays the “Proximity_BasicTest” application for demonstration of NFC functionality.

The application consists of a simple graphical interface, displayed on the HDMI output of the Raspberry Pi. It will react when NFC devices or tags are made proximate to the PN7120 antenna by displaying short messages:

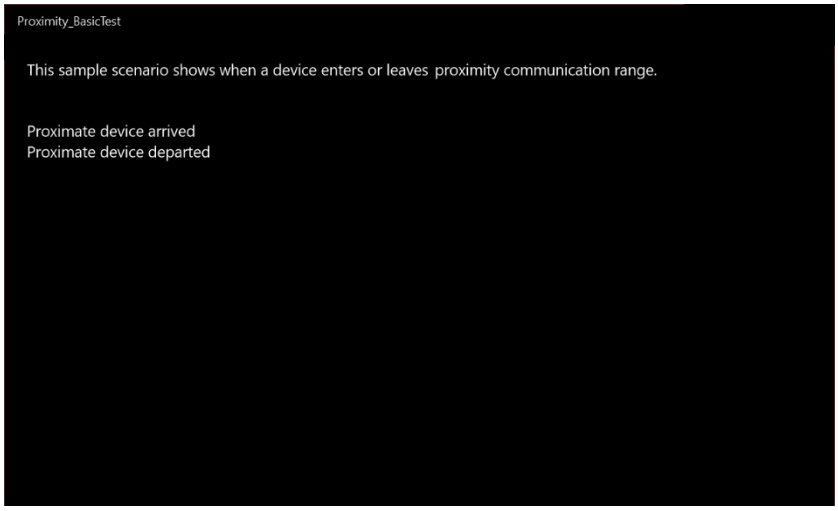

Fig 8. Proximity_BasicTest application

For more details about the demo application or instruction for driver installation on other platform (e.g. Raspberry Pi 3), you can refer to AN11767 [3].

3. References

[1] The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

For more information about it please visit https://www.raspberrypi.org/

[2] AN11697 PN71x0 Linux Software Stack Integration Guidelines: http://www.nxp.com/documents/application_note/AN11697.pdf

[3] AN11767 PN71x0 Windows IoT Porting Guidelines: http://www.nxp.com/documents/application_note/AN11767.pdf

[4] Raspberry Pi 2 WinIoT demo: https://www.nxp.com/lgfiles/updates/NFC/OM557x-PN71x0S_Rpi2_Win10IoT_demo.zip

[5] NFC Devices in Windows: https://msdn.microsoft.com/en-us/windows/hardware/drivers/nfc/index

[6] UM10935 PN7150 NFC Controller SBC Kit User Manual: http://www.nxp.com/documents/user_manual/UM10935.pdf

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