

# AN11646

## PN7120 NFC Controller SBC Kit Quick Start Guide

Rev. 1.2 — 9 October 2015  
319712

Application note  
COMPANY PUBLIC

### Document information

Info	Content
<b>Keywords</b>	OM5577, PN7120, Raspberry Pi, BeagleBone, NFC, P2P, Card Emulation, Linux, Android, Win10 IoT
<b>Abstract</b>	This document gives a description on how to get started with the PN7120 NFC Controller SBC Kit.



## Revision history

Rev	Date	Description
1.2	20151009	- Information about Win10 IoT demo added - Section <a href="#">6.3 Licenses</a> updated
1.1	20150701	- Correction of a syntax error in a referenced link - Explicitly point to the demo images
1.0	20150601	First release

## Contact information

For more information, please visit: <http://www.nxp.com>

## 1. Introduction

This document gives a description on how to get started with the PN7120 NFC-Controller SBC Kit. This document provides a step by step guide to the installation procedure of the hardware and the software. Finally it shows PN7120 NFC Controller functionalities through demonstration application.

### 1.1 OM5577/PN7120S demo kit

OM5577/PN7120S kit is a high performance fully NFC compliant expansion board for both Raspberry Pi (refer to [1] for more details) and BeagleBone (refer to [2] 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 composed of 3 printed circuit boards and a MIFARE Ultralight EV1 card.



Fig 1. PN7120 NFC Controller SBC Kit content

## 1.2 Linux driver support

PN7120 NFC Controller is supported under GNU/Linux system using the NXP Linux libnfc-nci software stack (for more details, refer to AN11697 available on PN7120 Product Web Page [5]). The Raspberry Pi and BeagleBone Linux demo images include the complete stack (Kernel mode driver, User mode library and demo application) allowing to demonstrate the NFC functionalities offered by the PN7120.

## 1.3 Android driver support

PN7120 NFC Controller is supported from the official Android Open Source Project (refer to [7] for more details) with the addition of dedicated patches available through PN7120 Product Web Page [5] (refer to AN11690).

The BeagleBone Black demo image is based on this concept.

## 1.4 Windows IoT driver support

PN7120 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 [8]). For instructions on how to install this driver refer to AN11767 available through PN7120 Product Web Page [5].

The Win10 IoT Raspberry Pi 2 demo image is based on this concept.

## 2. Quick Startup on Raspberry Pi

### 2.1 Required items

- Raspberry Pi (Win10IoT demo only support Raspberry Pi Model 2) [1]
- Compatible SD or MicroSD card (depending of the Raspberry Pi model) of at least 4Gb (8Gb for Win10IoT demo) memory size [3]
- Micro USB power supply (5V / 1A) [4]
- USB Keyboard (useless for Win10IoT demo)
- USB Mouse (useless for Win10IoT demo)
- HDMI cable to connect to a Monitor / TV
- Computer (running Windows, Linux or Mac OS X) for SD/MicroSD card installation
- Raspberry Pi demo image file, downloaded from the OM5577/PN7120S demo kit webpage [6]

### 2.2 Hardware setup

First of all assemble the PN7120 NFC Controller Board with the Raspberry Pi Interface Board.



Fig 2. OM5577/PN7120S Raspberry Pi configuration

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

### 2.2.1 Raspberry Pi A/B (old models)

On the old models, the Raspberry Pi Interface Board connector fit perfectly the Raspberry Pi one. Assemble the boards as shown in figure below, removing first the 4 white plastic spacers:

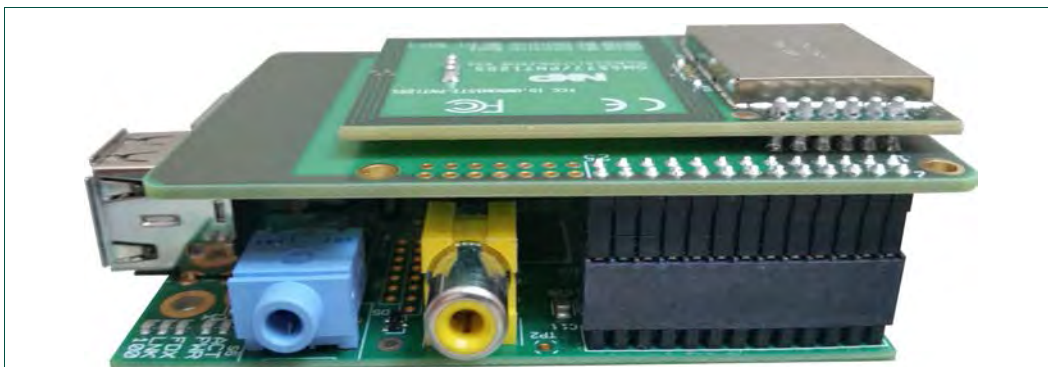


Fig 3. OM5577/PN7120S and Raspberry Pi B model stacked together

### 2.2.2 Raspberry Pi A+/B+ and Raspberry Pi 2 (new models)

The Raspberry Pi new models 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:

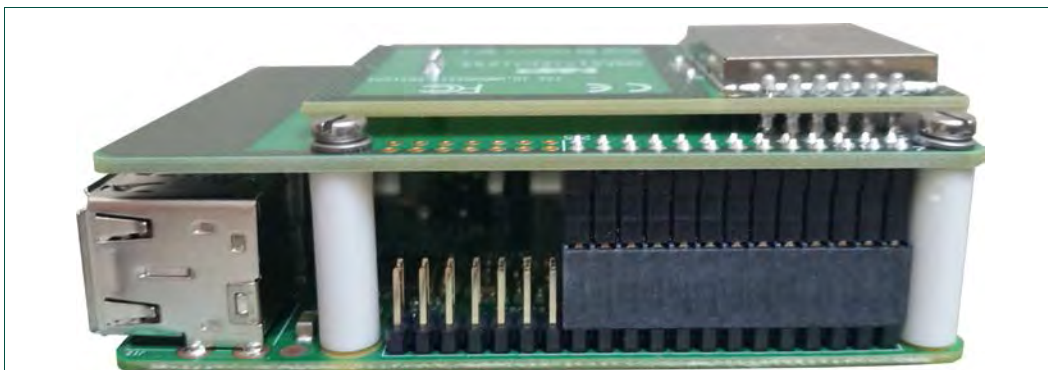


Fig 4. OM5577/PN7120S and Raspberry Pi B+ model stacked together

## 2.3 Software setup

Prepare a SD or MicroSD card, with the downloaded Raspberry Pi demo image ([http://www.nxp.com/documents/software/OM5577\\_Rbi.html](http://www.nxp.com/documents/software/OM5577_Rbi.html) or [www.nxp.com/redirect/nxp.box.com/OM5577-PN7120S-Rpi-Win10IoT](http://www.nxp.com/redirect/nxp.box.com/OM5577-PN7120S-Rpi-Win10IoT)), following the installation guidelines:

- On Windows:  
[www.nxp.com/redirect/raspberrypi.org/documentation/installation/installing-images/windows.md](http://www.nxp.com/redirect/raspberrypi.org/documentation/installation/installing-images/windows.md)

- On Linux:  
[www.nxp.com/redirect/raspberrypi.org/documentation/installation/installing-images/linux.md](http://www.nxp.com/redirect/raspberrypi.org/documentation/installation/installing-images/linux.md)
- On MAC OS X: [www.nxp.com/redirect/learn.adafruit.com/beaglebone-black-installing-operating-systems/mac-os-x.md](http://www.nxp.com/redirect/learn.adafruit.com/beaglebone-black-installing-operating-systems/mac-os-x.md)

## 2.4 Starting NFC demo

### 2.4.1 Linux image

Insert the SD or MicroSD card in the Raspberry Pi. Connect HDMI Display, mouse and keyboard. Then power-up the Raspberry Pi by plugging the USB power cable.

The Raspberry Pi boots and displays the Raspbian GUI:

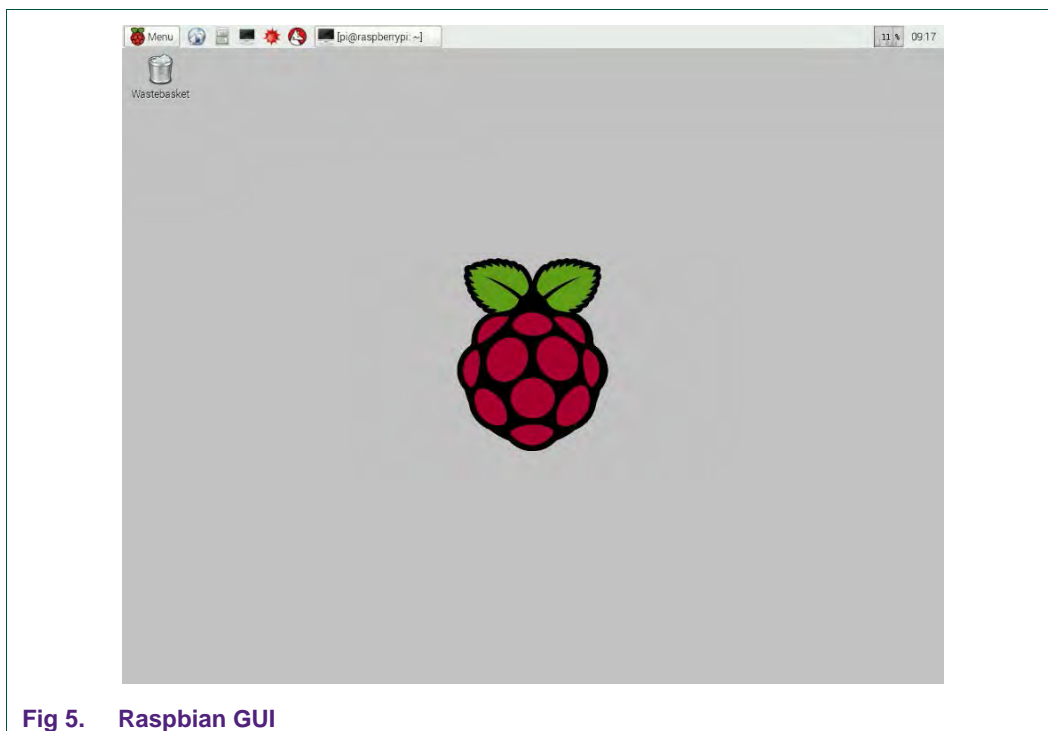


Fig 5. Raspbian GUI

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
```

Refer to chapter 4 for the following procedure.

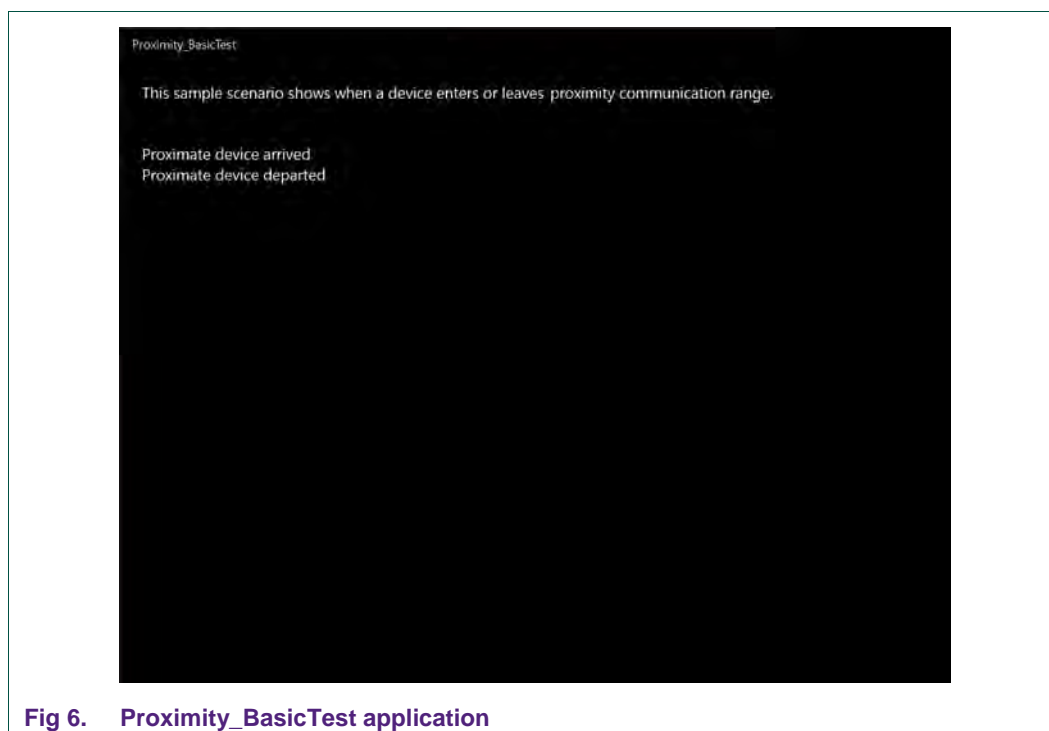


### 2.4.2 Win10 IoT image

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 6. Proximity\_BasicTest application**



### 3. Quick Startup on BeagleBone

#### 3.1 Required items

- BeagleBone Black [2]
- MicroSD card of at least 4 Gb (8 Gb for Android)
- 5 V adapter to power the BeagleBone
- USB Keyboard
- USB Mouse
- USB Hub to connect both Mouse and Keyboard to the BeagleBone
- HDMI cable to connect to a Monitor / TV
- Computer (running Windows, Linux or Mac OS X) for MicroSD card installation
- BeagleBone image file, downloaded from the OM5577/PN7120S demo kit webpage [6]

#### 3.2 Hardware setup

First of all assemble the PN7120 NFC Controller Board with the BeagleBone Interface Board.



Then stacked together the boards with the BeagleBone.

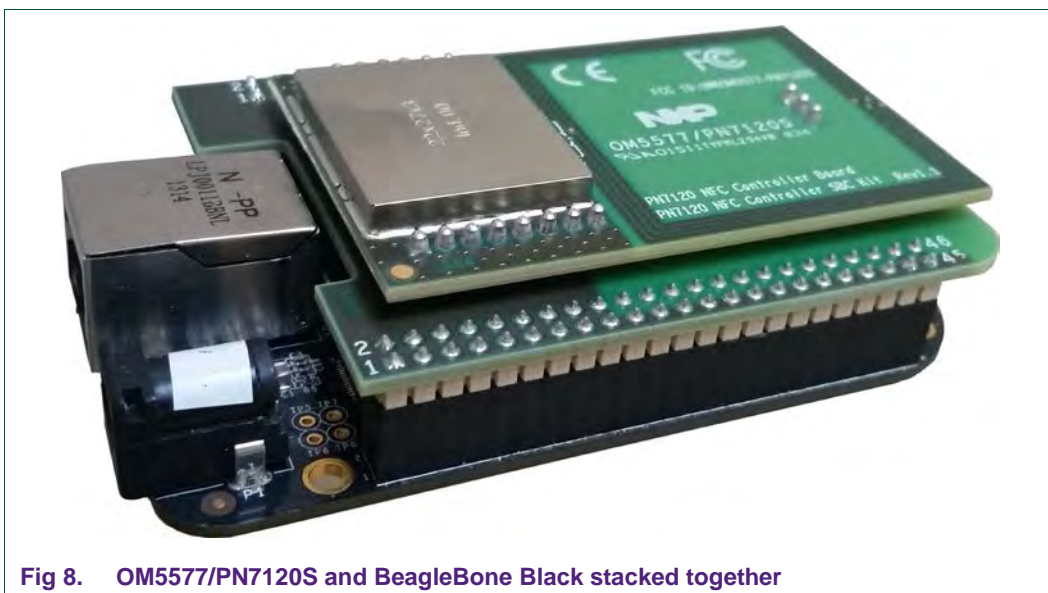


Fig 8. OM5577/PN7120S and BeagleBone Black stacked together

### 3.3 Software setup

Prepare a MicroSD card, with the downloaded BeagleBone demo image ([http://www.nxp.com/documents/software/OM5577\\_BBB\\_Linux.html](http://www.nxp.com/documents/software/OM5577_BBB_Linux.html) or [http://www.nxp.com/documents/software/OM5577\\_BBB\\_Kitkat.html](http://www.nxp.com/documents/software/OM5577_BBB_Kitkat.html)), following the installation guidelines. First extract the ".img" file from the archive, then flash it on the microSD card according to below guidelines.

#### 3.3.1 On Windows

Insert the MicroSD card into your computer (note the device drive letter), and using Win32 Disk Imager, write the image into it:

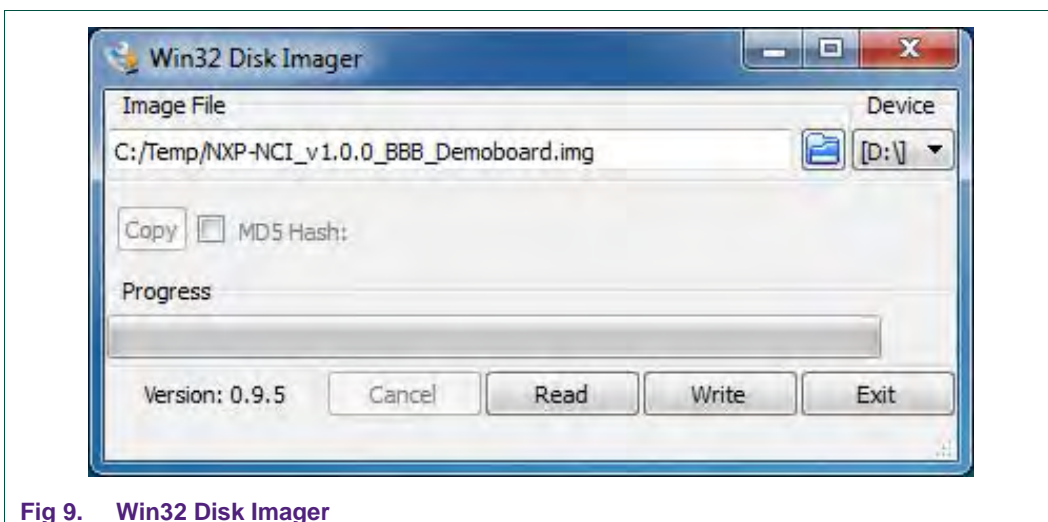


Fig 9. Win32 Disk Imager

### 3.3.2 On Linux

Insert the MicroSD card into your computer and determine the device node assigned to it (ignore the device number; e.g. /dev/sdb, not sdb1):

```
$ sudo dmesg | tail -20
```

```
$ sudo dmesg | tail -20
[95300.848154] usb 2-1: new high-speed USB device number 33 using ehci-pci
[95300.983859] usb 2-1: New USB device found, idVendor=14cd, idProduct=6d00
[95300.983872] usb 2-1: New USB device strings: Mfr=1, Product=3, SerialNumber=2
[95300.983880] usb 2-1: Product: USB 2.0 SD/MMC READER
[95300.983888] usb 2-1: Manufacturer: SDMMC M121
[95300.983895] usb 2-1: SerialNumber: 800340070270
[95300.984593] usb-storage 2-1:1.0: USB Mass Storage device detected
[95300.984882] scsi18 : usb-storage 2-1:1.0
[95301.985555] scsi 18:0:0:0: Direct-Access USB 2.0 SD/MMC Reader PQ: 0 ANSI: 0 CCS
[95301.986856] sd 18:0:0:0: Attached scsi generic sg2 type 0
[95301.988277] sd 18:0:0:0: [sdb] Attached SCSI removable disk
```

**Fig 10. Identifying device number under Linux**

Then, unmount the device node using following command:

```
sudo umount /dev/devicenode
```

Finally flash the image to the device node using following command:

```
sudo dd if=path_to_image_file.img of=/dev/devicenode bs=1M
```

### 3.3.3 On MAC OS X

Using PiFiller (see [www.nxp.com/redirect/learn.adafruit.com/beaglebone-black-installing-operating-systems/mac-os-x.md](http://www.nxp.com/redirect/learn.adafruit.com/beaglebone-black-installing-operating-systems/mac-os-x.md)), select the image file then insert the MicroSD card into your computer to flash it.

## 3.4 Starting NFC demo

Insert the MicroSD card in the BeagleBone. Connect the mini USB cable to your computer triggering power-up of the BeagleBone.

Depending of the demo image used:

### 3.4.1 Linux image

The Raspberry Pi boots and displays the bone-debian GUI:

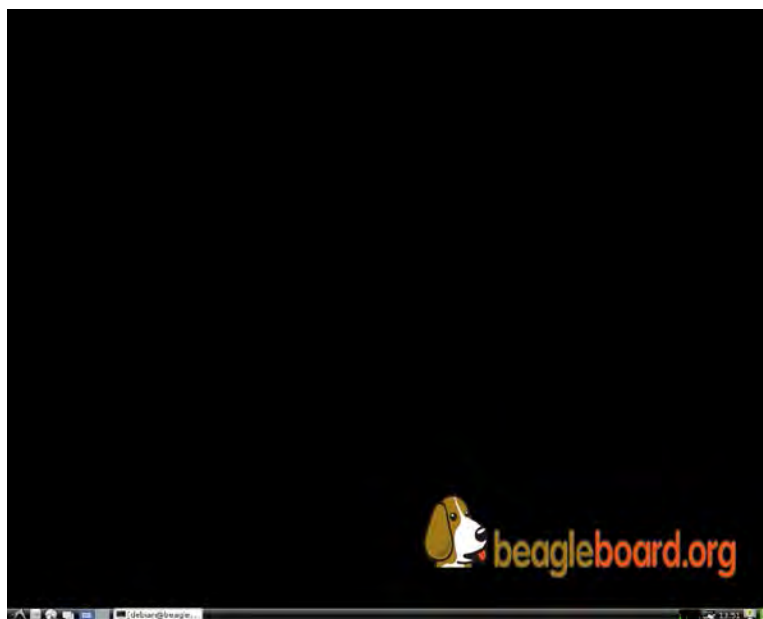


Fig 11. bone-debian GUI

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
```

Refer to chapter 4 for the following procedure.

### 3.4.2 Android image

After a few seconds Android boots up, NFC is then running, ready to read tags or interact with remote NFC device (e.g. NFC phone).

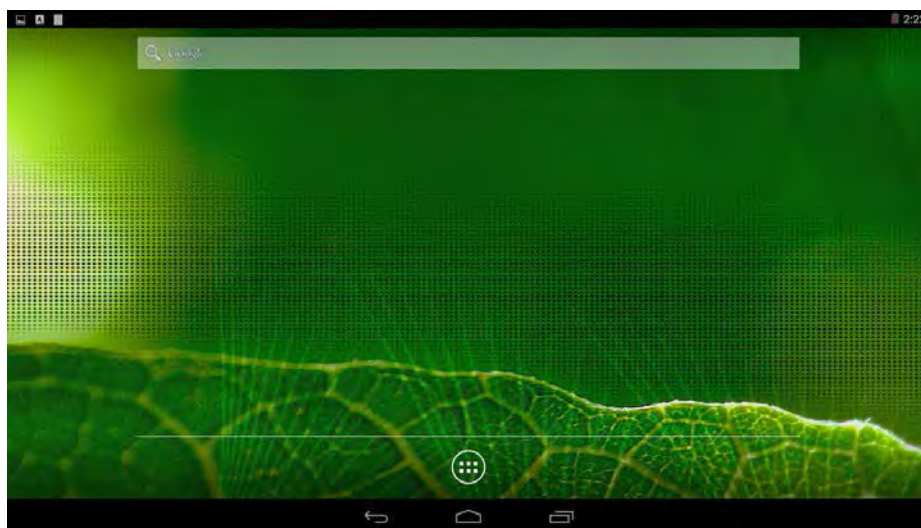


Fig 12. Android home screen

You can enable/disable the NFC function via “Settings/Wireless & Network/More...”

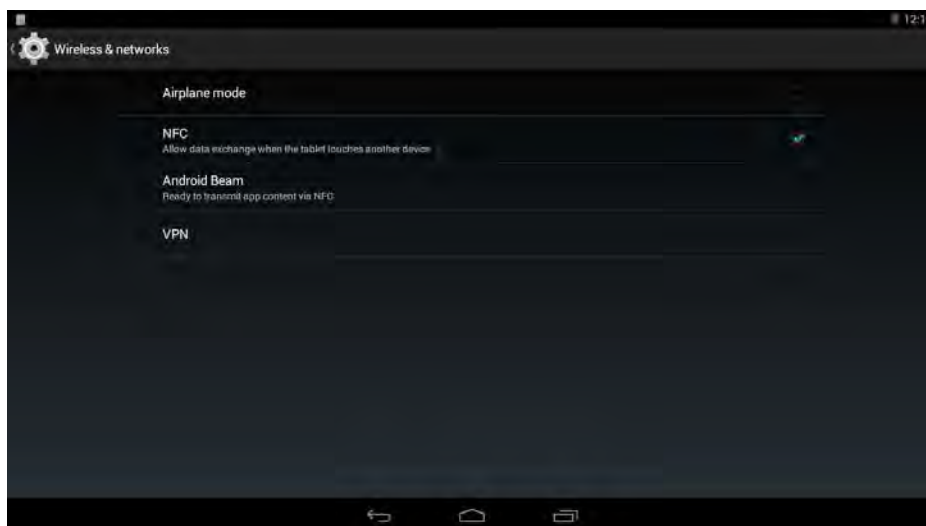


Fig 13. Android “Setting/Wireless&Network” menu

Using provided NXP TagInfo and NXP TagWriter applications you can get information from discovered tag and write content.

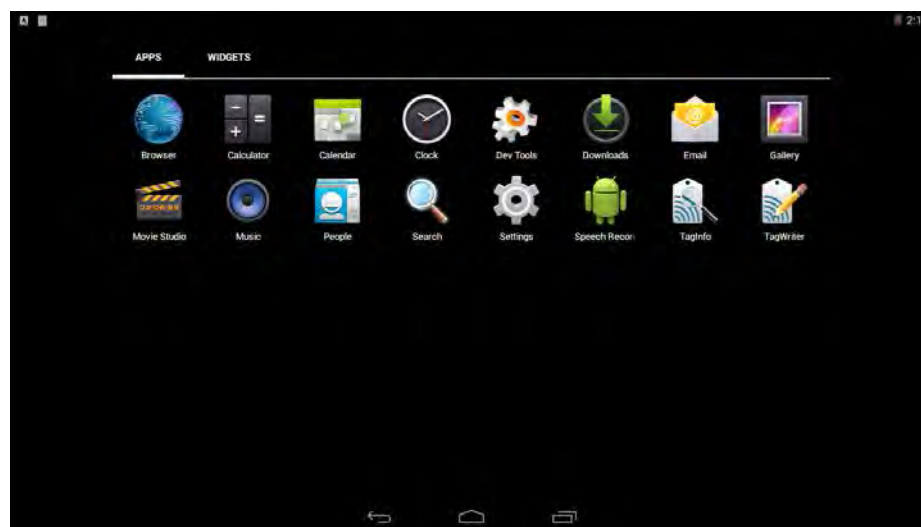


Fig 14. Android applications

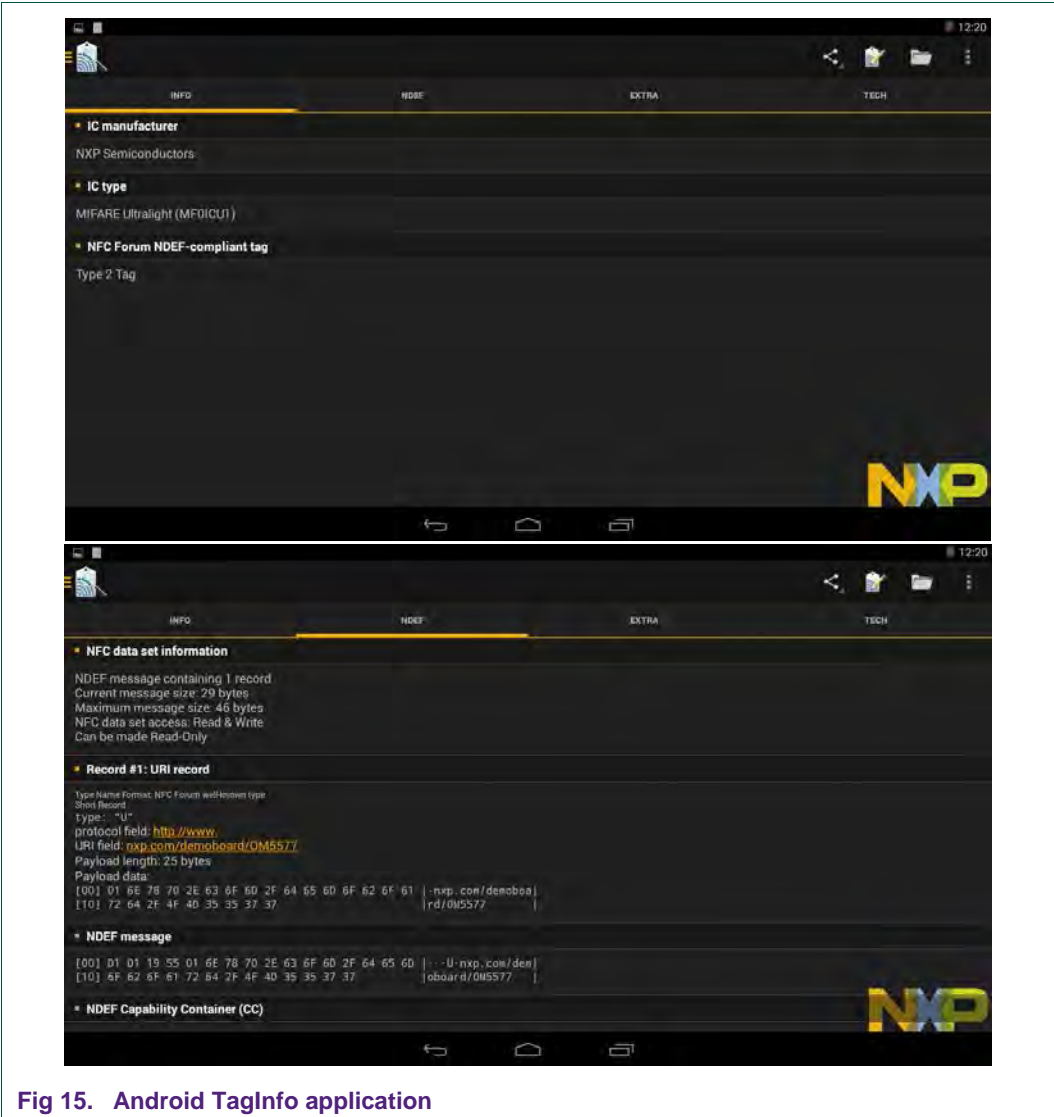


Fig 15. Android TagInfo application

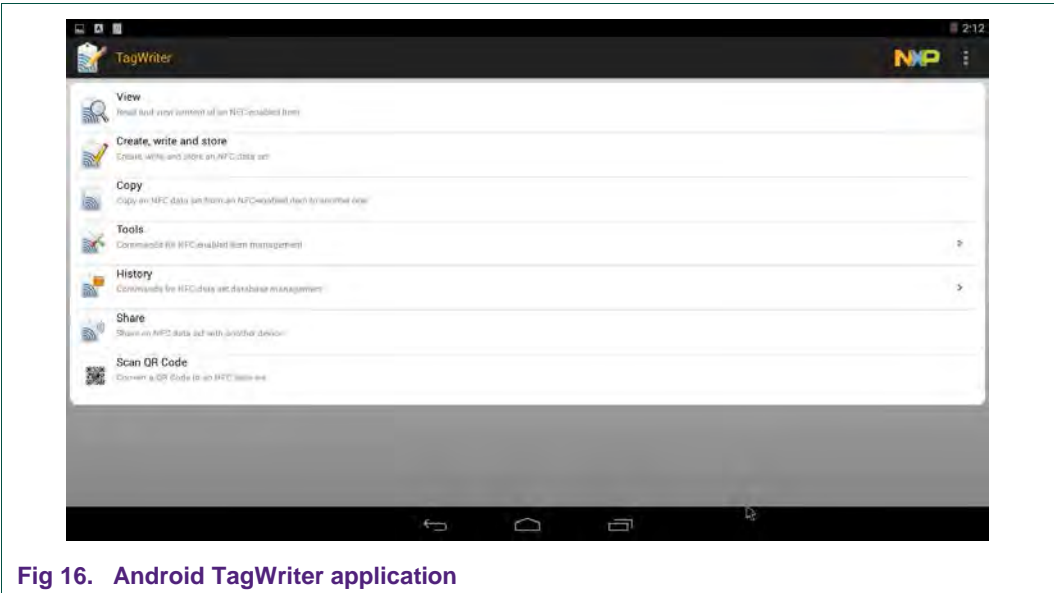


Fig 16. Android TagWriter application



## 4. Linux NFC demo application

### 4.1 Application details

The demo application is part of the Linux libnfc-nci stack delivery. More details can be found in document AN11697 available on PN7120 Product Web Page [5].

### 4.2 Using the application

The application must be started with parameters:

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

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

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

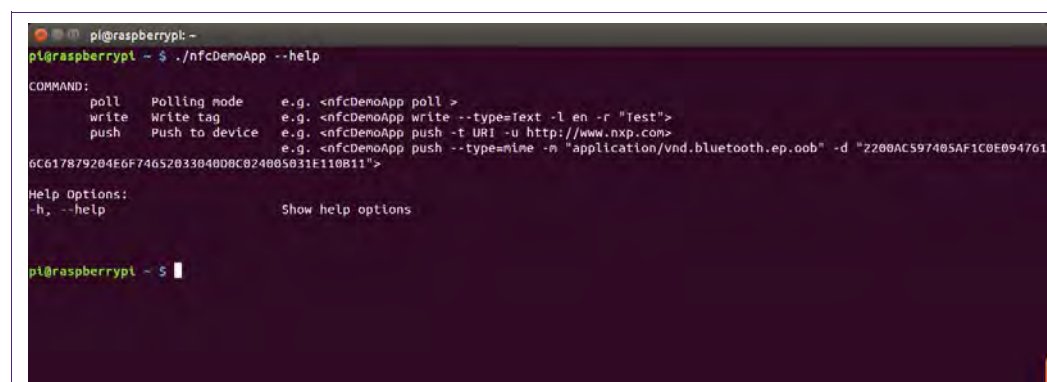


Fig 17. Linux demo application commands

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

#### 4.2.1 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
```



```

pi@raspberrypi:~$ ./nfcDemoApp poll
#####
#####      NFC demo      #####
#####
#####      Poll mode activated      #####
#####
#####      ... press enter to quit ...      #####
#####
Waiting for a Tag/Device...
NFC Tag Found
Type :      'Type A - Mifare UL'
Record Found :      NDEF Content Max size :      '868 bytes'
                   NDEF Actual Content size :      '29 bytes'
                   Readonly :      'FALSE'
                   Type :      'URI'
                   URI :      'http://www.nxp.com/demoboard/0M5577'

29 bytes of NDEF data received :
D1
01 19 55 01 0E 78 70 2E 63 6F 6D 2F 64 65 6D 6F 62 6F 61 72 64 2F 4F 4D 35 35 37 37
NFC Tag Lost
Waiting for a Tag/Device...

```

Fig 18. Linux demo application polling mode

## 4.2.2 Tag writing mode

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

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

```

pi@raspberrypi:~$ ./nfcDemoApp write --type-Text -l en -r "Hello World"
#####
#####      NFC demo      #####
#####
#####      Write mode activated      #####
#####
#####      ... press enter to quit ...      #####
#####
Waiting for a Tag/Device...
NFC Tag Found
Type :      'Type A - Mifare UL'
Record Found :      NDEF Content Max size :      '137 bytes'
                   NDEF Actual Content size :      '29 bytes'
                   Readonly :      'FALSE'
                   Type :      'URI'
                   URI :      'http://www.nxp.com/demoboard/0M5577'

29 bytes of NDEF data received :
D1
01 19 55 01 0E 78 70 2E 63 6F 6D 2F 64 65 6D 6F 62 6F 61 72 64 2F 6F 6D 35 35 37 37
Write Tag OK
Read back data
Record Found :      NDEF Content Max size :      '137 bytes'
                   NDEF Actual Content size :      '18 bytes'
                   Readonly :      'FALSE'
                   Type :      'Text'
                   Text :      'hello world'

18 bytes of NDEF data received :
D1
01 0E 54 02 65 0E 68 65 6C 6C 6F 20 77 6F 72 6C 64
NFC Tag Lost
Waiting for a Tag/Device...

```

Fig 19. Linux demo application tag writing mode

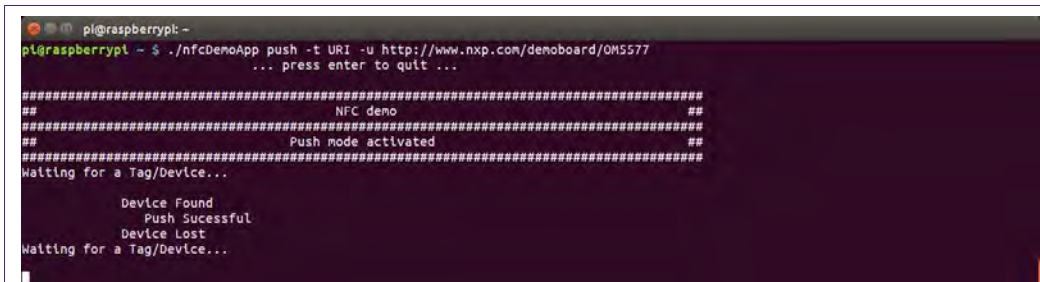
You can get more information about the message format using “-h” or “--help” parameter:

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

### 4.2.3 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>
```



```
pi@raspberrypi:~$ ./nfcDemoApp push -t URI -u http://www.nxp.com/demoboard/OMS577
... press enter to quit ...

#####
#####              NFC demo              #####
#####              Push mode activated      #####
#####
Waiting for a Tag/Device...

      Device Found
      Push Successful
      Device Lost
Waiting for a Tag/Device...
```

Fig 20. Linux demo application device push mode

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

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

## 5. References

---

- [1] The Raspberry Pi is a credit card sized computer. The initial idea behind it was to develop a small and cheap computer to be used by kids all over the world to learn programming. In the end it became very popular among developers all over the world. The heart of the Raspberry Pi is a SoC (System on Chip). This contains an ARM11 running at 700 MHz and a graphics processor that is capable of BluRay quality playback, using H.264 at 40MBits/s. It has a fast 3D core accessed using the supplied OpenGL ES2.0 and Open VG libraries. In addition, the Model B has 512MB RAM included in its SoC. To get started quickly, the Raspberry Pi Foundation provides several preconfigured Linux distributions.

For more information about it please visit [www.nxp.com/redirect/raspberrypi.org/](http://www.nxp.com/redirect/raspberrypi.org/).

- [2] BeagleBone is a low-power open-source hardware single-board credit-card-sized Linux computer that connects to the Internet and runs software such as Android and Ubuntu. With plenty of I/O and processing power for real-time analysis provided by a 720MHz ARM® processor based SoC (System on Chip), BeagleBone can be complemented with cape plug-in boards to augment functionality.

For more information about it please visit [www.nxp.com/redirect/beagleboard.org/bone](http://www.nxp.com/redirect/beagleboard.org/bone).

- [3] List of verified SD cards: [http://www.nxp.com/redirect/elinux.org/RPi\\_SD\\_cards](http://www.nxp.com/redirect/elinux.org/RPi_SD_cards)

- [4] List of verified USB power adapters:  
[http://www.nxp.com/redirect/elinux.org/RPi\\_VerifiedPeripherals\\_Power\\_adapters](http://www.nxp.com/redirect/elinux.org/RPi_VerifiedPeripherals_Power_adapters)

- [5] PN7120 Product Web Page:  
[http://www.nxp.com/products/identification\\_and\\_security/nfc\\_and\\_reader\\_ics/nfc\\_controller\\_solutions/PN7120A0EV.html](http://www.nxp.com/products/identification_and_security/nfc_and_reader_ics/nfc_controller_solutions/PN7120A0EV.html)

- [6] OM5577/PN7120S demo kit webpage:  
<http://www.nxp.com/demoboard/OM5577.html>

- [7] Android is an open-source software stack for a wide range of mobile devices and a corresponding open-source project led by Google.

For more information about it please visit [www.nxp.com/redirect/source.android.com/](http://www.nxp.com/redirect/source.android.com/)

- [8] NFC Devices in Windows  
[www.nxp.com/redirect/msdn.microsoft.com/en-us/library/windows/hardware/dn](http://www.nxp.com/redirect/msdn.microsoft.com/en-us/library/windows/hardware/dn)

## 6. Legal information

### 6.1 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

### 6.2 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Translations** — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

**Evaluation products** — This product is provided on an "as is" and "with all faults" basis for evaluation purposes only. NXP Semiconductors, its affiliates and their suppliers expressly disclaim all warranties, whether express, implied or statutory, including but not limited to the implied warranties of non-infringement, merchantability and fitness for a particular purpose. The entire risk as to the quality, or arising out of the use or performance, of this product remains with customer.

In no event shall NXP Semiconductors, its affiliates or their suppliers be liable to customer for any special, indirect, consequential, punitive or incidental damages (including without limitation damages for loss of business, business interruption, loss of use, loss of data or information, and the like) arising out of the use of or inability to use the product, whether or not based on tort (including negligence), strict liability, breach of contract, breach of warranty or any other theory, even if advised of the possibility of such damages.

Notwithstanding any damages that customer might incur for any reason whatsoever (including without limitation, all damages referenced above and all direct or general damages), the entire liability of NXP Semiconductors, its affiliates and their suppliers and customer's exclusive remedy for all of the foregoing shall be limited to actual damages incurred by customer based on reasonable reliance up to the greater of the amount actually paid by customer for the product or five dollars (US\$5.00). The foregoing limitations, exclusions and disclaimers shall apply to the maximum extent permitted by applicable law, even if any remedy fails of its essential purpose.

### 6.3 Licenses

#### Purchase of NXP ICs with NFC technology

Purchase of an NXP Semiconductors IC that complies with one of the Near Field Communication (NFC) standards ISO/IEC 18092 and ISO/IEC 21481 does not convey an implied license under any patent right infringed by implementation of any of those standards. Purchase of NXP Semiconductors IC does not include a license to any NXP patent (or other IP right) covering combinations of those products with other products, whether hardware or software..

### 6.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are property of their respective owners.

**MIFARE** — is a trademark of NXP Semiconductors N.V.

## 7. List of figures

---

Fig 1.	PN7120 NFC Controller SBC Kit content.....	3
Fig 2.	OM5577/PN7120S Raspberry Pi configuration..	5
Fig 3.	OM5577/PN7120S and Raspberry Pi B model stacked together .....	6
Fig 4.	OM5577/PN7120S and Raspberry Pi B+ model stacked together .....	6
Fig 5.	Raspbian GUI .....	7
Fig 6.	Proximity_BasicTest application .....	8
Fig 7.	OM5577/PN7120S BeagleBone configuration..	9
Fig 8.	OM5577/PN7120S and BeagleBone Black stacked together .....	10
Fig 9.	Win32 Disk Imager.....	10
Fig 10.	Identifying device number under Linux .....	11
Fig 11.	bone-debian GUI.....	12
Fig 12.	Android home screen.....	12
Fig 13.	Android “Setting/Wireless&Network” menu .....	13
Fig 14.	Android applications.....	13
Fig 15.	Android TagInfo application .....	14
Fig 16.	Android TagWriter application.....	14
Fig 17.	Linux demo application commands.....	15
Fig 18.	Linux demo application polling mode .....	16
Fig 19.	Linux demo application tag writing mode .....	16
Fig 20.	Linux demo application device push mode .....	17

## 8. Contents

---

<b>1.</b>	<b>Introduction .....</b>	<b>3</b>
1.1	OM5577/PN7120S demo kit.....	3
1.2	Linux driver support.....	4
1.3	Android driver support.....	4
1.4	Windows IoT driver support.....	4
<b>2.</b>	<b>Quick Startup on Raspberry Pi .....</b>	<b>5</b>
2.1	Required items .....	5
2.2	Hardware setup.....	5
2.2.1	Raspberry Pi A/B (old models) .....	6
2.2.2	Raspberry Pi A+/B+ and Raspberry Pi 2 (new models) .....	6
2.3	Software setup .....	6
2.4	Starting NFC demo .....	7
2.4.1	Linux image.....	7
2.4.2	Win10 IoT image.....	8
<b>3.</b>	<b>Quick Startup on BeagleBone.....</b>	<b>9</b>
3.1	Required items .....	9
3.2	Hardware setup.....	9
3.3	Software setup .....	10
3.3.1	On Windows.....	10
3.3.2	On Linux.....	11
3.3.3	On MAC OS X.....	11
3.4	Starting NFC demo .....	11
3.4.1	Linux image.....	12
3.4.2	Android image .....	12
<b>4.</b>	<b>Linux NFC demo application.....</b>	<b>15</b>
4.1	Application details .....	15
4.2	Using the application.....	15
4.2.1	Polling mode .....	15
4.2.2	Tag writing mode.....	16
4.2.3	Device push mode .....	17
<b>5.</b>	<b>References .....</b>	<b>18</b>
<b>6.</b>	<b>Legal information .....</b>	<b>19</b>
6.1	Definitions .....	19
6.2	Disclaimers.....	19
6.3	Licenses.....	19
6.4	Trademarks.....	19
<b>7.</b>	<b>List of figures.....</b>	<b>20</b>
<b>8.</b>	<b>Contents.....</b>	<b>21</b>

---

Please be aware that important notices concerning this document and the product(s) described herein, have been included in the section 'Legal information'.

---