

RN00082

PN7220/PN7221

Rev. 1.0 — 20 June 2023

Release notes

Document Information

Information	Content
Keywords	PN7220, PN7221 MW, FW, NFC
Abstract	PN7220/PN7221 release note



Revision history

Rev	Date	Description
1.0	20230620	First official release

1 Document purpose

The purpose of this document is to provide information on the content of the FW, MW delivery based on PN7220/PN7221 product versions. It includes the following reports:

- FW release content list
- MW release content list
- Revision history
- Known firmware and middleware issues and limitations

2 Scope of the release

This release package is an official release of the Android middleware for PN7220/PN7221 along with the PN7220/PN7221 firmware in secure binary format.

Release is tested with PN7220/PN7221 customer evaluation board consisting of PN7220/PN7221 IC, DB845C RB3 host controller and 45x45 RF antenna.

The PN7221 is based on the PN7220 and supports all features of PN7220 plus "Enhanced Contactless Polling" (ECP) by Apple - this description is not part of this document. Note, that the ECP feature is available after formal authorization only.

3 Definition and abbreviations

Table 1. Abbreviations

Abbreviation	Reference
DH	device host
DB845C	Dragon board 845c
FW	firmware
HIF-1	Host Interface 1
HIF-2	Host Interface 2
MW	middleware
NCI	NFC controller interface
NFC	near-field communication
NFCC	NFC controller
NFCEE	NFC execution environment
LPCD	low power card detection
PRBS	pseudo random binary sequence
RF	radio frequency
R/W	NFC reader/writer mode

4 Test environment used for release

4.1 Default SW/HW configuration

The list below details the default MW configuration about some important parameters:

Parameters	Values
Board used	RB3 + PN7220/PN7221 Customer evaluation board with PN7220/PN7221 IC
I ² C speed	1 MHz on RB3
Android version	13
MW version	NFC_AR_INFRA_0004_13.04.00
Clock configuration	XTAL
Firmware version	03.01.00

5 Features released

Table 2. RF features list

Mode	Protocol	Techno	NFCEE	Other	Completeness
R/W – NFC Forum	ISO-DEP	NFC-A	DH	Frame RF IF 106 kB/s	Functional verified
				ISO-DEP RF IF 106 kB/s	Functional verified
				ISO-DEP RF IF 212, 424, 848 kB/s	Functional verified
		NFC-B	DH	Frame RF IF 106 kB/s	Functional verified
				ISO-DEP RF IF 106 kB/s	Functional verified
				ISO-DEP RF IF 212, 424, 848 kB/s	Functional verified
	MIFARE Cl.	NFC-A	DH	TAG-CMD IF 106 kB/s	Functional verified
	T2T	NFC-A	DH	Frame RF IF 106 kB/s	Functional verified
				TAG-CMD IF 106 kB/s	Functional verified
FeliCa / T3T	NFC-F	DH	Frame RF IF 212, 424 kB/s	Functional verified	
ISO 15693	ISO 15693	DH	Frame RF IF 26, 53 kB/s	Functional verified	
R/W – EMVCo Mode	ISO-DEP	NFC-A	DH	ISO-DEP RF IF 106 kB/s	Functional verified
		NFC-B	DH	ISO-DEP RF IF 106 kB/s	Functional verified
	FeliCa / T3T	NFC-F	DH	Frame RF IF 212, 424 kB/s	Functional verified

Table 3. Other FW features released

Sl.no	Feature	Completeness
1	Secure FW download	Functional verified
2	Mode Switch GPIO	Functional verified
3	PRBS	Functional verified
4	Clock management (PLL / XTAL)	Functional verified
5	Automatic Waveshape Control	Functional verified
6	Dynamic Power Control (DPC)	Functional verified
7	External DC-DC support	Functional verified
9	LPCD - Tag detector	Functional verified
10	Standby mode	Functional verified

Table 4. Other MW features released

Sl.no	Feature
1	Firmware downloads through Android
2	EMVCo Discovery Profile -> Type A,B, and F (Prop tech) Technology polling Enablement
4	NFC Discovery Profile -> Type A, B, F, and V Technology polling Enablement
5	Discovery Mode Switch between NFC and EMVCo Profiles
6	Proprietary commands Support

Table 4. Other MW features released...continued

Sl.no	Feature
7	HIF1-I2C interface support

Table 5. PSP released

Sl.no	Feature
1	EMVCo loopback application for Digital and analog Compliance
2	EMVCo Transac A and B application for analog Compliance
3	EMVCo Interop application
4	Configuration tool to update EEPROM and Protocol Area of PN7220
5	Self-test APK

Table 6. Certifications

Sl.no	Feature	Completeness
1	NFC Forum CR13 - Digital Compliance (Internal)	Functional verified
2	NFC Forum CR13 - Analog Compliance (Internal)	Functional verified
3	EMVCo 3.0 L1 Digital Compliance (Internal)	Functional verified
4	EMVCo 3.0 L1 analog Compliance (Internal)	Functional verified

6 Release content

6.1 Firmware

The release contains a firmware subpackage, intended for use with PN7220 IC.

The zip file of this release contains:

- FW (code and data) in secure format *PN7220.sfwu to perform firmware update* on PN7220 IC, part of the customer evaluation board.
- C file *phDnldNfc_UpdateSeq.c* containing secure firmware image sequence of the above binary in C programming format.
- *pn7220_64bits.so* file which is an android compliant file of the secure firmware image used for downloading the PN7220 firmware on Android integrations.
- SCR and license file.

Table 7. FW version corresponding to this release note

FW version	Antenna type	IC revision	ROM version	Flash version	Build number
03.01.00	45 mm x 45 mm	PN7220 HW 0x53	03	01.00	NA

6.2 Android middleware

The release package is intended for use with PN7220/PN7221 IC and firmware.

The zip file of this release contains:

- DB845c android system images, MW Config files, and source files.

Table 8. MW version corresponding to this release note

Description	Version
MW / NFC	NFC_AR_INFRA_0004_13.04.00
NCI	2.2
Android	13

7 Android middleware memory size

Table 9. NFC libraries memory consumed

Library	Text (bytes)
android.hardware.nfc@1.0-impl.so	13170
android.hardware.nfc@1.0.so	156029
android.hardware.nfc@1.1.so	164999
hal_libnfc.so	927607
libnfc_nci_jni.so	811552
libnfc-nci.so	1027104
nfc_nci_nxp.so	272287
vendor.nxp.nxpncf@2.0-adapter-helper.so	91351
vendor.nxp.nxpncf@1.0.so	88118
emvco_poller.so	100048
android.hardware.emvco-V1-ndk.so	107392

8 Revision history

8.1 Firmware

8.1.1 v03.00.04

Table 10. V03.00.04

SI no.	Description
1	First PN7220 EAR Release.

8.1.2 v03.01.00

Table 11. V03.01.00

SI no.	Description
1	PN7220 RFP1 release

8.2 Android middleware release content

8.2.1 NFC_AR_INFRA_0004_13.02.00

The following list of implementations has been done for NFC_AR_INFRA_0004_13.02.00 and FW03.00.04 for the Android 13 release.

The list of features is as follows:

- NCI init Sequence
- NCI Deinit Sequence
- PN7220 firmware update issue fix with production samples
- EMVCo Profile Mode tests
 - Verify nfc polling to emvco polling via switch and vice versa.
 - Verify emvco init and De-init
 - Verify emvco polling for typeA, B, F only enabled.
 - Verify emvco polling for type F only enabled.
 - Perform nfc reset when device is in emvco mode with all mode enabled.
 - Perform device reboot when device is in emvco mode with all modes enabled.
 - Perform tag detection in default mode and switch to emvco mode.
- EMVCo Profile Tag Detection
 - FeliCa Lite
 - FeliCa 212
 - T4T MIFARE DESFire 2K, 4K, 8K
 - MIFARE Ultralight, Ultralight C
- Self-Tests
 - Switch RF Field tests
 - CTS Control commands
 - EEPROM Access
 - Load Protocol
 - PRBS
- EMVCo analog + digital compliance test execution for Type A,B technology

- NFC Forum Type F technology
- NFC profile ISO-DEP Protocol support
- Mode switch with LED handling bug fixes
- Bug fixes
- Coverity issues fixes
- Compiler warning fixes
- Mode switch with LED handling

8.2.2 NFC_AR_INFRA_0004_13.04.00

The following list of implementations has been done for NFC_AR_INFRA_0004_13.04.00 and FW03.01.00 for the Android 13 release.

The list of features is as follows:

- All the features support with MW release NFC_AR_INFRA_0004_13.02.00.
- Enabled PCD Setting through config file
- Updated loopback Polling behavior
 - Resend the PPSE for In-Valid data sizes
 - Start the discover on In-Valid status code
 - NCI header bytes are propagated to the upper layer and upper layer
 - forms the NCI header for the NCI data packet
 - Adapted legacy loopback flow model
- NFC LPCD config update and bug fixes
- EEMROM Config read after FW download
- Coverity changes and Bug fixes
- Removed unsupported B PRIME card
- MIFARE NDEF tag read issues fixed
- Multiprotocol tag read bug fixed
- Self-test CTS command update
- NFC flush callback supported in the NFC driver

9 Known issues and limitations

9.1 Firmware

- Issue: When T4AT card with historical bytes is activated, “RATS Response Length” field in RF_INTF_ACTIVATED_NTF sent by PN72XX is not including the length of historical bytes, but “Length of Activation Parameters” field is updated with correct length information including historical bytes.

Solution: User shall consider “Length of Activation Parameters” field in RF_INTF_ACTIVATED_NTF instead of “RATS Response Length” field.

- Following China ID cards are not supported in the release.
 - TRANSIT_BEIJING_YKT_0996F7D3
 - TRANSIT_SHANGHAI_5432FA20
 - MIFARE_CLASSIC_Tag28_8D97C096

9.2 Android middleware

EMVCo middleware KPI values are not guaranteed in Android as Android thread scheduling varies every time based on other background threads running on the system. It is recommended to run the EMVCo stack on trusted environment to ensure consistent thread scheduling and achieve the optimized KPI value. EMVCo Stack is implemented fully in native mode and it is thread-safe to ensure critical timings once the thread is scheduled.

10 Precautionary notes

Table 12. Pre-cautions and recommendations

Limitation	Recommendation
TX driver may be damaged due to overcurrent.	Do not disable DPC on PN7220.

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