RN00304

Android 14 MW Release notes for PN722x/PN716x

Rev. 1.0 — 23 June 2025 **Release notes**

Document information

Information	Content
Keywords	PN722x, PN716x, Android 14
Abstract	Contains information about the release content of Android 14 MW for PN722x/PN716x.

1 Document purpose

The purpose of this document is to provide information on the content of the Android 14 MW based on PN7220/PN7221 and PN7160/PN7161 product versions.

2 Middleware version history

The tables below shows the version history of the Android MW releases:

Table 1. Android 15 MW version history

MW version history	Link to release version
NFC_AR_INFRA_001E_15.03.00	RN00305
NFC_AR_INFRA_001E_15.02.00	RN00305
NFC_AR_INFRA_0006_15.01.01	RN00305
NFC_AR_INFRA_001E_15.01.00	RN00305

Table 2. Android 14 MW version history

MW version history	Link to release version
NFC_AR_INFRA_001E_14.04.00	Section 3.1 "NFC_AR_INFRA_001E_14_04_00"
NFC_AR_INFRA_001E_14.03.00	Section 3.2 "NFC_AR_INFRA_001E_14_03_00"
NFC_AR_INFRA_001E_14.02.00	Section 3.3 "NFC_AR_INFRA_001E_14_02_00"
NFC_AR_INFRA_001E_14.01.00	Section 3.4 "NFC_AR_INFRA_001E_14_01_00"

Table 3. Android 13 MW version history

MW version history	Link to release version
NFC_AR_INFRA_001E_13.21.00	Coming soon. NXP is improving the release note documents.
NFC_AR_INFRA_001E_13.20.00	Coming soon. NXP is improving the release note documents.
NFC_AR_INFRA_0004_13.04.00	Coming soon. NXP is improving the release note documents.

3 Android 14 MW releases

3.1 NFC_AR_INFRA_001E_14_04_00

Limitation:

- If the user sends an incorrectly configured APDU to the TDA or Secure Element followed by an attempt to close the connection, the NFCEE_MODE_SET Disable CMD is not send after CORE_CONN_CLOSE_CMD. Afterward, a new connection cannot be opened.
  - **Solution**: Recover the NFC stack.
- **PN722x FW 03.02.04 only:** After FW update is performed in SMCU, a dummy CORE_SET_CMD is added as part of VTS synchronization issue. With the latest change in FW, whenever any command is send except CORE_RESET_CMD after FW update is performed, A7 error NTF is getting triggered.

3.1.1 Release content

- Firmware download sequence update;
  - Before sending the HDLL command, VEN is toggled as HDLL command is allowed with in 5sec of VEN toggle.
  - During the FW download sequence, checking the session is opened before sending the firmware version command.
- Support added for China IoT simulation tag.
  - Simulated Shenzhen Polytechnic card.
- Added support for NXP_ACT_PROP_EXTN in Android 14.
- GMS Compliancy for PN722x products
  Note: *FW 03.02.04 and later need to be used with this MW release, since other FW releases do not support POWER_SUB_SCREEN_STATE_CMD.*
  Note: *For more information about the supported states and commands shown in Figure 1, refer to ref.[4].*
  - Fix for CTS issue (screen off HCE payment in emulator mode test was failing)
  - Support of HCE in screen off state for PN722x:
    - For screen off and lock state,
      POWER_SUB_SCREEN_STATE_CMD is sent,
      RF_DEACTIVATE_CMD into IDLE,
      RF_DISCOVER_CMD with only CE enabled.
    - For screen on and unlock state,
      POWER_SUB_SCREEN_STATE_CMD is sent,
      RF_DEACTIVATE_CMD into IDLE,
      RF_DISCOVER_CMD with only Card and Reader enabled.

Screen State	Previous Screen State	Action
SCREEN_OFF_LOCKED	SCREEN_ON_LOCKED	RF_DISCOVER_IDLE
SCREEN_OFF_LOCKED	SCREEN_ON_UNLOCKED	RF_DISCOVER_CMD(Listen enable & poll disabled)
SCREEN_OFF_UNLOCKED	SCREEN_ON_LOCKED	RF_DISCOVER_IDLE
SCREEN_OFF_UNLOCKED	SCREEN_ON_UNLOCKED	RF_DISCOVER_CMD(Listen enable & poll disabled)
SCREEN_ON_UNLOCKED	SCREEN_ON_LOCKED	RF_DISCOVER_IDLE
SCREEN_ON_UNLOCKED	SCREEN_OFF_UNLOCKED	RF_DISCOVER_CMD(Listen enable & poll enable)
SCREEN_ON_LOCKED	Not supported	Not supported

Figure 1. Supported states

3.1.2 Test environment

For PN7220/PN7221:

Parameters	Values
Board used	DragonBoard 845c + PN7220/PN7221 Customer evaluation board PNEV7220 BP1 and PNEV7220 BP2 with PN7221 IC
I^2C speed	1 MHz on DragonBoard 845c
Android version	14
MW version	NFC_AR_INFRA_001E_14.04.00
Clock configuration	XTAL
Firmware version	03.02.04

For PN7160/PN7161:

Parameters	Values
Board used	DragonBoard 845c + PN7160/PN7161 Customer evaluation board PNEV7160 with PN7161 IC
I^2C speed	1 MHz on DragonBoard 845c
Android version	14
MW version	NFC_AR_INFRA_001E_14.04.00
Clock configuration	PLL
Firmware version	12.50.11

3.1.3 Android MW memory size

Note: *Memory sizes are based on the used development platform, compiler, and settings. Sizes can be different on customer site.*

Table 4. NFC libraries memory consumed

Library	Text (bytes)
nfc_nci_nxp_pn72xx.so	237770

Table 4. NFC libraries memory consumed*...continued*

android.hardware.nfc@1.0.so	155836
android.hardware.nfc@1.1.so	164833
android.hardware.nfc@1.2.so	109617
libnfc_nci_jni.so	854529
libnfc-nci.so	1044175
nfc_nci_nxp.so	186848
nfc_tda.so	37317
vendor.nxp.nxpnfc@1.0.so	67966
vendor.nxp.nxpnfc@2.0.so	88470
emvco_poller.so	88491
vendor.nxp.emvco-V1-ndk.so	120999
emvco_tda.so	37157
emvco_ecp_vas.so	1537
vendor.nxp.emvco-V2-ndk.so	120840

3.2 NFC_AR_INFRA_001E_14_03_00

Limitation:

- If the user sends an incorrectly configured APDU to the TDA or Secure element, followed by an attempt to the close connection, the NFCEE_MODE_SET Disable CMD is not send after CORE_CONN_CLOSE_CMD. Afterwards, a new connection cannot be opened.
  - **Solution**: Recover the NFC stack.
- **PN722x FW 03.02.04 only:** After FW update is performed in SMCU, a dummy CORE_SET_CMD is added as part of VTS synchronization issue. With the latest change in FW, whenever any command is send except CORE_RESET_CMD after FW update is performed, A7 error NTF is getting triggered.

3.2.1 Release content

- Segregation and handling different configuration in the different config files:
  - All EEPROM configs are part of libnfc-nxp-eeprom.conf.
  - Flags are added.
- Added support for direct access to SE (see ref.[5]).

3.2.2 Test environment

For PN7220/PN7221:

Parameters	Values
Board used	DragonBoard 845c + PN7220/PN7221 Customer evaluation board PNEV7220 BP1 and PNEV7220 BP2 with PN7221 IC
I^2C speed	1 MHz on DragonBoard 845c
Android version	14
MW version	NFC_AR_INFRA_001E_14.03.00

Parameters	Values
Clock configuration	XTAL
Firmware version	An internal version was used for testing.

For PN7160/PN7161:

Parameters	Values
Board used	DragonBoard 845c + PN7160/PN7161 Customer evaluation board PNEV7160 with PN7161 IC
I^2C speed	1 MHz on DragonBoard 845c
Android version	14
MW version	NFC_AR_INFRA_001E_14.03.00
Clock configuration	PLL
Firmware version	12.50.0D

3.2.3 Android MW memory size

Note: *Memory sizes are based on the used development platform, compiler and settings. Sizes can be different on customer site.*

Table 5. NFC libraries memory consumed

Library	Text (bytes)
nfc_nci_nxp_pn72xx.so	237770
android.hardware.nfc@1.0.so	155836
android.hardware.nfc@1.1.so	164833
android.hardware.nfc@1.2.so	109617
libnfc_nci_jni.so	854529
libnfc-nci.so	1044175
nfc_nci_nxp.so	186848
nfc_tda.so	37317
vendor.nxp.nxpnfc@1.0.so	67966
vendor.nxp.nxpnfc@2.0.so	88470
emvco_poller.so	88491
vendor.nxp.emvco-V1-ndk.so	120999
emvco_tda.so	37157
emvco_ecp_vas.so	1537
vendor.nxp.emvco-V2-ndk.so	120840

3.3 NFC_AR_INFRA_001E_14_02_00

3.3.1 Release content

- All PN722x features are supported in this release.
- Support for DTA is added.
- The SMCU_Switch app is updated as per AIDL HAL (before it was in HIDL interface)
- The SelfTestAidl app is updated as per AIDL Hal (before it was in HIDL interface)
- Build optimization changes are integrated.
  - Previously, a module compiling approach was used (for example, system/nfc need to be compiled separately). New approach adds all modules into an .mk file which allows compiling to be performed from AROOT and all modules are directly added to the build image.
- Flash script update (batch file to flash images to Dragonboard 845c).

3.3.2 Test environment

For PN7220/PN7221:

Parameters	Values
Board used	DragonBoard 845c + PN7220/PN7221 Customer evaluation board PNEV7220 BP1 and PNEV7220 BP2 with PN7221 IC
I^2C speed	1 MHz on DragonBoard 845c
Android version	14
MW version	NFC_AR_INFRA_001E_14.02.00
Clock configuration	XTAL
Firmware version	An internal version was used for testing.

For PN7160/PN7161:

Parameters	Values
Board used	DragonBoard 845c + PN7160/PN7161 Customer evaluation board PNEV7160 with PN7161 IC
I^2C speed	1 MHz on DragonBoard 845c
Android version	14
MW version	NFC_AR_INFRA_001E_14.02.00
Clock configuration	PLL
Firmware version	12.50.0D

3.3.3 Android MW memory size

Note: *Memory sizes are based on the used development platform, compiler and settings. Sizes can be different on customer site.*

Table 6. NFC libraries memory consumed

Library	Text (bytes)
nfc_nci_nxp_pn72xx.so	237770
android.hardware.nfc@1.0.so	155836
android.hardware.nfc@1.1.so	164833

Table 6. NFC libraries memory consumed*...continued*

android.hardware.nfc@1.2.so	109617
libnfc_nci_jni.so	854529
libnfc-nci.so	1044175
nfc_nci_nxp.so	186848
nfc_tda.so	37317
vendor.nxp.nxpnfc@1.0.so	67966
vendor.nxp.nxpnfc@2.0.so	88470
emvco_poller.so	88491
vendor.nxp.emvco-V1-ndk.so	120999
emvco_tda.so	37157
emvco_ecp_vas.so	1537
vendor.nxp.emvco-V2-ndk.so	120840

3.4 NFC_AR_INFRA_001E_14_01_00

Note: *This release was not fully validated. It served as an early access release to customers to start integrations. This MW version must not be used in production. Users should use the latest MW releases.*

3.4.1 Release content

- Android version migration from Android 13 to Android 14.

3.4.2 Test environment

For PN7220/PN7221:

Parameters	Values
Board used	DragonBoard 845c + PN7220/PN7221 Customer evaluation board PNEV7220 BP1 and PNEV7220 BP2 with PN7221 IC
I^2C speed	1 MHz on DragonBoard 845c
Android version	14
MW version	NFC_AR_INFRA_001E_14.01.00
Clock configuration	XTAL
Firmware version	An internal version was used for testing.

For PN7160/PN7161:

Parameters	Values
Board used	DragonBoard 845c + PN7160/PN7161 Customer evaluation board PNEV7160 with PN7161 IC
I^2C speed	1 MHz on DragonBoard 845c
Android version	14
MW version	NFC_AR_INFRA_001E_14.01.00

Parameters	Values
Clock configuration	PLL
Firmware version	12.50.0D

3.4.3 Android MW memory size

Note: *Memory sizes are based on the used development platform, compiler and settings. Sizes can be different on customer site.*

Table 7. NFC libraries memory consumed

Library	Text (bytes)
nfc_nci_nxp_pn72xx.so	237770
android.hardware.nfc@1.0.so	155836
android.hardware.nfc@1.1.so	164833
android.hardware.nfc@1.2.so	109617
libnfc_nci_jni.so	854529
libnfc-nci.so	1044175
nfc_nci_nxp.so	186848
nfc_tda.so	37317
vendor.nxp.nxpnfc@1.0.so	67966
vendor.nxp.nxpnfc@2.0.so	88470
emvco_poller.so	88491
vendor.nxp.emvco-V1-ndk.so	120999
emvco_tda.so	37157
emvco_ecp_vas.so	1537
vendor.nxp.emvco-V2-ndk.so	120840

4 Recommendations, known limitations, and precautions

4.1 PN722x customer eval board

- In PN722x customer eval BP2 board used for Dual CPU use case, Android host shall use HIF2-I2C (I2CM follower) Interface of PN722x. By design this interface is not possible to be used as a wake-up reason from Standby.
  - **Solution**: GPIO3 of PN722x needs to used as a wake-up signal. By connecting HIF2-I2C SCL line to GPIO3, any HIF activity will be used as wake-up of PN722x.
- The Secure MCU mode switch application is only for reference purpose. Any negative testing scenarios using this application may result in ambiguous behavior.

4.2 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 in a 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.
- The Secure MCU mode switch application is only for reference purpose. Any negative testing scenarios using this application may result in ambiguous behavior.
- To use only contactless interface and achieve the best standby current (LPCD average current) it is advised to remove/delete the *xxx.so* file from the Android installation which disables the NFC CT feature.
  - **Solution**: Remove the NFC tda library (*nfc_tda.so*) from the *system/lib64* path.

4.3 PN722x NFCC

- Limitation:
  - Incompliance to Digital CT EMVCo 4.3d specs – 4 test failures related to handling of CWT & EGT where both values are same (i.e. min = max) – TC_1800.DTS112, TC_1800.DTS113,TC_1800.DTS212 and TC_1800.DTS213 test cases fail
- Cautions/Recommendations:
  - It is advised not to disable the DPC as It may damage TX drivers due to overcurrent.
  - Firmware updates shall be done in a stable power supply condition, otherwise a full firmware download can be required. Therefore it is recommended to not interrupt the FW update procedure.

4.4 Precautionary notes

Table 8. Precautions and recommendations

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

5 Features, certifications, and applications supported in releases

To achieve all below mentioned things, users need to check the test environment chapter of the MW version in use and check with which settings the below results were achieved (see Section 3 "Android 14 MW releases").

The results in the tables below can be achieved with all minor versions releases on Android 14.

Table 9. 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
Card Emulation	ISO-DEP	NFC-A	HCE	ISO-DEP RF IF 106 kB/s	Functional verified
				ISO-DEP RF IF 212, 424, 848 kB/s	Functional verified

Table 10. Other FW features released

Sl.no	Feature	Completeness
1	Secure FW download	Functional verified
2	Mode Switch GPIO	Functional verified
3	Standby mode	Functional verified
4	PRBS	Functional verified
5	Contact Interface support using ISO7816 Interface	Functional verified
6	Dynamic Power Control (DPC)	Functional verified
7	External DC-DC support	Functional verified
9	Automatic Waveshape Control	Functional verified
10	LPCD - Tag detector	Functional verified
11	Clock management (PLL / XTAL)	Functional verified

Table 11. 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
7	HIF1-I2C interface support
8	Contact interface support for NFC and EMVCo

Table 12. Android 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
6	EMVCo loopback application for CT Compliance
7	NFC reference application to test SAM card on contact interface
8	Secure MCU switch application to switch between SMCU and Android Host

Table 13. Secure MCU PSP released

Sl.no	Feature
1	EMVCo Contactless loopback application for Digital and analog Compliance
2	EMVCo Contactless Transac A and B application for analog Compliance
3	EMVCo Contactless Interop application
4	EMVCo Contact loopback application for CT compliance
5	Secure MCU application to update the PN722x FW

Table 14. 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
5	EMVCo 4.3d L1 CT Compliance (Internal)	Functional verified

6 Abbreviations and acronyms

Table 15. Abbreviations

Acronym	Description
FW	FirmWare
GMS	Google Mobile Service
MW	MiddleWare

7 References

[1] Webpage – PN7160-EVK - Development Kits for PN7160 Plug'n Play NFC Controller (link)
[2] Webpage – PNEV7220BP1 - Development Board for PN7220 NFC Controller for EMVCo and NFC Forum Operation (link)
[3] Webpage – PNEV7220BP2 - Development Board for PN7220 NFC Controller with Two Host Configuration (link)
[4] Specificaiton - NFC Controller Interface (NCI) version 2.2
[5] Application note – AN14587 – PN722x – Direct Access to Secure Element (link)

8 Revision history

Table 16. Revision history

Document ID	Release date	Description
RN00304 v.1.0	23 June 2025	PN722x/PN716x MW documentation previously found in RN00082. • Initial version.

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