

UIC680 Technical Specification for NFC Peer to Peer (P2P) Communication

Version 1.3

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Introduction

This document describes the technical requirements of UIC680 for NFC P2P Communication.

Modification History

Rev	Author	Date	Revisions
1.3	UIC PDRD	1/13/2015	Public released

Reference

- UIC680TG Contactless Smart Card Reader Programmer's Manual, Revision 2.3
- UIC680TG Configuration Guide REV 1.6
- NFC Digital Protocol Technical Specification version 1.0, 11/17/2011
- Near Field Communication – Interface and Protocol (NFCIP1, ISO 18092) , 04/01/2004
- Logical Link Control Protocol Technical Specification version 1.1, 06/20/2011
- Simple NDEF Exchange Protocol Technical Specification version 1.0, 08/31/2011

Audience

This document assumes the audiences have the knowledge/information on the following:

- UIC680 programming experience
- NFC Digital Protocol
- ISO/IEC 18092

Devices

UIC680TG Standard model

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General Operation

The NFC Forum is an industry consortium with a goal to further develop and improve the Near Field Communication (NFC) technology guaranteeing interoperability among devices and services. An NFC Forum Device has three different types of NFC Forum Operating Modes: NFC Forum Peer Mode, NFC Forum Reader/Writer Mode and NFC Forum Card Emulation Mode. Based on the architecture presented in the NFC Forum, from top to bottom, there can be distinguished into three main parts: the Application layer, the Logical layer, and the HAL (RF and Digital protocol) layer.

In the digital protocol, it defines both the Active and the Passive communication modes.

In the Active Communication Mode, an Initiator and a Target shall alternately generate a RF field. The Initiator starts the NFCIP-1 communication. The Target responds to an Initiator command using self-generated modulation by self-generating the RF field.

In the Passive Communication Mode, an Initiator shall produce a RF field to energize the target to start the communication. The Target responds to an Initiator command using a load modulation scheme. Based on different technologies, it can be distinguished into NFC-A, NFC-B, and NFC-F. And currently, only NFC-A and -F support the NFC-DEF protocol.

In the logical and application layers of the Peer Mode, NFC Forum defines Logical Link Control Protocol (LLCP) and Simple NDEF Exchange Protocol (SNEF) on top of the Digital Protocol peer mode.

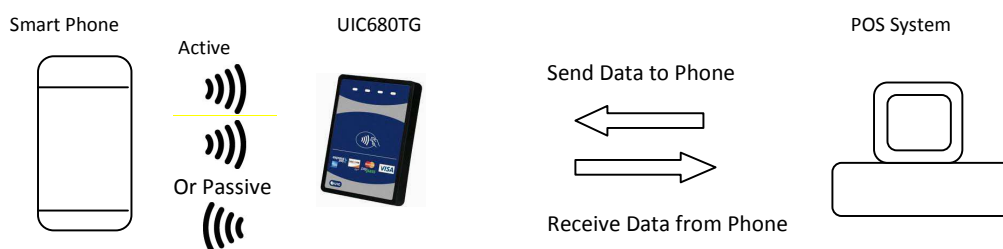
The reader plays the role of receiving data from the POS terminal and sending data to the phone via the Active/Passive (NFC-A/F) Communication Modes.

At the moment, UIC680TG only supports as an Initiator in the Active/Passive (NFC-A/F) Communication Mode and cannot act as a Target.

The Peer to Peer (P2P) Communication Mode Concept

The UIC680TG is designed as a card reader and an Initiator device. The reader can read card tracks data when a user taps the payment card in the operating field and become an Initiator to communicate with a phone via the Peer to Peer Communication Mode.

The host can set the UIC680TG as an Initiator, and the reader will poll the target in the operation field, handle the anti-collision, and initialize the NFC-DEP Protocol. After a Target is detected, the host can send to, and/or receive from, the Phone by the UIC defined commands. The host shall packet and un-packet the data based on the Peer to Peer Protocol stack.



For P2P protocol stack, it has Logical Link Control Protocol (LLCP) and Simple NDEF Exchange Protocol (SNEF). LLCP specifies the procedural means for the transfer of upper layer information units between two NFC Forum devices and can be split into MAC Mapping, Link Management, and connection-oriented/ connectionless transport. SNEF allows an application on an NFC-enabled device to exchange NFC Data Exchange Format (NDEF) messages with another NFC Forum device.

NFC Function

Operation	Support Function	Remark
Initiator	Send/ Receive	Active/ Passive (NFC-A/F) Communication Mode

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Configuration

In general, the reader is armed to read cards for contactless payment applications such as VISA payWave or PayPass. It is necessary to activate the NFC functions by sending NFC commands. The host application can utilize these commands to exchange the data with the NFC devices.

Factory Default Setting

Item Description	EEPROM Default Value
NFC P2P ₇ -Communication Mode	Disable

NFC Peer to Peer Communication Mode Commands

• N<00> (4EH 00H) – Activate NFC Function

COMMENT Activate NFC Function

FORMAT N<00>

RESPONSE [Length, 2 bytes][Status, 1 byte]

The length field is equal to the length of the status byte(s) and does not include the length field itself.

Status	Description
00	Ok
Others	Fail

EXAMPLE 4E 00 →
 ← 00 01 00

• N<01> (4EH 01H) – Poll Card/Target Function

COMMENT Poll Card/Target Function

FORMAT N[01H][Poll Type, 1 byte][Baud Rate, 1 byte][Feature, 1 byte]

Poll Type	
Value	Description
A	NFC – A
F	NFC – F
N	Active Communication Mode (ISO 18092)
Others	Reserved

Baud Rate	
Value	Description
00	Passive – 106 Kbps
01	Passive – 212 Kbps
02	Passive – 424 Kbps
10	Active – 106 Kbps
11	Active – 212 Kbps
12	Active – 424 Kbps
Others	RFU

Feature	
bit	Description
1	Send Out Card/ Target Information
2	RFU
3	RFU
4	RFU
5	Append General bytes in ATR_REQ Command (NFC-DEP protocol)
6	RFU
7	RFU
8	NFC-DEP Protocol

RESPONSE

NFC-A:

[Length, 2 bytes][Status, 1 byte] [Baud Rate, 1 byte][ATQA, 2 bytes][Length of UID, 1 byte][UID, n bytes][SAK, 1 byte]
[NFCID3t, 10 bytes] [DIDt, 1 byte][Length of General Bytes, 1 byte][General Bytes, n bytes]

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NFC-F:

[Length, 2 bytes][Status, 1 byte] [Baud Rate, 1 byte][NFCID2, 8 bytes][NFCID3t, 10 bytes] [DIDt, 1 byte]
[Length of General Bytes, 1 byte][General Bytes, n bytes]

Active Communication Mode:

[Length, 2 bytes][Status, 1 byte] [Baud Rate, 1 byte][NFCID3t, 10 bytes][DIDt, 1 byte][Length of General Bytes, 1 byte]
[General Bytes, n bytes]

Status	Description
00	Ok
01	No Target in the Operation Field
06	Parse ATR-RES Fail
08	Collision Error
09	The parameters in ATR-REQ is incorrect
Others	Fail

Note:

1. If the bit 1 in the Feature field is set, the reader will send out the NFCID3, DID, length of General Bytes, and General bytes.
2. If the length of General bytes is 0, then the field of General Bytes is not present.
3. Both the Length field and the Length of General Bytes field are counting the sum of following fields and do not include the Length field bytes.
4. For NFC-A/F mode, if bit 8 of Feature is not set, the response will not include the field of NFCID3t, DIDt, Length of General Bytes and General Bytes.
5. For NFC-A, it only supports the 106kbps baud rate. For NFC-F, it supports the 212kbps and 424kbps baud rates.

EXAMPLES

NFC-A

4E 01 41 00 91 0d 46 66 6D 01 01 10 03 02 00 01 04 01 96 →
← 00 23 00 00 08 00 04 08 13 54 91 40 86 93 A5 26 DE F5 85 A3 42 CA 00 0D 46 66 6D 01
01 10 03 02 00 01 04 01 96

NFC-F

4E 01 46 01 91 0d 46 66 6D 01 01 10 03 02 00 01 04 01 96 →
← 00 23 00 01 01 FE 85 99 75 DF E9 6D 60 52 51 53 98 90 82 CC 65 BB 00 0D 46 66 6D 01
01 10 03 02 00 01 04 01 96

Active Communication Mode:

4E 01 4E 10 91 0d 46 66 6D 01 01 10 03 02 00 01 04 01 96 →
← 00 1B 00 10 74 FE 46 E1 CF 8F 9E D7 15 EF 00 0D 46 66 6D 01 01 10 03 02 00 01 04 10 96

• N<02> - Remove Card/Target Function

COMMENT Remove Card/Target Function
FORMAT N[02H][Feature, 1 byte]

Feature Type	
Value	Description
00	Deselect Target
01	Release Target
Others	Reserved

RESPONSE [Length, 2 bytes][Status, 1 byte]

Status	Description
00	Ok
02	Fail
Others	RFU

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EXAMPLE 4E 02 01 →
 ← 00 01 00

• **N<03>** - Data Transceive Command

COMMENT Transceive data from Phone

FORMAT N[03H][Length, 2 byte][Data, n bytes]

[Length, 2 byte]

The length of data field does not include the two bytes of the length. The first byte is the High byte of length, and then the Low byte.

[Data, n bytes]

The data shall be put in this field and will be transferred to the Phone. The reader will wait for the Phone Response and then returned to the Host with Acknowledgement.

RESPONSE [Length, 2 bytes][Status, 1 byte] [Data, n bytes]

Status	Description
00	Ok
01	Fail
Others	RFU

EXAMPLE 4E 03 00 02 11 20 →
 ← 00 02 00 00 00

• **N<04>** - Wakeup Target Function

COMMENT Wakeup Target Function

FORMAT N[04H]

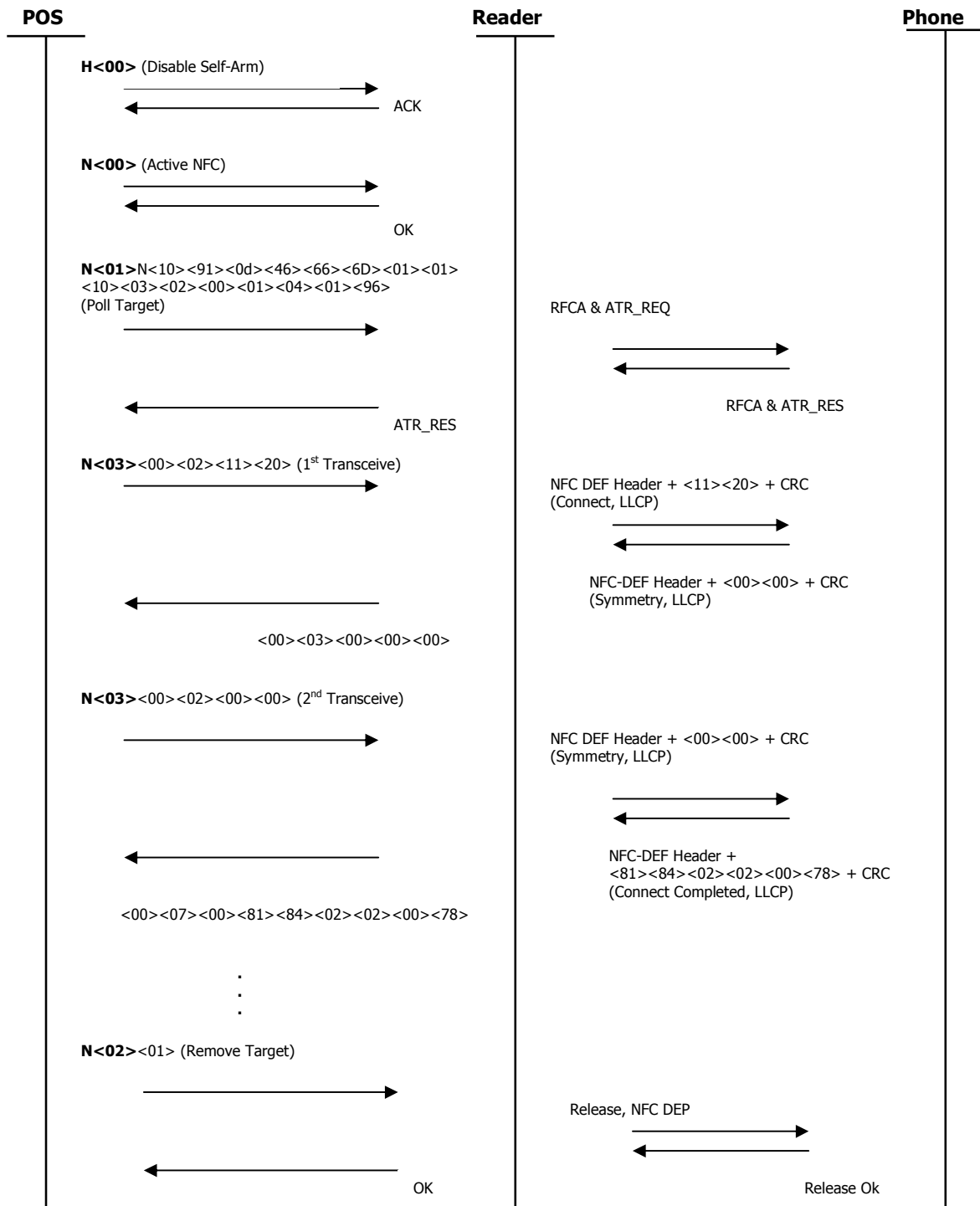
Description If user sends the Deselect via Remove Card/Target function command, then user shall wake up the target before sending the next Data Transceive command.

RESPONSE [Length, 2 bytes][Status, 1 byte]

Status	Description
00	Ok
02	Fail
Others	RFU

EXAMPLE 4E 04 →
 ← 00 01 00

Example Flow of NFC P2P, Active Communication Mode



Note:

1. The host shall handle and packet the data into the correct format which is based on the definition of the NFC forum

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