
**Information technology —
Telecommunications and information
exchange between systems —
Front-end configuration command for
NFC-WI (NFC-FEC)**

*Technologies de l'information — Télécommunications et échange
d'informations entre systèmes — Commande à configuration frontale
pour NFC-WI (NFC-FEC)*



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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 16353 was prepared by Ecma International (as ECMA-390) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Introduction

ISO/IEC 28361 specifies a two-wire interface for which this International Standard defines commands, responses and their transmission, allowing the exchange of control and state information between the transceiver and the front-end as specified in ISO/IEC 28361. Such exchange may include indication of the presence of the RF field and control information to change data rates and communication modes of the front-end.

Information technology — Telecommunications and information exchange between systems — Front-end configuration command for NFC-WI (NFC-FEC)

1 Scope

This International Standard specifies commands for the Near Field Communication Wired Interface (NFC-WI) specified in ISO/IEC 28361. The commands allow exchange of control and state information between the transceiver and the front-end.

2 Conformance

To conform to this International Standard, an NFC-FEC device shall conform to all mandatory parts specified herein and all mandatory parts of ISO/IEC 28361 (NFC-WI).

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 28361:2007, *Information technology — Telecommunications and information exchange between systems — Near Field Communication Wired Interface (NFC-WI)*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 28361 apply.

5 Conventions and notations

For the purposes of this document the conventions and notations given in ISO/IEC 28361 apply.

6 Acronyms

For the purposes of this document the acronyms given in ISO/IEC 28361 apply.

7 States

NFC-FEC extends the compound NFC-WI Command state with the Escape, Quite, “Command Ready” and “Command Busy” sub-states as specified in Figure 1.

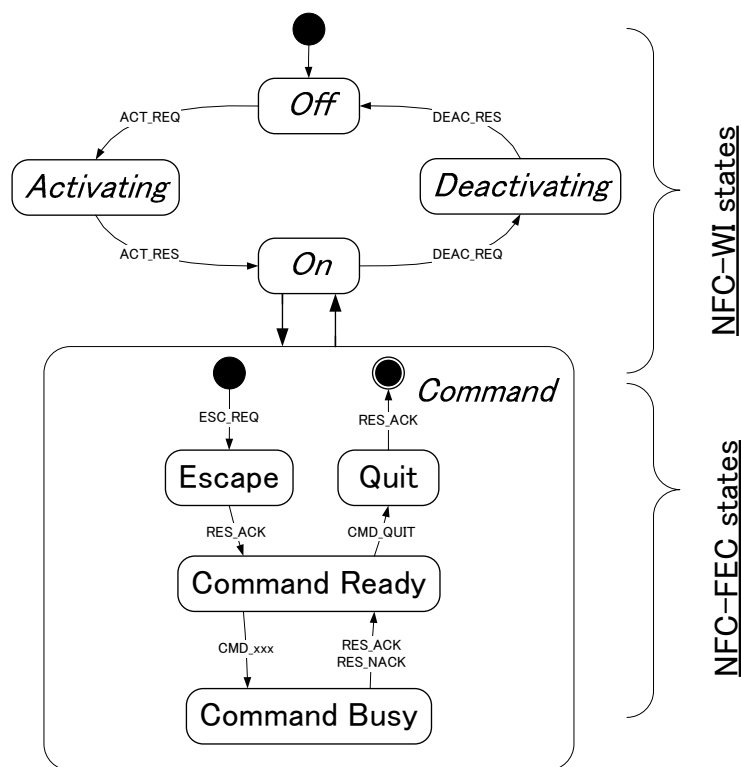


Figure 1 — NFC-WI states and NFC-FEC sub-states

7.1 Escape state

NFC-FEC shall move from the NFC-WI ON state to Escape by the Escape sequence (ESC_REQ) as defined in ISO/IEC 28361:2007, 7.5.1. NFC-FEC shall move from Escape to Command Ready after receiving RES_ACK or after expiry of the timeout specified in 8.4.

7.2 Command Ready state

NFC-FEC allows transmission of commands in the Command Ready state. After submission of a command, NFC-FEC shall move to Command Busy state.

CMD_QUIT or expiry of the timeout specified in 8.4 shall move NFC-FEC to the Quit state.

7.3 Command Busy state

When a response is transmitted, or after expiry of the timeout specified in 8.4, NFC-FEC shall move back to Command Ready state.

7.4 Quit state

Reception of RES_ACK or after expiry of the timeout specified in 8.4, NFC-FEC shall move to ON.

8 Commands and Responses

8.1 Command and response Format

The command and response format is specified in Figure 2, the data field is optional and of arbitrary length.

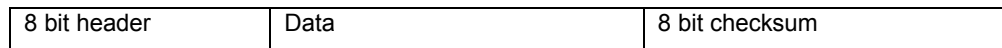


Figure 2 — Command and Response format

8.2 Checksum

The checksum shall be the bitwise exclusive OR of the Initialization Vector (11111111) and the Header and the Data.

The receiver shall respond with RES_NACK if it receives a wrong checksum.

8.3 Commands

Table 1 specifies the coding of commands.

Undefined commands are RFU and their use is prohibited.

Table 1 — Coding of Commands

Command Header	Name	Description	Expected Response
0001 1111	CMD_QUIT	Quit	ACK or NACK
0000 0000	CMD_NOP	No operation	ACK or NACK
0000 0001	CMD_IMP_106	Set Initiator passive communication mode 106kbps	ACK or NACK
0000 0010	CMD_IMP_212	Set Initiator passive communication mode 212kbps	ACK or NACK
0000 0011	CMD_IMP_424	Set Initiator passive communication mode 424kbps	ACK or NACK
0000 1001	CMD_IMA_106	Set Initiator active communication mode 106kbps	ACK or NACK
0000 1010	CMD_IMA_212	Set Initiator active communication mode 212kbps	ACK or NACK
0000 1011	CMD_IMA_424	Set Initiator active communication mode 424kbps	ACK or NACK
0000 1100	CMD_IMA_847	Set Initiator active communication mode 847kbps	ACK or NACK
0000 1101	CMD_IMA_1695	Set Initiator active communication mode 1695kbps	ACK or NACK
0000 1110	CMD_IMA_3390	Set Initiator active communication mode 3390kbps	ACK or NACK
0000 1111	CMD_IMA_6780	Set Initiator active communication mode 6780kbps	ACK or NACK
0000 0100	CMD_TM	Set Target communication mode	ACK or NACK
0000 0101	CMD_RF_OFF	Switch RF field OFF	ACK or NACK
0000 0110	CMD_RF_ON	Switch RF field on	ACK or NACK
0001 0000	CMD_WR	Write register, followed by two data bytes (register address, value)	ACK or NACK
0001 0010	CMD_RR	Read register, followed by one data byte (address);	1 byte
0001 0001	CMD_WB	Write block, followed by six data bytes (2 bytes address, 4 bytes value)	ACK or NACK
0001 0011	CMD_RB	Read block, followed by two data byte (address);	4 bytes
0001 0100	CMD_GS	Get status; reply shall be four data bytes	4 bytes

8.4 Responses

Table 2 specifies the coding of responses.

Undefined responses are RFU and their use prohibited.

Table 2 — Coding of Responses

Header	Name	Description
1010 0101	RES_ACK	ACK (no data)
1010 1010	RES_NACK	NACK
1010 1001	RES_DATA	Data

In case the expected response is ACK or NACK, then any response different to ACK shall be handled as NACK.

For all commands the response timeout is 2 ms.

9 Information-Transfer

The commands and responses as specified in 8 shall be transmitted between a “Start of communication” and “End of communication” symbol specified in 9.1 and 9.2 respectively.

The odd parity bit P shall be set such that the number of ONEs is odd in (bit 1 to bit 8, P).

9.1 Transceiver Frames

The transceiver shall use Manchester encoding as defined in ISO/IEC 28361:2007, 8.1 and the bit coding for $f_{CLK}/128$ as defined in ISO/IEC 28361:2007, 8.3.2.

Transceiver frames shall use the following framing.

Start of communication: ONE.

$n \cdot (8 \text{ data bits (ZERO or ONE)} + \text{odd parity bit with } n \geq 1)$. The LSB of each byte is transmitted first.

End of communication: HIGH for one bit duration.

9.2 Front-end Frames

The RF front-end shall use Modified Miller encoding as defined in ISO/IEC 28361:2007, 8.2 and the bit coding for a bit rate of $f_{CLK}/128$ as defined in ISO/IEC 28361:2007, 8.3.1.

Front-end frames shall use the following framing.

Start of communication: ZERO.

$n \cdot (8 \text{ data bits (ZERO or ONE)} + \text{odd parity bit with } n \geq 1)$. The LSB of each byte is transmitted first.

End of communication: ZERO followed by no gating for two bit durations.

