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Technologies de l'information — Télécommunications et échange d'information entre systèmes — Interface et protocole -2 en communication de champ proche (NFCIP-2)

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Foreword

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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.

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ISO/IEC 21481 was prepared by Ecma International (as ECMA-352) 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.

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Introduction

In 2002, Ecma International formed Task Group 19 of Technical Committee 32 to specify Near Field Communication (NFC) signal interfaces and protocols. The NFC devices are wireless closely coupled devices communicating at 13,56 MHz.

Although ISO/IEC 18092 (NFCIP-1), ISO/IEC 14443 and ISO/IEC 15693 standards all specify 13,56 MHz as their working frequency, they specify distinct communication modes. These are defined as NFC, PCD, and VCD communication modes respectively.

This NFCIP-2 Standard specifies the mechanism to detect and select one communication mode out of those three possible communication modes. Furthermore, NFCIP-2 requires that subsequent behaviour be as specified in the standard specifying the selected communication mode.

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Information technology — Telecommunications and information exchange between systems — Near Field Communication Interface and Protocol -2 (NFCIP-2)

1 Scope

ISO/IEC 18092, ISO/IEC 14443 and ISO/IEC 15693 standards specify the RF signal interface, initialisation, anti-collision and protocols for wireless interconnection of closely coupled devices and access to contactless integrated circuit cards operating at 13,56 MHz.

This International Standard specifies the communication mode selection mechanism, designed to not disturb any ongoing communication at 13,56 MHz, for devices implementing ISO/IEC 18092 and the reader functionality for integrated circuit cards compliant to ISO/IEC 14443 or ISO/IEC 15693. This International Standard requires implementations to enter the selected communication mode as specified in the respective standard. The communication mode specifications, however, are outside the scope of this NFCIP-2 Standard.

2 Conformance

A comforming implementation complies with all the mandatory clauses in this International Standard.

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 18092:2004, *Information technology — Telecommunications and information exchange between systems — Near Field Communication — Interface and Protocol (NFCIP-1)*

ISO/IEC 14443-2:2001, *Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 2: Radio frequency power and signal interface*

ISO/IEC 14443-3:2001, *Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 3: Initialization and anticollision*

ISO/IEC 14443-4:2001, *Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 4: Transmission protocol*

ISO/IEC 15693-1, *Identification cards — Contactless integrated circuit(s) cards — Vicinity cards — Part 1: Physical characteristics*

ISO/IEC 15693-2, *Identification cards — Contactless integrated circuit(s) cards — Vicinity cards — Part 2: Air interface and initialization*

ISO/IEC 15693-3, *Identification cards — Contactless integrated circuit(s) cards — Vicinity cards — Part 3: Anticollision and transmission protocol*

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4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1
$H_{Threshold}$
the minimum value of an external RF field that a NFCIP-2 device shall detect to not disturb ongoing communication by ensuring that its own RF field is switched off.

4.2
NFC MODE
the communication as specified in ISO/IEC 18092.

4.3
OPERATING FREQUENCY (fc)
13,56 MHZ +/- 7 kHz.

4.4
PCD
Proximity Coupling Device as specified in ISO/IEC 14443.

4.5
PCD MODE
the contactless communication between PCD and PICC as specified in ISO/IEC 14443.

4.6
VCD
Vicinity Coupling Device as specified in ISO/IEC 15693.

4.7
VCD MODE
the contactless communication between VCD and VICC as specified in ISO/IEC 15693.

5 Conventions and notations

5.1 Names

The names of basic elements, e.g. specific fields, are written with a capital initial letter.

6 External RF field threshold value

NFCIP-2 devices shall detect external RF fields at the OPERATING FREQUENCY with a value higher than $H_{THRESHOLD}$ while performing external RF field detection.

The value of $H_{THRESHOLD}$ = 0,1875 A/m.

7 RF Field detection

In order to not disturb any communication on the OPERATING FREQUENCY, an NFCIP-2 device shall not switch on its RF field when it detects an external RF field, as specified in Clause 6.

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8 Mode selection

Mode selection specifies the procedure for NFCIP-2 devices to select and subsequently enter one the NFC MODE, or the PCD MODE and VCD MODE.

NFCIP-2 devices shall implement the following functions:

1. Initiator and target as specified in ISO/IEC 18092;
2. PCD as specified in ISO/IEC 14443; and
3. VCD as specified in ISO/IEC 15693.

NFCIP-2 devices shall execute the following sequence:

1. The NFCIP-2 device shall have its RF field switched off.
2. If the NFCIP-2 device detects an external RF field, as specified in Clause 6, it shall select the NFC MODE.
3. If the NFCIP-2 device does not detect an external RF field it shall select the NFC MODE, or the PCD MODE or the VCD MODE.
4. If the NFCIP-2 device has selected the NFC MODE, it shall enter the NFC MODE.
5. NFCIP-2 devices that have selected either the PCD MODE or VCD MODE, shall perform RF detection, Initial RF generation and subsequently enter the selected mode as specified in Clause 9.

Figure 1 illustrates the above procedure.

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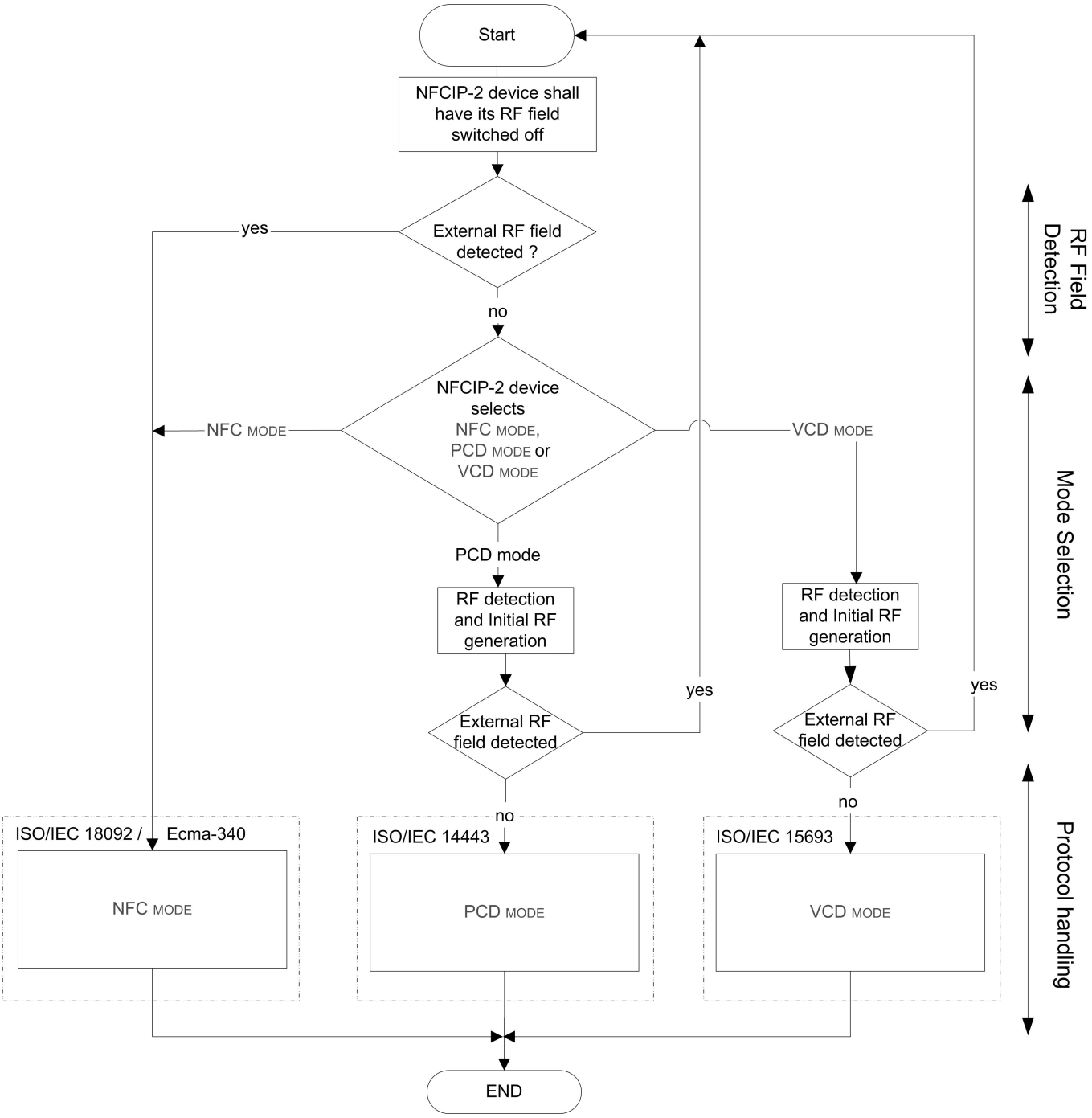


Figure 1 — Mode selection

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9 RF detection and Initial RF generation

Any NFCIP-2 device having selected the PCD MODE or the VCD MODE shall continue the mode selection sequence and comply with the timing as specified below.

When the NFCIP-2 device detects an external RF field, as specified in Clause 7, during the time $T_{IDT} + n \times T_{RFW}$ it shall recommence the mode selection procedure that is specified in Clause 8.

If the NFCIP-2 device does not detect an external RF field during the time$T_{IDT} + n \times T_{RFW}$, it shall switch on its RF field, and enter the selected communication mode.

Figure 2 illustrates the RF detection and initial RF generation.

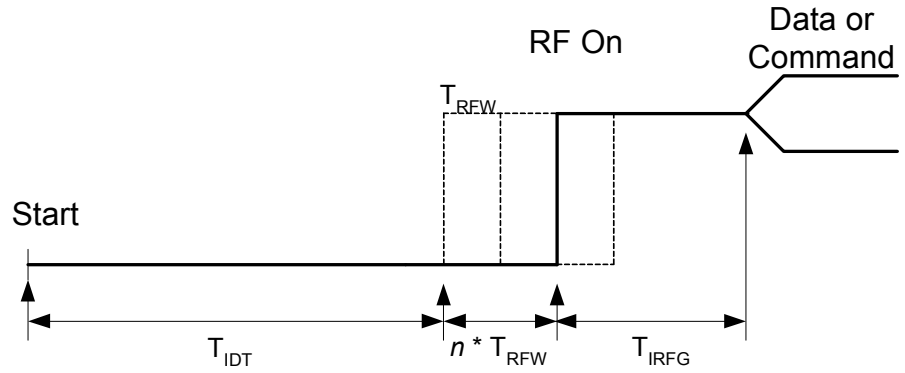


Figure 2 — RF detection and initial RF generation for *PCD MODE* and *VCD MODE*

T_{IDT}: Initial delay time. $T_{IDT} > 4\,096 / fc$ (~300 µs)

T_{RFW}: RF waiting time. $512 / fc$ (~38 µs)

n: randomly generated integer $0 \leq n \leq 3$

T_{IRFG}: Initial guard-time between switching on RF field and start modulation to send command or data. The specification of T_{IRFG} is not part of this International Standard.
In PCD MODE the time between switching on the RF field and modulating the field to transmit data is specified in Clause 5 of ISO/IEC 14443-2.
In VCD MODE the time between switching on the RF field and modulating the field to transmit data is specified in Clause 7.3 of ISO/IEC 15693-2.

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