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AMENDMENT 1
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Identification cards — Contactless integrated circuit cards — Proximity cards —

Part 4: Transmission protocol

AMENDMENT 1: RFU handling rules

Cartes d'identification — Cartes à circuit intégré sans contact — Cartes de proximité —

Partie 4: Protocole de transmission

AMENDEMENT 1: Règles de manipulation des bits RFU

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Amendment 1 to ISO/IEC 14443-4:2016 was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, SC 17, *Cards and personal identification*.

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Identification cards — Contactless integrated circuit cards — Proximity cards —

Part 4: Transmission protocol

AMENDMENT 1: RFU handling rules

Amendment 1: RFU handling rules

Page 2, Clause 4

Add new text after the last dash:

"For the purposes of this part of ISO/IEC 14443, the following general rules apply:

— A PICC or PCD sending RFU bits shall set these bits to the value indicated herein or to (0)b if no value is given.

— A PICC or PCD receiving RFU bits shall disregard the value of these bits and shall maintain and not change its function, unless explicitly stated otherwise."

Page 5, 5.1

Replace the second dash and NOTE with the following dash and NOTE:

"— Until the RFU values 'D' - 'F' are assigned by ISO/IEC, a PICC receiving an FSDI with a value = 'D' - 'F' shall interpret it as FSDI = 'C' (FSD = 4 096 bytes).

NOTE This PCD requirement is added for PCD's compatibility with future PICCs when ISO/IEC further defines the behaviour for the RFU values of 'D' - 'F'."

Delete the fourth dash.

Page 7, 5.2.3

Replace the first dash with:

"— b8 is RFU."

Replace the fourth dash and NOTE with the following dash and NOTE:

"— Until the RFU values 'D' - 'F' are assigned by ISO/IEC, a PCD receiving an FSCI with a value = 'D' - 'F' shall interpret it as FSCI = 'C' (FSC = 4 096 bytes).

NOTE This PICC requirement is added for PICC´s compatibility with future PCDs when ISO/IEC further defines the behaviour for the RFU values of 'D' - 'F'."

Replace Figure 5 with:

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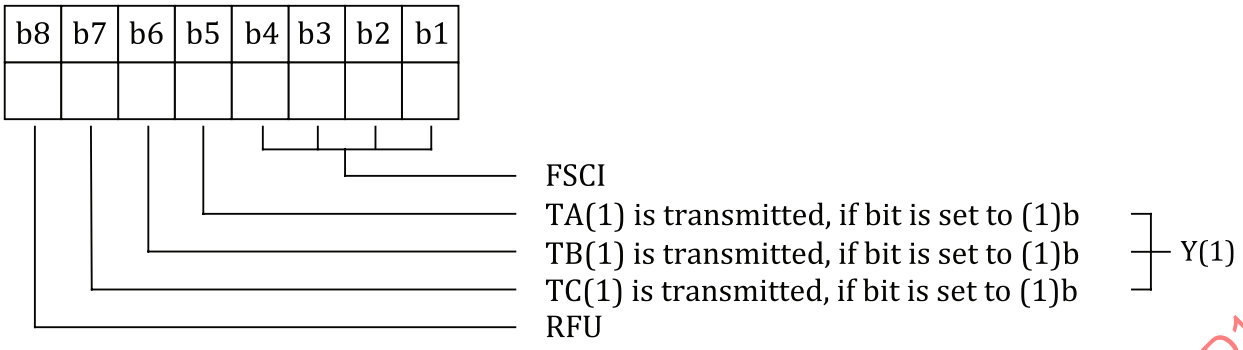

Figure 5 — Coding of format byte

Page 8, 5.2.4

Replace the third dash with:

"— b4 shall be set to (0)b."

Replace Figure 6 with:

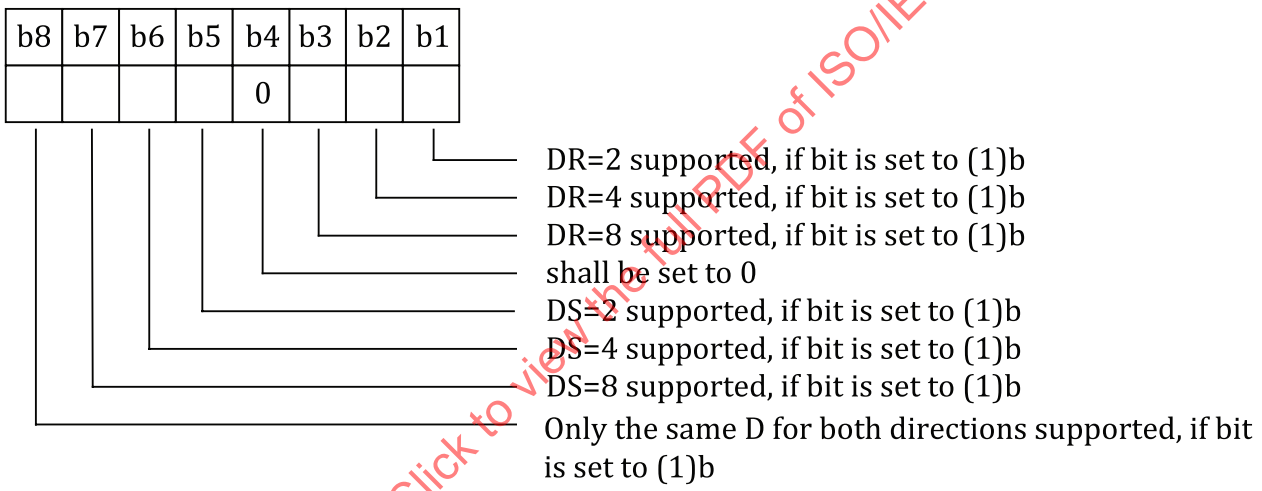

Figure 6 — Coding of interface byte TA(1)

Replace the last paragraph with:

A PCD receiving TA(1) with b4 = (1)b shall interpret it as (b8 to b1) = (00000000)b, implying only ~106 kbit/s supported in both directions. The definition of TA(1) with b4 = (1)b is otherwise undefined.

Page 9, 5.2.5

Replace the last two paragraphs with:

"Until the RFU value 15 is assigned by ISO/IEC, a PCD receiving SFGI = 15 shall interpret it as SFGI = 0.

Until the RFU value 15 is assigned by ISO/IEC, a PCD receiving FWI = 15 shall interpret it as FWI = 4."

Page 9, 5.2.6

Replace the first dash of the second paragraph with:

"— b8 to b3 are each RFU."

Delete the third dash of the second paragraph.

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Replace Figure 8 with:

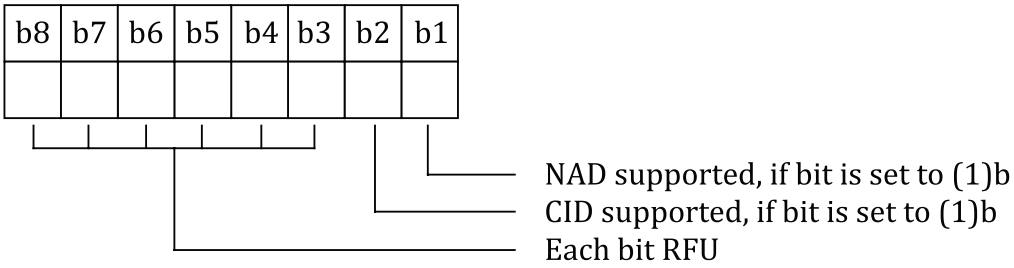

Figure 8 — Coding of interface byte TC(1)

Page 11, 5.3.2

Replace the first sentence of the second paragraph with:

"The PCD shall set (b4 to b1) = (0001)b and (b8 to b6) = (000)b."

Replace Figure 11 with:

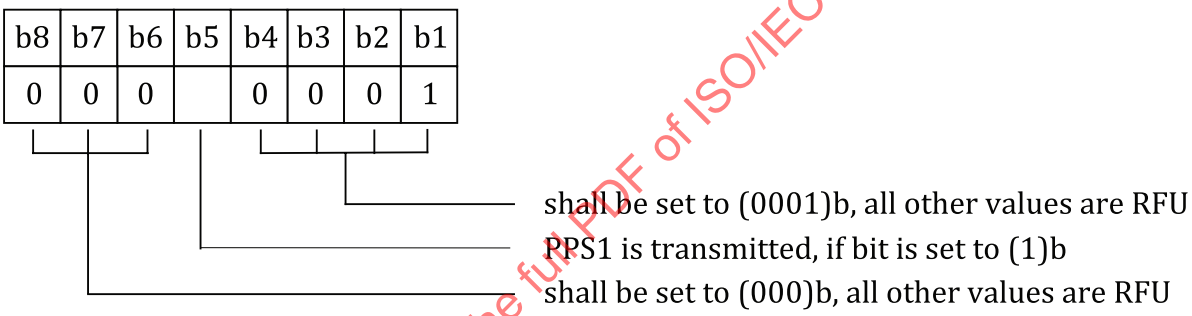

Figure 11 — Coding of PPS0

Page 11, 5.3.3

Replace the four dashes of the first paragraph with:

"— b8 to b5 shall each be (0)b; a PICC receiving any bit b8 to b5 set to (1)b shall apply 5.6.2.2 (b).

— The two-bit value field (b4, b3) is called 'DSI' and codes the selected divisor integer from PICC to PCD.

— The two-bit value field (b2, b1) is called 'DRI' and codes the selected divisor integer from PCD to PICC."

Replace Figure 12 with:

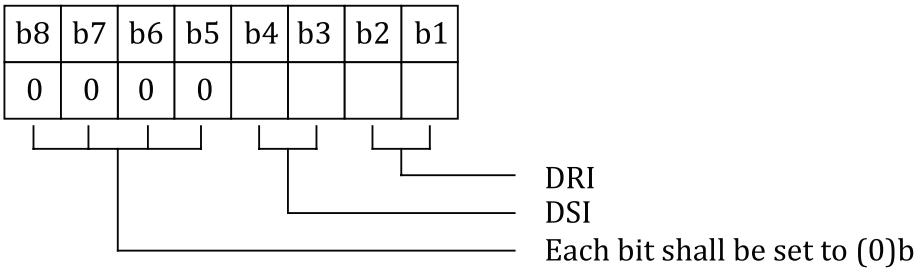

Figure 12 — Coding of PPS1

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Page 11, 5.4

Replace the second paragraph with:

"The new bit rates shall become effective in the PICC immediately after it has sent the PPS response. The PCD shall not change the bit rate when the PPS response is missing or invalid or when the PPSS returned by the PICC is not identical with the PPSS sent by the PCD."

Page 12, 5.6.1.2

Replace b) and c) with:

"b) receives a valid HLTA, the PICC

— shall process the command and shall enter HALT state.

c) receives an invalid command, an error or a RATS command with CID = 15, the PICC

— shall not respond and shall enter IDLE state or HALT state as specified in ISO/IEC 14443-3:2016, Figure 7."

Page 15, 7.1.2.1

Replace the whole subclause with the following:

"7.1.2.1 Protocol control byte field

The PCB is used to convey the information required to control the data transmission.

The protocol defines three fundamental types of blocks:

— I-block is used to convey information for use by the application layer.

— R-block is used to convey positive or negative acknowledgements. An R-block never contains an INF field. The acknowledgement relates to the last received block.

— S-block is used to exchange control information between the PCD and the PICC. The support of the S(PARAMETERS) block is optional for PCDs and PICCs. Three different types of S-blocks are defined:

1) "Waiting time extension" containing a 1 byte long INF field,

2) "DESELECT" containing no INF field, and

3) "PARAMETERS" containing an n-byte long INF field with $n \geq 0$.

FSD and FSC should be large enough to contain the expected S(PARAMETERS) blocks.

The PCD and PICC maximum frame size should be large enough to contain the expected S(PARAMETERS) blocks.

The coding of the PCB depends on its type and is defined by the following figures. The setting of (b8, b7) is used to identify its block type as defined in Table 3.

A PICC or PCD receiving (b8, b7) = (01)b shall treat it as a protocol error.

Table 3 — Coding of block type

(b8,b7)	Block Type
(00)b	I-block
(01)b	RFU
(10)b	R-block
(11)b	S-block

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The coding of I-block PCB is shown in Figure 16.

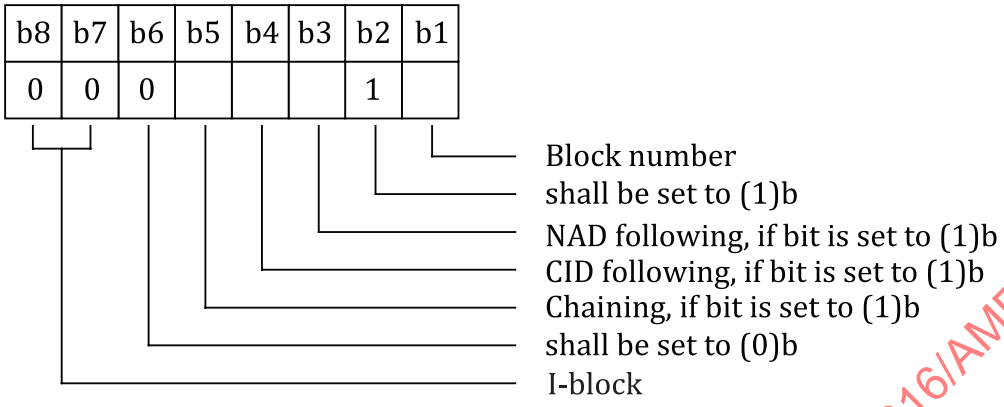

Figure 16 — Coding of I-block PCB

A PICC or PCD receiving an I-block with b2 = (0)b shall treat it as a protocol error.

A PICC or PCD receiving an I-block with b6 = (1)b should treat it as a protocol error.

The coding of R-block PCB is shown in Figure 17.

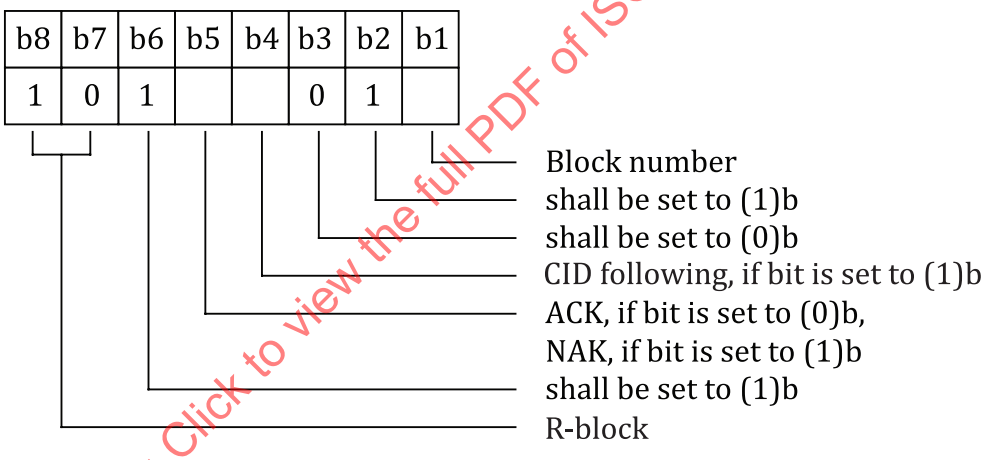

Figure 17 — Coding of R-block PCB

A PICC or PCD receiving an R-block with b6 = (0)b or b3 = (1)b shall treat it as a protocol error.

A PICC or PCD receiving an R-block with b2 = (0)b should treat it as a protocol error.

The coding of S-block PCB is shown in Figure 18.

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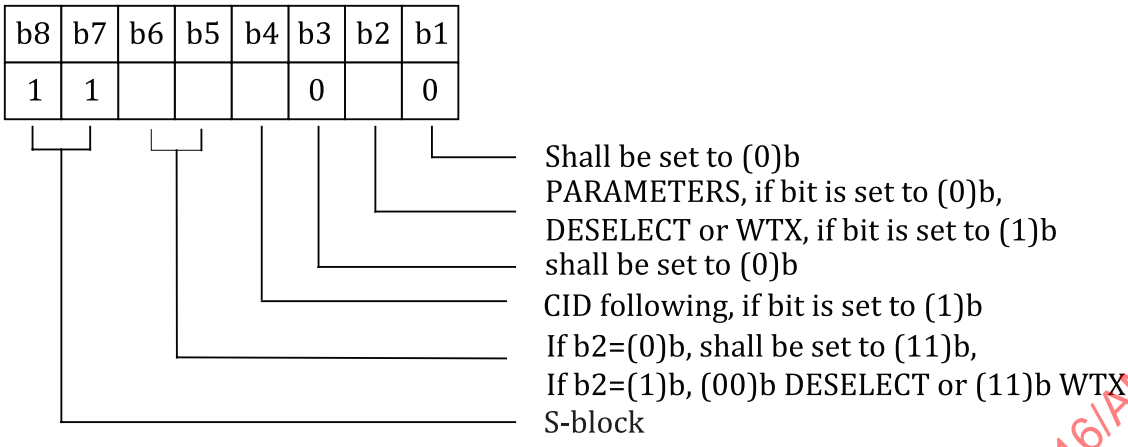

Figure 18 — Coding of S-block PCB

A PICC or PCD receiving S-block with b3 = (1)b shall treat it as a protocol error.

A PICC or PCD receiving S-block with b1 = (1)b should treat it as a protocol error.

A PICC or PCD receiving S-block with b2 = (0)b and (b6,b5) <> (11) b shall treat it as a protocol error.

A PICC or PCD receiving S-block with b2 = (1)b and (b6,b5) = (01)b or (10)b shall treat it as a protocol error."

Page 17, 7.1.2.2

Replace the second and the third dashes with:

"— (b6,b5) shall be set to (00)b.

— A PICC or PCD receiving (b6,b5) = (01)b or (10)b or (11)b shall treat it as a protocol error."

Page 18, 7.1.2.3

Replace the first and the second paragraphs with:

"The usage of NAD shall be compliant to the definition of NAD in ISO/IEC 7816-3.

A PICC or a PCD receiving a NAD not compliant to ISO/IEC 7816-3 shall treat it as protocol error."

Page 18, 7.2

Replace the last paragraph and NOTE 2 with:

"The PICC shall not set FWI to the RFU value of 15. Until the RFU value 15 is assigned by ISO/IEC, a PCD receiving FWI = 15 shall interpret it as FWI = 4."

NOTE 2 This PCD requirement is added for PCD's compatibility with future PICCs when ISO/IEC further defines the RFU value 15."

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Page 19, 7.3

Replace the whole subclause with the following:

"7.3 Frame waiting time extension

When the PICC needs more time than the defined FWT to process the received block, it shall use an S(WTX) request for a waiting time extension. An S(WTX) request contains a 1 byte long INF field that consists of two parts (see Figure 21).

— b8 and b7 code the power level indication (see 7.4).

— b6 to b1 codes the WTXM. The WTXM is coded in the range from 1 to 59. The values 0 and 60 to 63 are RFU.

— When receiving WTXM = 0 or WTXM = 60 – 63, the PCD shall treat it as a protocol error.

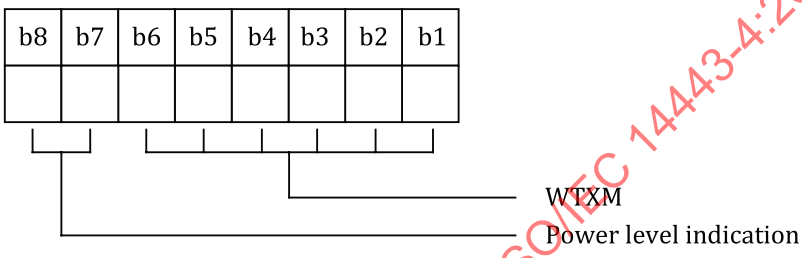

Figure 21 — Coding of INF field of an S(WTX) request

The PCD shall acknowledge by sending an S(WTX) response containing also a 1 byte long INF field that consists of two parts (see Figure 22) and contains the same WTXM as received in the request.

— b8 and b7 shall be (00)b and all other values are RFU.

— b6 to b1 codes the acknowledged WTXM value used to define a temporary FWT.

— The PICC shall treat (b8,b7) <> (00)b as protocol error.

— If PICC receives a WTXM value which does not match the WTXM sent by PICC, the PICC shall treat it as a protocol error.

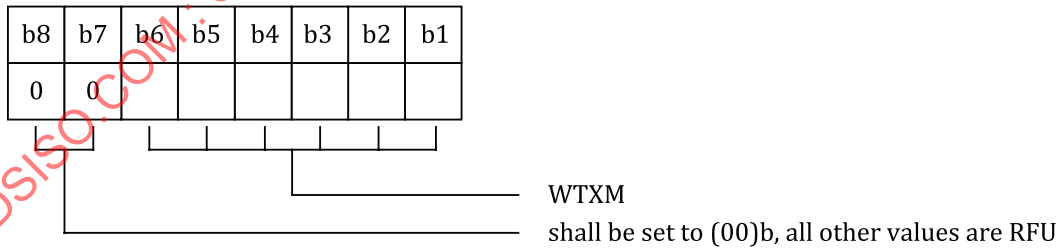

Figure 22 — Coding of INF field of an S(WTX) response

The corresponding temporary value of FWT is calculated by the following formula:

$$FWT_{TEMP} = FWT \times WTXM$$

The time FWT_{TEMP} requested by the PICC starts after the PCD has sent the S(WTX) response.

FWT_{MAX} shall be used, when the formula results in a value higher than FWT_{MAX}.

The temporary FWT applies only until the next block has been received by the PCD."

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