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ISO/IEC 14443-3

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AMENDMENT 2
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Identification cards — Contactless integrated circuit cards — Proximity cards —

Part 3: Initialization and anticollision

AMENDMENT 2: Bit rates of *fc*/8, *fc*/4 and *fc*/2, frame size from 512 bytes to 4 096 bytes and minimum TR0

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

Partie 3: Initialisation et anticollision

AMENDEMENT 2: Débits binaires de fc*/8,* fc*/4 et* fc*/2, taille de trame comprise entre 512 octets et 4 096 octects et TR0 minimal*

Reference number
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Foreword

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Amendment 2 to ISO/IEC 14443-3:2011 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

Identification cards — Contactless integrated circuit cards — Proximity cards —

Part 3: Initialization and anticollision

AMENDMENT 2: Bit rates of *fc*/8, *fc*/4 and *fc*/2, frame size from 512 bytes to 4 096 bytes and minimum TR0

Pages 5–6, 6.1

Replace the subclause with the following:

“

6.1 etu

The value of the etu for each bit rate is defined in Table 1.

Table 1 — etu

Bit rates	etu
fc/128 (~ 106 kbit/s)	128/*fc* (~ 9,4 µs)
fc/64 (~ 212 kbit/s)	128/2*fc* (~ 4,7 µs)
fc/32 (~ 424 kbit/s)	128/4*fc* (~ 2,4 µs)
fc/16 (~ 848 kbit/s)	128/8*fc* (~ 1,2 µs)
fc/8 (~ 1,70 Mbit/s)	128/16*fc* (~ 0,59 µs)
fc/4 (~ 3,39 Mbit/s)	128/32*fc* (~0,29 µs)
fc/2 (~ 6,78 Mbit/s)	128/64*fc* (~0,15 µs)

”

Page 6, 6.2.1.1

Add the following after the first paragraph:

"For bit rates of *fc*/8, *fc*/4 and *fc*/2 the FDT starts at the end of the last modulation transmitted by the PCD."

Page 7, 6.2.1.1

Replace the title of Figure 1 with the following:

"**Figure 1 — Frame delay time PCD to PICC for bit rates up to fc/16**"

Replace the row before the last row of Table 2 with the following:

"

fc/128 or *fc*/64 or *fc*/32 or *fc*/16 or *fc*/8 or *fc*/4 or *fc*/2	*fc*/64 or *fc*/32 or *fc*/16 or *fc*/8 or *fc*/4 or *fc*/2	Not applicable	≥ 1116/*fc*	≥ 1116/*fc*

"

Add the following after Table 2:

"

NOTE If a bit rate higher than *fc*/16 is selected for PCD to PICC communication, then a bit rate of *fc*/128 is not allowed for PICC to PCD communication, see ISO/IEC 14443-4:2008/Amd.2. This restriction is required because the necessary precise FDT is not defined for PCD NRZ coding which is used for bit rates higher than *fc*/16.

The FDT measurement starts at the beginning of the rising edge as specified and illustrated with small circles in the following figures of ISO/IEC 14443-2:

— Figure 3 for bit rate of *fc*/128,

— Figure 6 for bit rates of *fc*/64, *fc*/32 and *fc*/16,

— Figure 12 for bit rates of *fc*/8, *fc*/4 and *fc*/2.

"

Page 7, 6.2.1.2

Replace the word "pause" by "modulation".

Page 8, 6.2.3

Add the following after the last dash:

"

— PCD standard frames for bit rates of *fc*/8, *fc*/4 and *fc*/2.

"

Pages 8–9, 6.2.3.2

Add the following new subclause:

"**6.2.3.2.1 PCD standard frame for bit rates of *fc*/128, *fc*/64, *fc*/32 and *fc*/16 and PICC standard frame**"

Move the text of 6.2.3.2 into this subclause.

Replace:

"The PCD standard frame is illustrated in Figure 3."

with:

"The PCD standard frame for bit rates of *fc*/128, *fc*/64, *fc*/32 and *fc*/16 is illustrated in Figure 3."

Replace Figure 3 title with:

"**Figure 3 — PCD standard frame for bit rates of *fc*/128, *fc*/64, *fc*/32 and *fc*/16**"

Replace the third paragraph (below Figure 3) with the following:

"As an exception the last parity bit of a PICC standard frame shall be inverted if this frame is transmitted with bit rate higher than *fc*/128. PICC standard frames are illustrated in Figure 4."

Page 9, 6.2.3.2, Figure 4

Replace the second caption with the following:

"PICC standard frames for bit rates higher than *fc*/128"

Replace Figure 4 title with:

"**Figure 4 — PICC standard frames for bit rates higher than fc/128**"

Add the following new subclause after Figure 4:

"**6.2.3.2.2 PCD standard frame for bit rates of *fc*/8, *fc*/4 and *fc*/2**

The character transmission format and character separation as defined in 7.1.1 and 7.1.2, respectively, shall be used.

The frame format is defined in 7.1.3.

"

Page 23, 7.1

Add the following paragraph:

"etu is defined in 6.1."

Page 24, 7.1.1

Add the following paragraph below Table 13:

"For bit rates higher than *fc*/16, bit boundaries shall occur at nominal bit positions."

Page 24, 7.1.2

Add a new subclause in 7.1.2:

"**7.1.2.1 Character separation for bit rates up to *fc*/16**"

Move the content of 7.1.2 to 7.1.2.1.

Add a note after Table 15:

"NOTE Integer number of etu for EGT should be used for all bit rates. Non integer values may not be accepted in future revisions of this standard."

Add a second new subclause in 7.1.2:

"**7.1.2.2 Character separation for bit rates of *fc*/8, *fc*/4 and *fc*/2**

No character separation shall be applied."

Page 25, 7.1.4

In Table 17 replace "***fc*/16**" with "**> *fc*/32**"

Page 26, 7.1.4

In Table 18 replace "***fc*/16**" with "**> *fc*/32**"

Page 27, 7.1.5

In Table 20 replace "***fc*/16**" with "**> *fc*/32**"

Page 27, 7.1.6

Replace third paragraph including list with:

"The maximum value of TR0 is:

— 4096/*fc* (~ 302 µs) for ATQB;

— 65536/*fc* (~ 4,8 ms) for S(DESELECT) and S(PARAMETERS) blocks (see ISO/IEC 14443-4, 8.1);

— (4096/*fc*) x 2^{FWI} – TR1 for all other frames (see 7.9.4.3)."

Remove timing information "(~ 236 µs)" in fourth paragraph.

Replace second sentence of last paragraph with the following:

“PCDs shall accept minimal and maximal values of TR0 with a margin of 16/*fc* and of TR1 with a margin of 1/*fs*.”

Page 40, 7.9.4.4

Replace Table 27 with the following:

“

b3	b2	Minimum TR2
0	0	10 etu + 512/*fc*
0	1	10 etu + 2048/*fc*
1	0	10 etu + 4096/*fc*
1	1	10 etu + 8192/*fc*

”

Page 41, 7.9.4.5

Replace the subclause with the following:

“

7.9.4.5 Max_Frame_Size

Table 28 defines the maximum frame size.

Table 28 — Maximum frame size

Maximum Frame Size Code in ATQB	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'	'8'	'9'	'A'	'B'	'C'	'D' – 'F'
Maximum Frame Size (bytes)	16	24	32	40	48	64	96	128	256	512	1024	2048	4096	RFU

A PICC setting Maximum Frame Size Code = 'D' - 'F' is not compliant with this standard.

Until the RFU values 'D' - 'F' are assigned by ISO/IEC, a PCD receiving Maximum Frame Size Code = 'D' - 'F' should interpret it as Maximum Frame Size Code = 'C' (Maximum frame size = 4096 bytes).

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

”

Page 41, 7.9.4.6

Add after last paragraph:

“NOTE S(PARAMETERS) as defined in ISO/IEC 14443-4:2008/Amd.2 is the only way to negotiate bit rates higher than *fc*/16 and may also be used to negotiate any specified bit rate.”