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Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 3: Initialization and anticollision

AMENDMENT 1

Bit rates of *fc/64*, *fc/32* and *fc/16*

*Cartes d'identification — Cartes à circuit(s) intégré(s) sans contact - Cartes de proximité — Partie 3:
Initialisation et anticollision*

AMENDEMENT 1

*Débits binaires de *fc/64*, *fc/32* et *fc/16**

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Amendment 1 to ISO/IEC 14443-3:2001 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information Technology*, Subcommittee SC 17, *Identification cards and related devices*.

Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 3: Initialization and anticollision

AMENDMENT 1

Bit rates of $fc/64$, $fc/32$ and $fc/16$

Page 2, subclause 3.5

Replace the existing definition with the following:

"elementary time unit (etu)

calculated by the following formula:

$$1 \text{ etu} = 128 / (D \times fc) \text{ where } D \in \{1,2,4,8\}$$

The initial value of the divisor D is 1, giving the initial etu as follows:

$$1 \text{ etu} = 128 / fc$$

where fc is the carrier frequency as defined in ISO/IEC 14443-2."

Page 3, clause 4

Add the following new abbreviation:

D Divisor

Page 5, clause 5

Add a new clause 5 **"Alternation of Type A and Type B commands"**, renumber clause 5 **"Polling"** to new subclause 5.1. and add the following examples at the end of the subclause:

"EXAMPLE 3 When a PICC Type A is exposed to field activation it shall be able to accept a REQA within 5 ms of unmodulated operating field.

EXAMPLE 4 When a PICC Type B is exposed to field activation it shall be able to accept a REQB within 5 ms of unmodulated operating field."

Add a new subclause 5.2 **"Influence of Type A commands on PICC Type B operation"** with the following text:

"A PICC Type B should either go to IDLE state (be able to accept a REQB) or be able to continue a transaction in progress after receiving any Type A command."

Add a new subclause 5.3 **"Influence of Type B commands on PICC Type A operation"** with the following text:

"A PICC Type A should either go to IDLE state (be able to accept a REQA) or be able to continue a transaction in progress after receiving any Type B command."

Add the following new subclause 5.4:

"Minimum delay time for resetting a PICC

When a PICC is not exposed to any operating field (see ISO/IEC 14443-2) for at least 100 ms, it shall go to Power OFF state."

Page 5, clause 6

Insert a new subclause 6.1 at the end of the clause and renumber all subsequent subclauses. Note that the new subclause 6.1 includes a new table 1 and consequently all following tables shall be renumbered.

6.1 Bit rates

Communication between PCD and PICC can be achieved with four different bit rates.

Bit rates of $fc/64$, $fc/32$ and $fc/16$ are optional and may be independently supported by PCD and PICC.

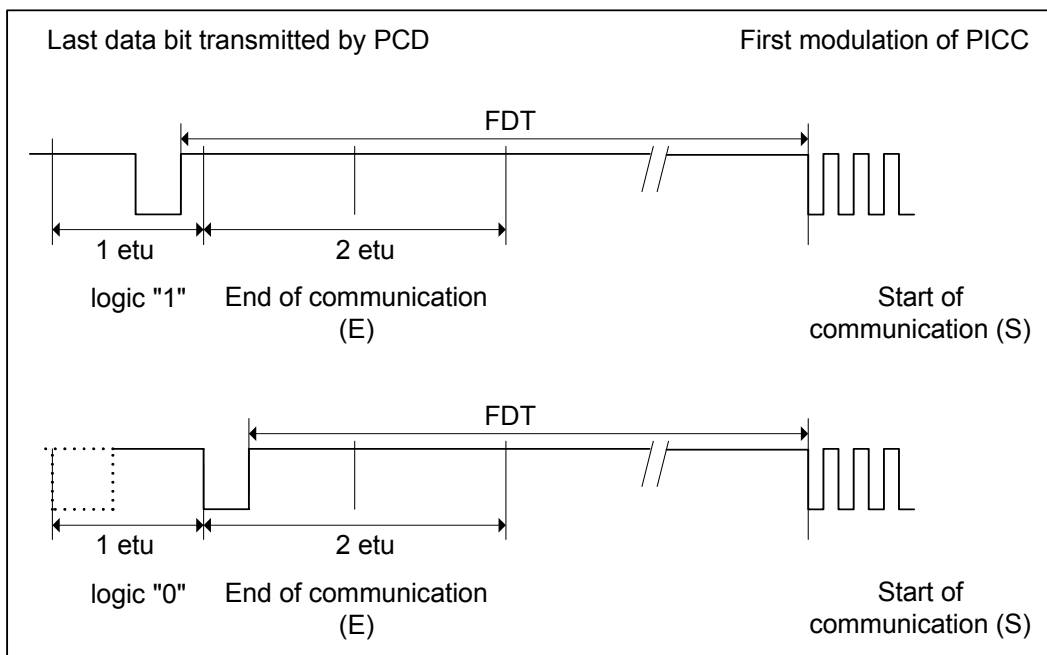
Table 1 — Bit rates

Divisor D	etu	Bit rate
1	$128/fc$ (~9,4 μ s)	$fc/128$ (~106 kbit/s)
2 (optional)	$128/(2fc)$ (~4,7 μ s)	$fc/64$ (~212 kbit/s)
4 (optional)	$128/(4fc)$ (~2,4 μ s)	$fc/32$ (~424 kbit/s)
8 (optional)	$128/(8fc)$ (~1,2 μ s)	$fc/16$ (~847 kbit/s)

NOTE The initial bit rate is $fc/128$. This applies for the whole initialization and anticollision sequence.

Page 6, subclause 6.1.2 (renumbered to 6.2.2)

Replace figure 1 with the following:



Replace table 1 with the following, delete last two sentences of subclause 6.1.2 (renumbered to 6.2.2) and add the note after the table:

Command type	n (integer value)	FDT	
		last bit = (1)b	last bit = (0)b
REQA Command WUPA Command ANTICOLLISION Command SELECT Command		1236/ <i>fc</i>	1172/ <i>fc</i>
All other commands at bit rates: PCD → PICC: <i>fc</i> /128 PCD ← PICC: <i>fc</i> /128	≥ 9	(<i>n</i> *128+84)/ <i>fc</i>	(<i>n</i> *128+20)/ <i>fc</i>
All other commands at bit rates: PCD → PICC: <i>fc</i> /64 PCD ← PICC: <i>fc</i> /128	≥ 8	(<i>n</i> *128+138)/ <i>fc</i>	(<i>n</i> *128+106)/ <i>fc</i>
All other commands at bit rates: PCD → PICC: <i>fc</i> /32 PCD ← PICC: <i>fc</i> /128	≥ 8	(<i>n</i> *128+106)/ <i>fc</i>	(<i>n</i> *128+90)/ <i>fc</i>
All other commands at bit rates: PCD → PICC: <i>fc</i> /16 PCD ← PICC: <i>fc</i> /128	≥ 8	(<i>n</i> *128+97)/ <i>fc</i>	(<i>n</i> *128+89)/ <i>fc</i>
All other commands at bit rates: PCD → PICC: <i>fc</i> /128 or <i>fc</i> /64 or <i>fc</i> /32 or <i>fc</i> /16 PCD ← PICC: <i>fc</i> /64 or <i>fc</i> /32 or <i>fc</i> /16		≥ 1113/ <i>fc</i>	≥ 1113/ <i>fc</i>

NOTE All PICCs in the field shall respond in a synchronous way to the commands: REQA, WUPA, ANTICOLLISION and SELECT. This is needed for anticollision.

Page 7, subclause 6.1.5.2 (renumbered to 6.2.5.2)

Add at the end of the subclause the following text and new figure and renumber all subsequent figures.

"As an exception the last parity bit of a PICC standard frame shall be inverted if this frame is transmitted with bit rate of *fc*/64, *fc*/32 or *fc*/16."

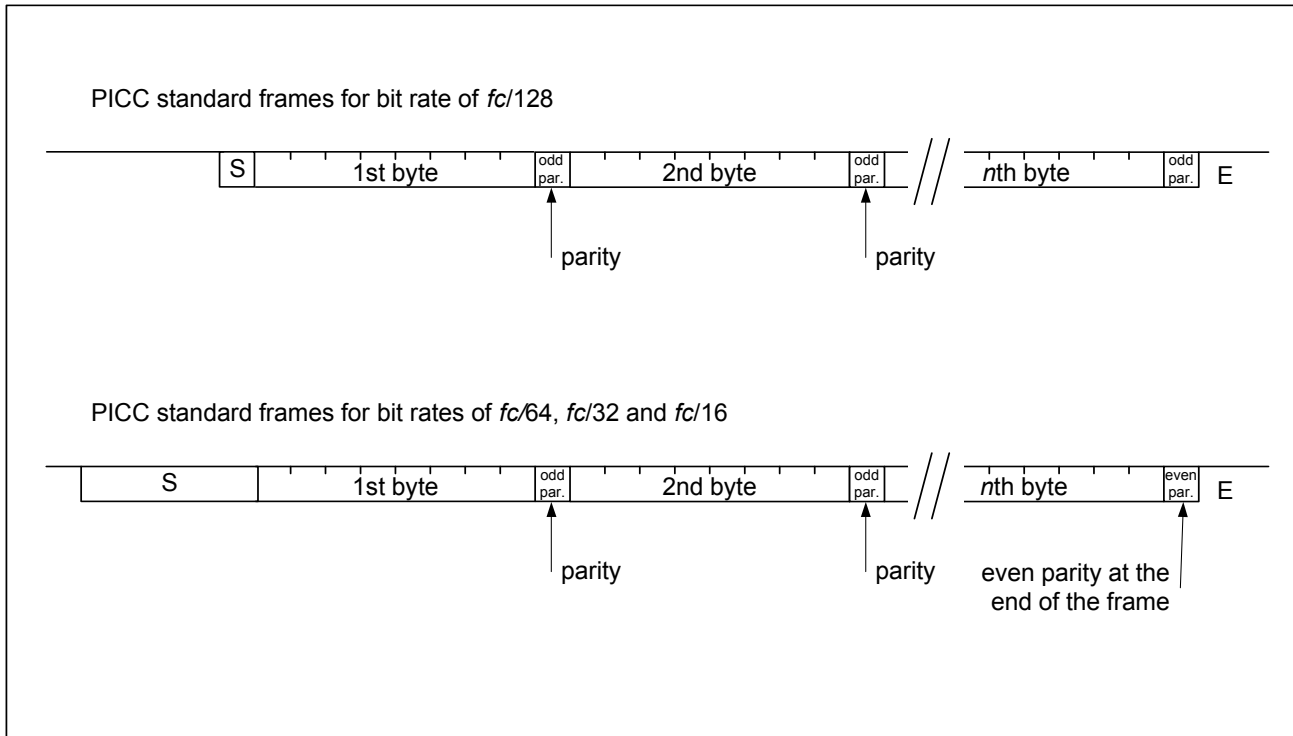


Figure 4 — PICC standard frames

Page 10, figure 6 (renumbered to figure 7)

Replace the text "ISO/IEC 14443-4" in the state bubble with "PROTOCOL state".

Page 15, clause 6.4.2.1 (renumbered to 6.5.2.1)

Replace Table 3 (renumbered to table 4) with the following table:

MSB

LSB

b16	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1
RFU				Proprietary	HB2	HB1	HB0	UID size bit frame	RFU	Bit frame anticollision					

Add the following text and 3 new tables at the end of the subclause. Note that all subsequent tables shall be renumbered.

"High bit rate indicators HB0, HB1 and HB2 indicate whether PICC is capable of supporting optional Select codes '92', '94' or '98' as shown in table 5, table 6 and table 7."

Table 5 — High bit rate indicator HB0 coding

b9	Meaning
0	PICC does not support Select code '92'
1	PICC supports Select code '92'

Table 6 — High bit rate indicator HB1 coding

b10	Meaning
0	PICC does not support Select code '94'
1	PICC supports Select code '94'

Table 7 — High bit rate indicator HB2 coding

b11	Meaning
0	PICC does not support Select code '98'
1	PICC supports Select code '98'

Page 17, subclause 6.4.3.2 (renumbered 6.5.3.2)

Replace existing text with the following and replace table 6 (renumbered to table 10) with the following table:

"Length: 1 byte

Possible values: '93', '95', '97' (mandatory)

'92', '94', '98' (optional)"

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	0	0	1	0	0	1	1	'93': Select cascade level 1
1	0	0	1	0	1	0	1	'95': Select cascade level 2
1	0	0	1	0	1	1	1	'97': Select cascade level 3
1	0	0	1	0	0	1	0	Optional: '92': Select cascade level 1 and switch bit rate to $fc/64$ after receiving SAK
1	0	0	1	0	1	0	0	Optional: '94': Select cascade level 1 and switch bit rate to $fc/32$ after receiving SAK
1	0	0	1	1	0	0	0	Optional: '98': Select cascade level 1 and switch bit rate to $fc/16$ after receiving SAK
1	0	0	1	other values				RFU

Add the following text at the end of the subclause:

"If a PICC indicates the support of higher bit rate according to table 4 (Coding of ATQA) then a PCD may optionally select a new communication speed by using SEL values '92', '94' or '98'. In this case, both the PCD and the PICC shall send and receive frames using the new bit rate after transmission of SAK.

NOTE There is an alternative method for selection of bit rates specified in ISO/IEC 14443-4 clause 5.3.3. This alternative method also allows bit rate selection individually and separately for PCD and PICC."

Page 19, subclause 6.4.4 (renumbered 6.5.4)

Replace table 10 (renumbered to table 14) with the following:

Table 14 — Single size UIDs

uid0	Description
'08'	uid1 to uid3 is a random number which is dynamically generated
'x0' - 'x7'	Proprietary number
'x9' - 'xE'	Proprietary number
'18' - 'F8'	RFU
'xF'	RFU

Add the following sentence after table 11 (renumbered to table 15):

"The value '88' of the cascade tag CT shall not be used for uid3 in double size UID."

Page 20, subclause 6.4.4 (renumbered 6.5.4)

Replace figure 11 (renumbered to figure 12) with the following and add the following note after new figure 12:

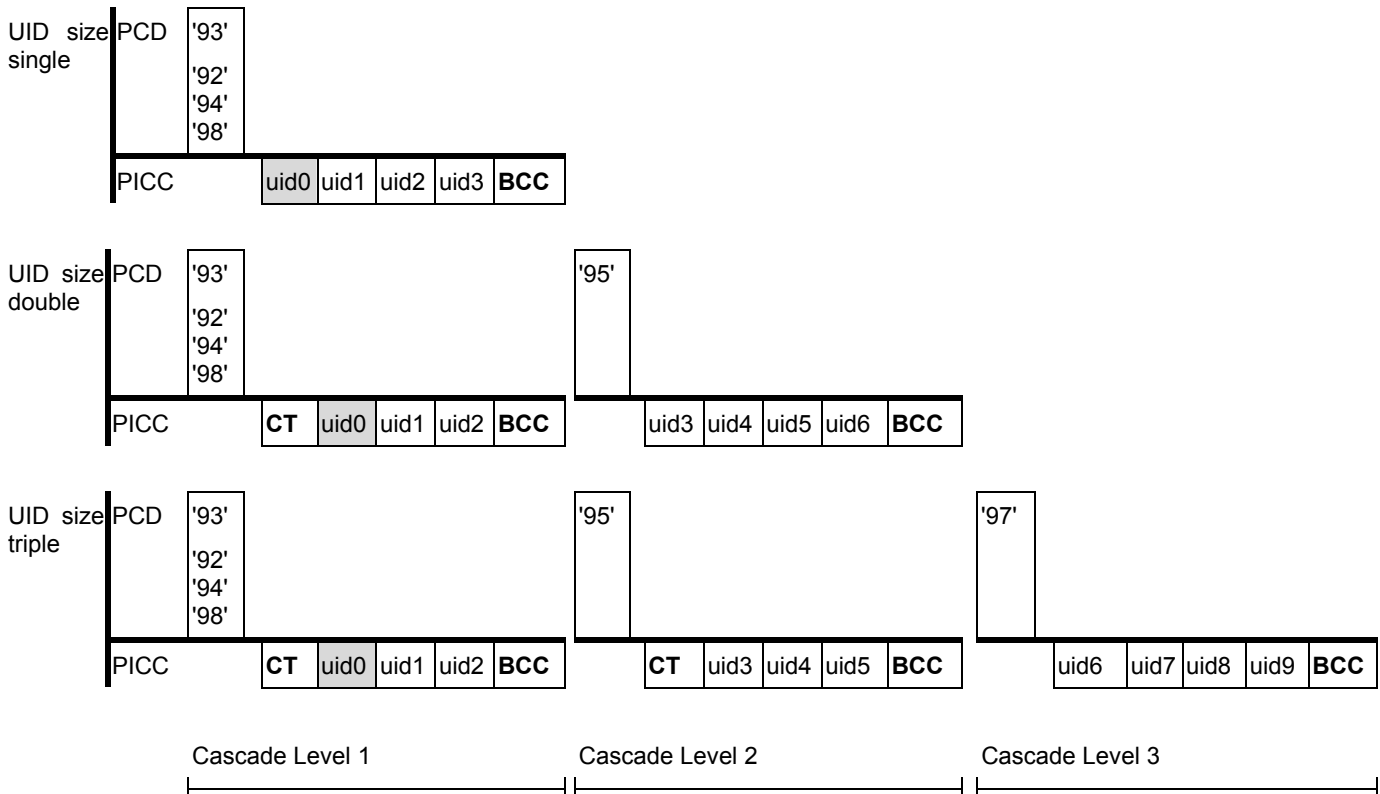


Figure 12 — Usage of cascade levels

NOTE The SEL values '92', '94' and '98' are optional and may be used to switch to bit rates of $fc/64$, $fc/32$ and $fc/16$.

Page 21, subclause 7.1.1:

Replace the last sentence by the following text and table. Note that subclause 7.1.1 includes a new table 16 and consequently all following tables shall be renumbered.

"From PCD to PICC, bit boundaries within a character shall occur between $(n - 0,125)$ etu and $(n + 0,125)$ etu where n is the number of bit boundaries after the start bit falling edge ($1 \leq n \leq 9$).

From PICC to PCD, bit boundaries within a character shall only occur at nominal positions of rising or falling edges of the subcarrier as specified in ISO/IEC 14443-2:

Table 16 — Bit boundaries from PICC to PCD

	PICC to PCD bit rate			
	$\frac{fc}{128}$ (1 etu = 8/fs)	$\frac{fc}{64}$ (1 etu = 4/fs)	$\frac{fc}{32}$ (1 etu = 2/fs)	$\frac{fc}{16}$ (1 etu = 1/fs)
Bit boundaries from PICC to PCD	$n \text{ etu} \pm 1/fs$	$n \text{ etu} \pm 1/(2fs)$	$n \text{ etu}$	$n \text{ etu}$

Page 21, subclause 7.1.2

Replace the existing text by the following:

“A character is separated from the next one by the extra guard time EGT.

The EGT between 2 consecutive characters sent by the PCD to the PICC shall be between 0 and 6 etu (not necessarily an integer number of etu).

The EGT between 2 consecutive characters sent by the PICC to the PCD shall be between 0 and 2 etu (not necessarily an integer number of etu).”

Page 22, subclause 7.1.6

Replace the 3rd paragraph with the following:

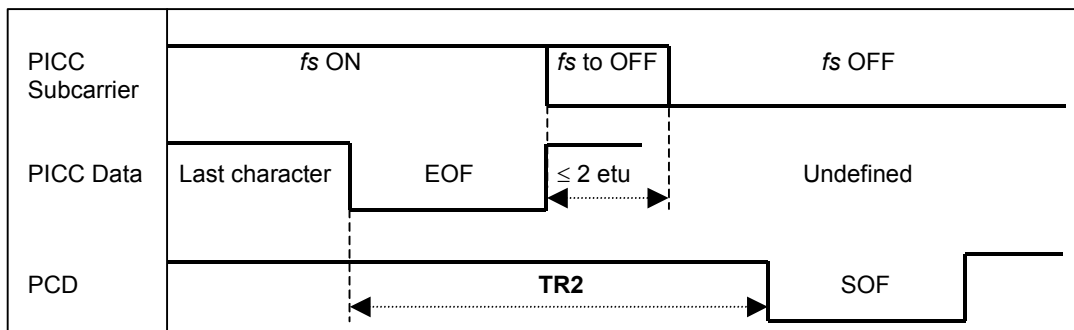
“The maximum value of TR0 is 256/fs for ATQB only and $(256 \cdot 16 / fc) \cdot 2^{FWI} - TR1$ for all other frames (see subclause 7.9.4.3).”

Page 23, subclause 7.1.7

Replace the last sentence with the following:

“The minimum value of TR2 is coded in ATQB by Protocol_type in “Protocol Info” field (see 7.9.4.4).”

Replace the figure 17 (renumbered to figure 18) with the following:



Page 33, subclause 7.9.4.4

Replace subclause with the following. Note that new subclause 7.9.4.4 includes a new table 25 and consequently all following tables shall be renumbered.

"7.9.4.4 Protocol_Type

Table 24 — Compliance with ISO/IEC 14443-4

b1	Meaning
1	PICC compliant with ISO/IEC 14443-4
0	PICC not compliant with ISO/IEC 14443-4

The minimum value of TR2 (delay between PICC EOF start and PCD SOF start) is defined by Protocol_Type bits (b3,b2) as specified in table 25.

Table 25 — Minimum TR2 coding

b3	b2	Minimum TR2 for PICC to PCD bit rate of			
		<i>fc</i> /128 (1 etu = 8/ <i>fs</i>)	<i>fc</i> /64 (1 etu = 4/ <i>fs</i>)	<i>fc</i> /32 (1 etu = 2/ <i>fs</i>)	<i>fc</i> /16 (1 etu = 1/ <i>fs</i>)
0	0	10 etu + 32/ <i>fs</i>	10 etu + 32/ <i>fs</i>	10 etu + 32/ <i>fs</i>	10 etu + 32/ <i>fs</i>
0	1	10 etu + 32/ <i>fs</i>	10 etu + 32/ <i>fs</i>	10 etu + 32/ <i>fs</i>	26 etu
1	0	10 etu + 32/ <i>fs</i>	18 etu	18 etu	18 etu
1	1	10 etu + 32/ <i>fs</i>	14 etu	14 etu	14 etu

b4 is RFU."

Page 33, subclause 7.10

Add the following sentence at the end of the subclause:

"The parameters selected in the ATTRIB command shall apply after the Answer to ATTRIB."

Page 34, subclause 7.10.3.1

Replace table 20 (renumbered to table 28) with the following:

b8	b7	Minimum TR0 for PCD to PICC bit rate of			
		<i>fc</i> /128	<i>fc</i> /64	<i>fc</i> /32	<i>fc</i> /16
0	0	64/ <i>fs</i>	64/ <i>fs</i>	64/ <i>fs</i>	64/ <i>fs</i>
0	1	48/ <i>fs</i>	32/ <i>fs</i>	16/ <i>fs</i>	16/ <i>fs</i>
1	0	16/ <i>fs</i>	8/ <i>fs</i>	4/ <i>fs</i>	4/ <i>fs</i>
1	1	RFU	RFU	RFU	RFU

Page 34, subclause 7.10.3.2

Replace the table 21 (renumbered to table 29) with the following:

b6	b5	Minimum TR1 for PCD to PICC bit rate of			
		<i>fc/128</i>	<i>fc/64</i>	<i>fc/32</i>	<i>fc/16</i>
0	0	80/fs	80/fs	80/fs	80/fs
0	1	64/fs	32/fs	32/fs	32/fs
1	0	16/fs	8/fs	8/fs	8/fs
1	1	RFU	RFU	RFU	RFU