

## Minutes of the 40th meeting of WG8 Task Force 2

held at: Japan Society for the Promotion of Machine Industry (JSPMI), Room 6D4  
3-5-8, Shiba-koen, Minato-ku,  
Tokyo, 105-0011  
Japan  
on: 3<sup>rd</sup> and 4<sup>th</sup> June 2013

### Participants:

Pascal ROUX	Convener	
Reinhard MEINDL	Austria	
Erich REISENHOFER	Austria	
Michael STARK	Austria	
Franck BRICOUT	France	
Jean-Paul CARUANA	France	
Christophe CATALDO	France	
Stéphane JOBARD	France	
Jean-Luc MERIDIANO	France	
Klaus FINKENZELLER	Germany	
Michael HEGENBARTH	Germany	
Florian PETERS	Germany	
Peter RAGGAM	Germany	
Uwe SCHNABEL	Germany	
Hemy ITAY	Israel	
Tomoyuki EMURA	Japan	
Yoshiaki KANEKO	Japan	
Hiroshi KARIBE	Japan	
Kenichi NAKAMURA	Japan	
Satoshi SAWAMURA	Japan	(Observer)
Hiroo SHIMIZU	Japan	
Yoshihisa TAKAYAMA	Japan	
Keisuke UCHIDA	Japan	(Observer)
Maksimiljan STIGLIC	Slovenia	
Chris STANFORD	UK	
Terry SCHINDLER	USA	
Hauke MEYN	NFC Forum liaison	

## OPENING OF THE MEETING

1. The convener opened the fortieth meeting of WG8 Task Force 2 by welcoming all the participants. He expressed special thanks to JBMIA (Japan Business Machine and Information System Industries Association) for the organisation of this meeting.

## ROLL CALL

2. During the roll call, the convener asked all the participants to introduce themselves and to indicate their affiliations.

## REVIEW OF THE MEMBERSHIP LIST

3. An attendance register was circulated during the meeting. The TF2 membership is mentioned in the document WG8 SD2. The regular delegates are requested to register as TF2 members (through their national bodies) to get access to the TF2 documents.

## ADOPTION OF THE AGENDA

4. The agenda (document TF2 N777) was agreed with no addition.

## APPROVAL OF THE LAST MEETING MINUTES

5. The minutes of the thirty-ninth TF2 meeting in Paris (document TF2 N771) were approved.

## REVIEW OF AVAILABLE DOCUMENTS

6. The documents submitted before and during this meeting were as follows:

TF2 N770	CD ISO/IEC 10373-6:2011/Amd.x — Identification cards — Test methods — Part 6: Proximity cards — AMENDMENT x: Frame with error correction	(Project editor)
TF2 N771	Minutes of the 39 <sup>th</sup> meeting of WG8/TF2 Paris, France – 28 <sup>th</sup> , 29 <sup>th</sup> and 30 <sup>th</sup> January 2013	(TF2 convener)
TF2 N772	Proposal for ISO/IEC 10373-6 Additional Test Methods for PICCs supporting Active and/or Passive Transmission (Update of document TF2 N763)	(NXP)
TF2 N773	RFU contribution	(EMVCo)
TF2 N774	RFU Analysis	(Infineon)
TF2 N775	Disposition of comments on TF2 N773	(WG8)
TF2 N776	Calling Notice for the 40 <sup>th</sup> meeting of WG8/TF2 Tokyo, Japan – 3 <sup>rd</sup> and 4 <sup>th</sup> June 2013	(WG8 secretariat)
TF2 N777	Agenda of the 40 <sup>th</sup> meeting of WG8/TF2 Tokyo, Japan – 3 <sup>rd</sup> and 4 <sup>th</sup> June 2013	(TF2 convener)

TF2 N778	WD ISO/IEC 14443-3/Amd.4 (v2) — Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 3: Initialization and anticollision — AMENDMENT 4: Handling rule of RFU bits	(Project editor)
TF2 N779	WD ISO/IEC 14443-4/Amd.5 (v1) — Identification cards — Contactless integrated circuit cards - Proximity cards — Part 4: Transmission Protocol — AMENDMENT 5: Handling rule of RFU bits	(Project editor)
TF2 N780	Measurements on carrier stability	(HID, Bundesdruckerei)
TF2 N781	Contribution on R2 values at $H_{max}$	(ACS)
TF2 N782	WD ISO/IEC 10373-6/Amd.x — Identification cards — Test methods — Part 6: Proximity cards — AMENDMENT x: Improvement of PICC and PCD test methods	(Project editor)
TF2 N783	WD ISO/IEC 10373-6/COR2 — Identification cards — Test methods — Part 6: Proximity cards — TECHNICAL CORRIGENDUM 2: Correction of annexes G and H	(Project editor)
TF2 N784	WD ISO/IEC 14443-3/COR1 — Identification cards — Test methods — Part 6: Proximity cards — TECHNICAL CORRIGENDUM 1: Type A / Type B influence, frame delay time and frame waiting time	(Project editor)
TF2 N785	WD ISO/IEC 10373-6/COR2 — Identification cards — Test methods — Part 6: Proximity cards — TECHNICAL CORRIGENDUM 2: Correction of annexes G and H (Update of document TF2 N783)	(Project editor)
TF2 N786	AFNOR comment on ISO10373-6:2011	(France)
TF2 N787	Liaison letter to JTC1/SC17/WG8 - Clarification on ISO/IEC 14443 electromagnetic disturbance handling	(NFC Forum)
TF2 N788	PICC phase drift analysis tool	(Infineon)
TF2 N789	Reference PICC for Active Modulation	(Infineon)
TF2 N790	RFU usage within standards Suggestions for categorization and a split based on meaning	(NXP)
TF2 N791	EMD limit proposal for additional classes	(Infineon)

## R2 VALUES

7. The document TF2 N781 was presented by Pascal Roux. The 6 measured R2 values at  $H_{max}$  were compared with the 6 ranges of values proposed in the document TF2 N758 and inconsistencies were found. As no other contribution on this topic was available, TF2 could not decide on allowed ranges for R2 values at  $H_{max}$ . It is therefore necessary that different experts contribute and provide the actual R2 values at  $H_{max}$  they measure on their Reference PICCs (not proposed ranges), so that TF2 may finalise the allowed ranges during next TF2 meeting.

**Action 1** Measure actual R2 values for the 6 Reference PICCs at corresponding  $H_{max}$  with DC voltage of 3 V, resonance frequency of 19 MHz and using the test PCD assembly 1 or 2 depending on the Reference PICC

## **IMPROVEMENT OF PICC AND PCD TESTS IN ISO/IEC 10373-6, ANNEXES G AND H**

8. The working draft technical corrigendum to ISO/IEC 10373-6 (document TF2 N785) and the document TF2 N786 were presented by Stéphane Jobard and discussed by TF2 with the following main results:

- the PICC may chain and send S(WTX) requests in any scenario and at any time; the PICC-test-apparatus will adapt accordingly by adding the necessary steps (R(ACK) and S(WTX) responses) to continue the scenarios as specified,
- the PCD may chain, send S(PARAMETERS) requests and send test presence check commands in any scenario and at any time; the PCD-test-apparatus will adapt accordingly by adding the necessary steps,
- if a PICC never uses any S(WTX) block, scenarios using TEST\_COMMAND3 will not be applicable,
- if a PICC never uses chaining (e.g. because this PICC only send responses not exceeding 16 bytes), scenarios using TEST\_COMMAND2 will not be applicable.

The procedure was then discussed and a large number of delegates were in favour of balloting two independent documents, both relative to ISO/IEC 10373-6: a technical corrigendum to deal with corrections and an amendment to deal with improvements.

9. The working draft technical corrigendum to ISO/IEC 10373-6 was finalised and transmitted to WG8 to be balloted as soon as possible and integrated in the new ISO/IEC 10373-6 edition.

10. The working draft amendment to ISO/IEC 10373-6 will be finalised during next TF2 meeting. Only written comments on precise parts of the document will be discussed. Parts with no comments will not be discussed again before submitting the working draft to WG8 for CD ballot decision.

**Action 2** Check the working draft amendment to ISO/IEC 10373-6, annexes G and H (document TF2 N782) and comment the parts which should be discussed again during next TF2 meeting (preferably at least one week before the meeting)

11. The working draft technical corrigendum to ISO/IEC 14443-3 (document TF2 N784) was presented by Stéphane Jobard and discussed by TF2 with the following main results:

- clarification of "frame" and "command" when unexpected or considered as errors,
- clarification of the definition of frame error and transmission error,
- clarification of PICC Type A behaviour in READY\* and ACTIVE\* state,
- correction of S(DESELECT) and S(PARAMETERS) frame waiting time in Type B.

The working draft technical corrigendum to ISO/IEC 14443-3 was finalised and transmitted to WG8 to be balloted as soon as possible.

## **PICCS WITH EXTERNAL POWER SUPPLY**

12. The document TF2 N780 was presented by Florian Peters. The carrier frequency stability of a PCD was measured by different methods which do not reveal phase drift issues. It is therefore concluded that:

- the carrier frequencies produced by common PCDs are stable,
- there is no need to add a margin of 5° between PICC requirement and PCD requirement on phase drift,
- the Test PCD assembly carrier frequency stability shall be verified,
- the two measurement methods (spectrum analyzer / oscilloscope) can be used, but the oscilloscope method requires a large memory (a 4096 byte frame at a bit rate of  $f_c/128$  can result in 25 million samples, using a rate of less than 100 million samples per second).

**13.** Michael Stark confirms that the common PCDs do not show any significant phase drift. PICCs can therefore be measured after having measured the Test PCD assembly (precondition).

**14.** PCDs shall be measured to check their carrier frequency stability. Until the PCD and PICC measurement uncertainties are known, TF2 recommends keeping the 5° margin. In order to limit the sampling memory size, PCDs could be measured on several 50 ms periods to check if there is a drift, with extrapolation on the duration of the maximum frame size which can be received at a bit rate of  $f_c/128$ .

**15.** The document TF2 N788 was presented by Peter Raggam. This document proposes a method to measure the phase drift of a PICC during its response. In brief, the calibration coil and sense coil voltages are measured and filtered to get an image of the Test PCD assembly and DUT currents. Then, the PCD induced signal is removed from the PICC measured signal (which is important at high field strength). After that, the periods with no PICC active modulation are removed. Finally, the phase drift over time is calculated using Hilbert transformation. This method was compared with the one presented during last TF2 meeting (document TF2 N754) and both were considered usable.

**16.** The PICC parameter to be measured ("loaded state", "unloaded state", "loaded states 1 and 2") was then discussed at length and it was finally agreed that the relevant PICC parameter is the modulation seen by the PCD. This modulation is a (filtered) alternation between two PICC states and it was said that:

- most "passive" PICCs alternate between a "loaded state" and an "unloaded state",
- most "active" PICCs alternate between either:
  - a "loaded state" (active generation of a 13,56 MHz PICC current) and an "unloaded state" (no active generation of PICC current), or
  - a first "loaded state" and a second "loaded state" (with opposite phase),
- any PICC compliant to ISO/IEC 14443-2 (i.e. with passive or active modulation) may alternate between a first "loaded state" and a second "loaded state" (both with any amplitude and/or phase).

In the latter case, the measurement of the phase drift of the first "loaded state" only is not sufficient to guarantee the proper PCD reception, because the phase of the modulation seen by the receiver also depends on three additional parameters:

- the amplitude of each "loaded state",
- the phase of the second "loaded state".

A change in any of these three additional parameters may also result in a change of the modulation seen by the receiver, and therefore in possible reception problems.

17. The PICC test method will be adapted to measure the difference between the two PICC states during the PICC modulation.

The phase measurement of the "loaded state" on very short modulation periods ( $1/2f_s$ ) will also be measured because these periods may correspond to unsynchronized PICC carrier frequency, causing phase drift.

18. The PCD test method agreed during previous TF2 meeting (document TF2 N771, 12) was reviewed and clarified in order to limit the multiplication of tests (slow, fast and very fast phase drifts, positive and negative phase drifts, various initial phases, maximum and minimum load modulation amplitude, Reference PICCs 1 to 6 in different positions of the corresponding PCD operating volume).

The Reference PICC quality factor could also be modified to produce any modulation shape from a square (low Q) to a sinus (high Q). It was agreed to produce a square modulation (alternation between 2 states) and to use only one Q factor in the Reference PICC.

The agreed test conditions are:

- initial phase:  $-35^\circ$ ,  $-90^\circ$  and  $-145^\circ$ ,
- phase drift:
  - "slow" positive phase drift of  $+35^\circ$  over the whole Reference PICC frame,
  - "slow" negative phase drift of  $-35^\circ$  over the whole Reference PICC frame,
  - "fast" alternating phase drift of  $\pm 35^\circ$  over each group of 4 or 8 subcarrier cycles, always starting with the initial phase (only for Type A at a bit rate of  $f_c/128$ ),
  - "very fast" alternating phase drift of  $\pm 35^\circ$  over each "active" period of  $1/2f_s$  or  $1/f_s$ , always starting the modulation period with the initial phase,
- load modulation amplitude: maximum and minimum defined for the field strength of the tested position.

This gives:

- 24 test conditions for each Reference PICC in each tested position for Type A at a PICC to PCD bit rate of  $f_c/128$ ,
- 18 test conditions for each Reference PICC in each tested position for any other combination of type and PICC to PCD bit rate.

19. The document TF2 N789 was presented by Peter Raggam. This document proposes a Reference PICC schematic based on the existing one which adds the active modulation in parallel with the main coil. If possible, this new Reference PICC will replace the existing one, but if this is not possible, the new Reference PICC will only be used for new tests.

Test results show that this new tool is able to generate any initial phase while keeping the same modulation amplitude.

The signal generation may be done using by one of the following devices:

- an arbitrary waveform generator with external input, to produce the modulated signal,
- a vector signal generator synchronized with the PCD carrier to modulate it with an IQ external signal.

20. The working draft amendment on test methods for active modulation should be finalized during next TF2 meeting.

**Action 3** The project editor will prepare the working draft of the amendment to ISO/IEC 10373-6 on this topic a few weeks before next TF2 meeting.

## ELECTROMAGNETIC DISTURBANCE

21. The document TF2 N787 was presented by Hauke Meyn. The "PICC quiet time" definition was discussed and clarified. The complex present definition of the "PICC quiet time" comes from two original definitions :

- the PCD deaf time (a fixed time during which the PCD shall ignore any EMD or PICC answer),
- the PCD recovery time (a fixed maximum time for the PCD to recover from EMD).

All details are in the document TF2 N574.

22. The document TF2 N791 was presented by Peter Raggam. The EMD limit proposal for classes 2 and 3 is the same as the current EMD limit for "Class 1". The EMD limit proposal for classes 4, 5 and 6 is very similar (twice the value of the current EMD limit for "Class 1", measured on Test PCD assembly 2 which approximately doubles the LMA and EMD measurements). The ratio between the load modulation amplitude limits and the proposed EMD limits is approximately 10 for "Class 1" and only 3,5 for "Class 6".

23. However, while doing nothing, the Reference PICC 1 produces some noise close to the limit. Besides, at high field strength the oscilloscope generates more noise (because of a different attenuator). There is therefore a measurement problem to pass the noise floor precondition test, and a PICC Class 1 with a regulated voltage of 6 V DC would fail the test, even if doing nothing.

To overcome this problem, it was proposed to:

- use a high range spectrum analyser,
- reduce the measurement bandwidth,
- increase the EMD limit,
- test the noise floor precondition with the Reference PICC adjusted to 3 V instead of 6 V,
- measure PCDs immunity with noise and not with a "start of frame".

**Action 4** Contributions to resolve this measurement problem are requested.

**Action 5** A project editor is still needed for an amendment on this topic

## RFU VALUES AND MEANINGS IN WG8 STANDARDS

24. The document TF2 N790 was presented by Hauke Meyn. The term "RFU" is used with different meanings:

- fixed, when a modification breaks the backward compatibility,
- reserved, to keep the backward compatibility,
- unimportant, to be ignored, including proprietary.

To preserve the future, the behaviour of receivers must be defined as much as possible.

**25.** The document TF2 N778, taking into account the modifications agreed during previous WG8 ad-hoc meeting, was presented by Kenichi Nakamura and reviewed by TF2, including the possible PCD behaviour after ATQA reception. The working draft amendments to ISO/IEC 14443-3 and to ISO/IEC 14443-4 were finalised.

#### **DEFINITION OF PCD HMAX TEST IN ISO/IEC 10373-6 WITH ALL REFERENCE PICCS**

**26.** This topic was not discussed for lack of contributions. The working draft amendments are still needed.

**Action 6** The working draft amendments to ISO/IEC 14443-2 and to ISO/IEC 10373-6 will be prepared by the project editors and posted before next TF2 meeting for finalisation during next TF2 meeting

#### **TEST PLAN INCLUDING ALL PCD AND PICCS REQUIREMENTS DEFINED IN ISO/IEC 14443**

**27.** This topic was not discussed for lack of contributions and time.

**Action 7** Contributions to progress on this topic and finalise the test plan during next TF2 meeting

**Action 8** A project editor is needed to prepare this technical report

#### **PATENTS**

**28.** No patent was declared by any participant on topics which were presented and discussed during this TF2 meeting.

#### **ACTIONS FOR NEXT MEETING**

**29.** See 7, 10, 20, 23, 26 and 27.

#### **NEXT TF2 MEETINGS**

**30.** The forty-first meeting will be held in Singapore, in September 2013, on Monday 23<sup>rd</sup> and Tuesday 24<sup>th</sup>.

Distribution: WG8 and TF2 members

Pascal ROUX