Minutes of the 42nd meeting of WG8 Task Force 2

held at: Hotel Gasthof zur Post
Schmied-v.-Kochel-Platz 6
82431 Kochel am See
Germany
on: 28th, 29th and 30th January 2014

Participants:

Pascal ROUX	Convener	
Josef GRUBER	Austria	(Observer)
Reinhard MEINDL	Austria	
Erich REISENHOFER	Austria	
Michael STARK	Austria	
Franck BRICOUT	France	
Christophe CATALDO	France	
Stéphane JOBARD	France	
Jean-Luc MERIDIANO	France	
Romain PALMADE	France	
Kostas ASLANIDIS	Germany	
Daniel BARTZ	Germany	(Observer)
Klaus FINKENZELLER	Germany	
Michael HEGENBARTH	Germany	
Florian PETERS	Germany	
Uwe SCHNABEL	Germany	
Yoshiaki KANEKO	Japan	
Kenichi NAKAMURA	Japan	
Hiroo SHIMIZU	Japan	
Maksimiljan STIGLIC	Slovenia	
Jose Luis GEIJO-PEREZ	Switzerland	
Ryan BOUDREAU	USA	

OPENING OF THE MEETING

1. The convener opened the forty-second meeting of WG8 Task Force 2 by welcoming all the participants. He expressed special thanks to Giesecke & Devrient 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 N816) was agreed with the following additions:

- Application Profile TR-9303 - ISO/IEC 18745-2,
- S(PARAMETERS): FWT extension, ambiguities,
- Low power PCD.

APPROVAL OF THE LAST MEETING MINUTES

5. The minutes of the forty-first TF2 meeting in Singapore (document TF2 N811) were approved.

REVIEW OF AVAILABLE DOCUMENTS

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

TF2 N811	Minutes of the 41st meeting of WG8/TF2 Singapore – 23rd and 24th September 2013	(TF2 convener)
TF2 N812	Draft Doc9303 Part 10 - Logical Data Structure (LDS) for storage of biometrics and other data in the contactless IC – Normative references	(WG8 convener)
TF2 N813	Draft Doc9303 Part 10 - Logical Data Structure (LDS) for storage of biometrics and other data in the contactless IC – Section 3: Application profile for the contactless IC	(WG8 convener)
TF2 N814	9303 requirements on 14443 compliance	(NXP)
TF2 N815	Proposed Outline of Application Profile of the Contactless Interface as part of Draft 9303-10	(Bundesdruckerei)
TF2 N816	Agenda of the 42nd meeting of WG8/TF2 Kochel am See, Germany – 28th, 29th and 30th January 2014	(TF2 convener)

TF2 N817	Contribution on empty S(PARAMETERS)	(ACS-Xerox)
TF2 N818	WD ISO/IEC 10373-6/Amd.x — Identification cards — Test methods — Part 6: Proximity cards — PICCs supporting active and/or passive transmission	(Project editor)
TF2 N819	Layout and schematic of the active Reference PICC proposal	(NXP)
TF2 N820	Avoid long FWT to get info that no parameters are negotiable	(NXP)
TF2 N821	Phase drift analysis tool	(NXP)
TF2 N822	Phase stability analysis tool	(NXP)
TF2 N823	PCD Phase stability analysis	(Bundesdruckerei, HID, NXP)
TF2 N824	EMD spike probability analysis	(NXP)
TF2 N825	New additional H_{max} test for PICCs – Investigation	(NXP)
TF2 N826	ISO/IEC 14443-2:Amd6 Parameters supporting active and passive PICCs – Comments on amplitude and initial phase criterion	(NXP)
TF2 N827	Active Reference PICC Circuit Analysis	(NXP)
TF2 N828	Phase Drift Analysis Tool	(Project editor)
TF2 N829	Evaluation of passive and active cards	(Infineon)
TF2 N830	S(PARAMETERS)	(Infineon)
TF2 N831	Further consideration on ISO/IEC 14443 Low Power PCD	(Panasonic)

PICCS WITH EXTERNAL POWER SUPPLY

7. No contribution was received on active constant load.

Action 1 Contributions on possible active constant load to replace both the existing passive load and the need of using different resonance frequencies.

8. The document TF2 N827 was presented by Michael Stark. The proposed active Reference PICC circuitry was analysed with the following results, when connected to the existing passive Reference PICC:

- R2 value at H_{max} is not significantly changed,
- R2 value at H_{min} is significantly changed and moved out of the defined range,
- Resonance frequency and quality factor are significantly changed,
- The maximum load modulation amplitude (110 mV) cannot be produced,
- There is a constant bias of 38 mA in the PICC antenna,
- The GND of passive circuitry is negative due to active circuitry.

One conclusion is that the active Reference PICC circuit would have a better behaviour if the passive circuitry was disconnected.

The ultimate goal of the active Reference PICC circuitry was once more discussed and summarised. The active Reference PICC should provide:

- PICC constant load, at the carrier frequency,
- PICC load modulation, with two sidebands,

which results into 6 variables (3 amplitudes and 3 phases).

The generator driving the Reference PICC active circuitry could adjust 4 variables:

- 2 for the constant load (amplitude and phase of the PICC carrier frequency),
- 2 for the load modulation (average amplitude of the 2 sidebands and modulation angle $Ø_{LM}$, or, explained differently, magnitude and phase of MS1-MS2 vector).

The 5th variable is the ratio between the 2 sidebands amplitudes (or, explained differently, the shape of the curve when alternating between MS1 and MS2). It could be adjusted, to a certain extent, with the Reference PICC resonance frequency.

The 6th variable corresponds to a pure delay of the Reference PICC subcarrier signal. It could be adjusted by the generator driving the Reference PICC active circuitry but should not impact the PCD sensitivity measurements.

Action 2 Propose a Reference PICC active modulation circuit which allows load modulation amplitude adjustment in the whole defined range (up to 110 mV) and some constant loading (the existing passive circuitry may be disconnected if necessary).

9. The document TF2 N823 was presented by Michael Stark. All tested PCDs show a phase drift of less than ±5°. Different sample rates were compared and similar results were obtained with sample rates of at least 250 MSample/s, which is therefore the recommended minimum sample rate.

The filter bandwidth was then discussed. The filter has a greater impact on (fast) noise than on (slow) drift; but the risk of bad PCD reception comes more from the drift than the noise. As all PCDs tested with this filter comply with the requirements, TF2 decided to keep a 500 kHz bandwidth filter and a 25 ms analysis window.

10. The document TF2 N828 was presented by Michael Stark. The phase drift analysis tool was explained in detail:

- the notch filter is based on the theoretical value of *fc* which is sufficiently precise to reject the second harmonic 2*fc* based on the actual value of *fc*,
- the calibration coil signal is normalised in amplitude to avoid any influence on the result,
- the transient area between modulation states is defined by an absolute value of the complex correlation signal below 80% while MS1 and MS2 states corresponds to an absolute value of the complex correlation signal above 80%.

The phase drift analysis tool was then validated with test signals and with several active and passive PICCs which showed very high measurement accuracy.

Regarding the magnitude test results, TF2 agreed that ||US-MS1|| must be higher than 0,5x||US-MS2|| because this is the modulation seen by the PCD (on the contrary, "||MS1|| higher than 0,5x||MS2||" is not a valid requirement). Therefore, the magnitude diagrams should be modified accordingly, or the constellation diagram offsets should place the unloaded state (US) in complex position 0.

11. The document TF2 N826 was presented by Michael Stark and the document TF2 N829 was presented by Josef Gruber. The amplitude and phase criteria were then reviewed so that existing compliant passive PICCs are not rejected by the new requirements. It was agreed that:

- (US-MS1), and not MS1, represents the initial load modulation seen by the PCD; a valid requirement, useful for PCDs and consistent with existing passive PICCs is that ||US-MS1|| must be higher than 0,5x||US-MS2||, so that the PCD sees the beginning of the load modulation,
- the phase requirement on MS1 may be difficult to measure when the MS1 amplitude is low and it has not been proven that it would improve interoperability, as no problem has been seen to date: TF2 thinks this phase requirement should be removed.

The proposed text for 2nd CD amendment to ISO/IEC 14443-2 was then updated to reflect this agreement.

Action 3 The project editor will provide a new version of the 2nd CD amendment to ISO/IEC 14443-2 for final review during next TF2 before submission to WG8.

12. The document TF2 N818 (WD amendment to ISO/IEC 10373-6) was presented by the project editor and reviewed. The values of $Ø_{MS1}$ to be used during the PCD load modulation reception test were discussed and it was agreed to keep only the 3 proposed test values (−35°, −90° and −145°) mandatory in order not to increase the number of tests. A note will indicate that other values may be used, e.g. +15°, +65°, +115° and +165° to cover all possible cases.

Action 4 The project editor will update the working draft of the amendment to ISO/IEC 10373-6 on this topic.

EMD REQUIREMENTS FOR CLASSES 2, 3, 4, 5 AND 6

13. The document TF2 N824 was presented by Michael Stark. The precondition test was checked in the worst case (H_{max}) and with some additional external noise to get a noise level close to the limit. The number of spikes above the standard limit was measured on a 32/*fc* window, then on a 1408/*fc* window. The results confirm the values and the method defined in the EMD amendments.

In addition, the effective number of bits (e.g. 10,2 bits for a particular 12-bit oscilloscope) is an important parameter for an oscilloscope to pass the precondition test.

EMD requirements for classes 2, 3, 4, 5 and 6 were not discussed for lack of contributions, but as the precondition test is now clarified, there is no reason not to propose consistent EMD limits.

Action 5 Contributions to propose EMD limits for each new class 2 to 6 (or confirm the limits proposed in document TF2 N791).

Action 6 Check the precondition test for classes 2, 3, 4, 5 and 6.

Action 7 A project editor is still needed for an amendment on this topic.

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

14. The document TF2 N825 was presented by Reinhard Meindl. The loading effect at H_{max} of two limited use tickets was measured higher than the Reference PICC loading effect. Pascal Roux confirmed this result on many different PICCs. TF2 therefore decided to close this topic as it seems unlikely that some PICCs may have a loading effect lower than the Reference PICC loading effect.

TEST PLAN INCLUDING ALL PCD AND PICC REQUIREMENTS DEFINED IN ISO/IEC 14443

15. Although there was no contribution available, this topic was discussed and some progress was made.

The goals of the test plan were clarified as follows:

- ensure that each "shall" in the base standard is actually tested (whether or not a dedicated test method is defined in ISO/IEC 10373-6),
- give a complete list of these tests and the associated conditions (e.g. temperature, values of field, positions in the PCD operating volumes…),
- summarise the results (PASS/FAIL/NA), as already done in tables of annexes G and H of ISO/IEC 10373-6,
- provide guidelines on how to run the test methods on specific devices (e.g. some mobile phones that stop the transaction before the required 10 consecutive I-blocks in the PCD reception test) or at least provide a warning that some PCDs may need a specific test mode to allow some tests to be run,
- the test plan shall not be linked to a specific application,
- the PICC manufacturer shall fill a form to:
  - summarise the PICC features (type, bit rates and all other options) and therefore clarify the tests which are not applicable,
  - indicate a representative test sequence for PICC analog tests (e.g. H_{min} test),
  - define TEST_COMMAND1, TEST_COMMAND2, TEST_COMMAND3 and associated TEST_RESPONSE1, TEST_RESPONSE2 and TEST_RESPONSE3 for PICC digital tests,
- the PCD manufacturer shall fill a from to:
  - summarise the PCD features (bit rates and all other options) and therefore clarify the tests which are not applicable,
  - if the PCD is embedded in a product:
    - indicate a representative test sequence for PCD analog tests (e.g. high bit rate PCD reception),
    - define commands that can be used for PCD digital tests.

It was then discussed whether the test plan should be a technical report or an annex of ISO/IEC 10373-6. The latter option seems a better solution as:

- an annex may be normative,
- reference from every test method to a table in annex will be easier or more logical than reference to a separate technical report.

The content of the future working draft test plan was then discussed. It should include:

- a general introduction/scope clarifying that:
  - a product is compliant only when all applicable tests pass,
  - minimum/maximum temperatures, operating volumes… are specified by the application (or by the manufacturer),
  - test sequences are specified by the application (or by the manufacturer),

- a general explanation of the tables:
  - definition of the columns specifying the tests (test method reference, test temperature, Reference PICC to use, options…),
  - definition of the result columns (PASS/FAIL/NA, comments, ambient temperature value),
- 4 PCD and 4 PICC tables (1+1 for each part of ISO/IEC 14443) with the following columns:
  - test title,
  - test method reference in 10373-6,
  - test conditions:
    - temperature,
    - position (for PCD) or field strength (for PICC),
    - additional specific conditions (number of samples, iterations…),
  - test result (PASS/FAIL/NA),
  - comments (e.g. tests with optional resonance frequencies, remark on the test…).

To keep the test plan tables short and easy to read there will be only one line per test (i.e. per test method), including all test conditions. However, test laboratories may give more details in other parts of their test reports (using other tables or some text) or may duplicate lines of the test plan tables in accordance with all or some test conditions.

At the end of each of the 8 tables, the compliance of the tested samples with the corresponding part of ISO/IEC 14443 could be given: PASS or FAIL.

NOTE Some tests defined in the CEN TC278 test plan should move to ISO/IEC 10373-6, e.g. PCD test sequence, PICC operating field strength test, RFU reception…

Action 8 Stéphane Jobard will prepare a first working draft before next TF2 meeting.

Action 9 A project editor is needed for this test plan.

ISO/IEC 14443 INTEGRATION IN ANY OBJECT

16. This topic was not discussed for lack of contributions. TF2 decided to close this topic.

REVISION OF ISO/IEC 14443-1

17. This topic was not discussed for lack of contributions. Erich Reisenhofer volunteered to be the project editor of this revision, to be confirmed during next WG8.

APPLICATION PROFILE TR-9303 - ISO/IEC 18745-2

18. A contribution will be reviewed during next TF2 then endorsed during next WG8 before submission to WG3.

Action 10 Florian Peters and Stéphane Jobard will prepare this contribution.

S(PARAMETERS): FWT EXTENSION, AMBIGUITIES

19. The documents TF2 N817 and TF2 N820 were reviewed and it was then acknowledged that ISO/IEC 14443-4:2008/Amd.1:2012, 7.2 clearly defines the FWT for S(PARAMETERS). The word "default" should be removed for this value, even if it is the same value as the value used for Type A when TB(1) is omitted.

TF2 decided that no PCD test is needed in case a non-compliant PICC sends an S(WTX) request just after a PCD S(PARAMETERS) request. The error detection and recovery rules defined in ISO/IEC 14443-4:2008, 7.5.6.1 shall be applied by the PCD in such case.

20. The document TF2 N830 was presented by Erich Reisenhofer. The PICC only has 4,8 ms to respond to the PCD S(PARAMETERS) request and may not be able to check the S(PARAMETERS) content for inconsistencies, in particular because S(PARAMETERS) operation is between several communication layers. The same may apply to the PCD as receiver of information, although the PCD does not have to respect a short "response" time.

Action 11 Contributions to clarify this topic in ISO/IEC 14443-4 coming revision.

LOW POWER PCD

21. A Japanese proposal on this topic was discussed during previous SC17 meeting and a New Work Item Proposal on this topic is to be submitted by Japan.

22. The document TF2 N831 was presented by Kenichi Nakamura. 10 years ago, most PICCs and PCDs were dedicated to a single application. Now PICCs and PCDs are implemented in mobile devices with battery and are expected to support multiple applications. Besides, the PICC power consumption depends on the current PICC operation (cryptography, memory write…).

Different ideas were discussed with the following conclusions:

- Using a minimum filed strength below H_{min} (1,5 A/m for classes 1, 2 and 3): this would not provide interoperability with existing PICCs and therefore is considered not acceptable.
- Alternating request commands with low field strength and request commands with the standard minimum field strength H_{min}: this is not strictly forbidden by the present standard, but this is not recommended as the following risks or implementation difficulties were mentioned:
  - if the PCD field strength is rapidly modified, the PICC may have problems (voltage regulation, reception…),
  - transactions may start then stop in the operating volume, unless the field is increased immediately after answer to request (with the above risk),
  - PCD test may become difficult: need to synchronise all PCD tests to the ISO/IEC 14443 compliant part of the polling cycle, new tests procedures to write; in the meantime it can be considered forbidden as tests do not deal with such case.
- Using a reduced unmodulated time (less than 5 ms) before some request commands in the polling cycle: this would not reduce a lot the power consumption and PCD test may become difficult.
- Using the two bits reserved for power level indication in ISO/IEC 14443-4 to optimise the PCD power consumption and prolong the battery life. These two bits were originally defined to

avoid starting transaction too early and maybe for power reduction: they may be defined more precisely if needed but TF2 doubt there would be a large energy saving.

Today, many phones deliver only 0,8 A/m in PCD mode. They are:

- non compliant with H_{min} defined in ISO/IEC 14443-2,
- compliant with H_{min} defined in ISO/IEC 15693-2.

Solutions compliant with ISO/IEC 14443 and already implemented were then pointed out:

- some phones detect the PICC presence with a non ISO/IEC 14443 sensor, then activate the ISO/IEC 14443 field and send request commands,
- without a sensor, request commands may be less frequent, with no field between them, to save power; but the (automatic) detection time increases, unless the field is manually triggered.

PATENTS

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

ACTIONS FOR NEXT MEETING

24. See 7, 8, 11, 12, 13, 15, 18 and 20.

NEXT TF2 MEETINGS

25. The forty-third meeting will be held in Neuchâtel, Switzerland, in April 2014, on Tuesday 8th and Wednesday 9th.

26. The forty-fourth meeting will be held in Madrid, Spain, in September 2014.

Distribution: WG8 and TF2 members

Pascal ROUX