



Open Metering System Conformance Test

Volume 3 Data Link Layer

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Release

Document History

| Version | Date | Comment | Editor |
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| 1.0.0 | 2011-10-11 | Final version | J. Feuchtmeier |
| 1.0.1 | 2012-10-04 | Correction of test items [T31-TIM1] and [T31-ACN1] according to OMS AG3 results | J. Feuchtmeier |
| 2.0.0 | 2013-03-19 | Adaptions to OMS-S V3.00 | J. Feuchtmeier |
| 2.0.1 | 2013-10-30 | Correction of [T31-ACN1] | J. Feuchtmeier |
| 2.0.2 | 2014-08-14 | Test item [T31-TIM1] not mandatory for OMS-CT V2, adopt Table 3 Editorial: change names of test items [T31-TIM2] and [T31-TIM3] in Table 3 according headlines Add [T31-TIM4] as test description | J. Feuchtmeier |
| 3.0.0 | 2014-10-06 | Adopting version number of the OMS-CT to be in line with the corresponding OMS-S version | J. Feuchtmeier |
| | | Asynchronous telegrams shall be detected by the tool [T31-TIM3] | |
| | 2015-02-09 | Test description for DLL Address field | J. Feuchtmeier |
| | 2015-05-08 | Adoption for tolerances between single transmissions [T31-TIM3] | |
| | 2015-09-30 | Interval definition of installation telegrams more concrete | Seeberg |
| | 2015-09-30 | Release Version | J. Feuchtmeier |

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1 Scope

The present document is a part of the Conformance Test Specification used for certification of equipment according to the Open Metering System (OMS) specification.

This issue is applicable only together with [OMSCT-GEN].

- 5 This document specifies the tests to show conformance for the Data Link layer.

The parameters to be tested, and the test limits are based on OMS Specification Volume 2, Primary Communication [OMSS-Vol2], section 2, *Physical Layer*, section 3, data link layer, section 4, application layer, and the referenced Wireless M-Bus specification [EN 13757-4].

Note:

- 10 This version of test specification does not cover all items of the current OMS Specification.

It is not the scope of this document to show conformance to the essential requirements of the R&TTE directive (1999/5/EC), or other national or international standards.

2 References

- 15 The used references are listed in [OMSCT-GEN].

3 Definitions, symbols and abbreviations

The used term definitions, symbols and abbreviations are defined in [OMSCT-GEN] (OMS Open Metering System – Conformance Test Volume 1 – General Part).

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Part 1:

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wireless M-Bus (wMBus)

4 Test item

- 30 All tests shall be done in a low collision scenario. Transmissions of other devices than DUT shall be less than 2% channel occupation.

4.1 [T31-MAC1] MAC Test

The following items shall be tested:

- L-Field
- 35 • CRC
- Channel coding
- Bit Order
- Frame Format and Synchronization sequence
- Preamble length
- 40 ○ Mode T1, T2, S1: short and long preamble
- Mode S2: long preamble

All items shall be conform to [EN 13757-4].

4.2 [T31-ADR1] Address structure

Applies to: unidirectional meter, bidirectional meter, unidirectional repeater, MUC

- 45 It shall be verified that the address of the Link Layer in compliant with the requirements given in Table 1: Valid range for parts of meter addressTable 1:

| Byte number | Content | remark |
|-------------|--------------|--|
| Byte 1..2 | Manufacturer | Binary (binary coded 3-Letter Manufacture ID as listed by Flag association) ¹ |
| Byte 3..6 | Ident number | BCD only (from 00000001 to 99999999) |
| Byte 7 | Version | Binary (from 00h to FEh) |
| Byte 8 | Device type | Binary (all values from [EN 13757-4] Table 3 and [OMSS-Vol2] Table 10) |

Table 1: Valid range for parts of meter address²

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¹ Manufacturer must be listed in [FLAG]. The three letters of Manufacturer ID can be derived by calculation given in [EN13757-3] clause 5.5.

² The content is in different sequence as in [T41-AD1] of [OMSCT-APL]

4.3 [T31-C1] Supported C-fields

Applies to: unidirectional meter, bidirectional meter

The devices shall support C-field 44h and 47h.

55 If installation telegrams are supported (see [OMSCT-ManDec]) C-Field 46h shall be used to transmit installation telegrams.

All C-Fields shall be used only in context with message types according [OMSS-Vol2] Tab6.

4.4 [T31-DC1] Duty Cycle

Applies to: unidirectional meter

60 The duty cycle, as defined in [EN 300 220-1] sub clause 8.10.1, shall comply with the following limits:

S1 mode (meter): Maximum 0,02 %

S2 mode (other): Maximum 1 %

T1 mode (meter): Maximum 0,1 %

65 T2 mode (other): Maximum 1 %

The Duty Cycle of the meter shall be observed over a period of exact 1 h.

The Time Period shall be started with a telegram transmission.

The telegram length determination shall include preamble, coded message part and checksum's of all telegrams within the observation period.

70 4.5 Transmission intervals of meters

4.5.1 [T31-TIM1] Data telegram

Applies to: unidirectional meter, bidirectional meter

It shall be verified by using a sniffer tool that:

- 75 ▪ the device under test sends meter data (C-field = 44h) at least every (7,5, 30 or 240) minutes (depending on media) (refer to [OMSS-Vol2], Tab 1)
- The maximum tolerance of 10 received individual transmissions are $\leq 40\%$ of the stated transmission interval (refer to [OMSCT-ManDec]):

$$\frac{MAX(T_1...T_9) - MIN(T1...T9)}{T_set} \leq 40\%$$

- 80 • The typical tolerance of 10 received individual transmissions is $\geq 1\%$ of the stated transmission interval (refer to [OMSCT-ManDec]):

$$\frac{\sum_{i=1}^9 T_i}{9} * \frac{1}{T_set} \geq 1\%$$

- The standard deviation of 10 received individual transmissions is $\geq 12\%$ of the stated transmission interval (refer to [OMSCT-ManDec]):

$$StdDev(T_1...T_n) * \frac{1}{0,2 * T_set} \geq 12\%$$

Abbreviation's for all calculations of [T31-TIM1]:

- T_set: stated transmission interval in [OMSCT-ManDec]
- T_n: measured transmission interval (n= 1...9)
(over 10 transmissions)
- StdDev: standard deviation
- MIN: minimal value
- MAX: maximal value

4.5.2 [T31-TIM2] Installation telegram

Applies to: unidirectional meter, bidirectional meter

If the [OMSCT-ManDec] defines Installation telegram as active this test has to be passed.

It shall be verified by using a sniffer tool that:

- the device under test sends installation telegram (C-field = 46h) with an interval of 30 to 60 seconds
- installation telegrams shall be transmitted a least 6 times, stopping no later than 60 minutes after the manual start event

4.5.3 [T31-TIM3] Synchronous transmission

Applies to: unidirectional meter, bidirectional meter

Reference: OMS, Vol2, Issue 3.0.1 / 2011-01-29, chapter 2.2.2.1

Test of Manufacturer Declaration:

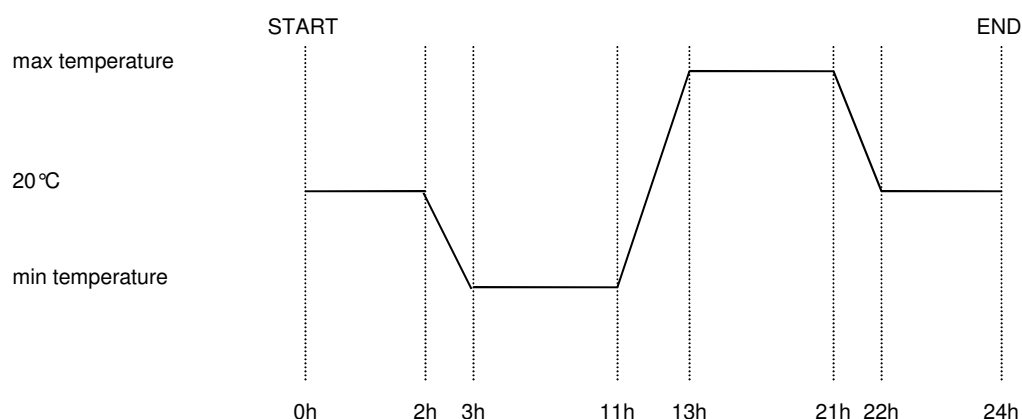
- T_{nom} must be defined by manufacturer (in Manufacturer Declaration)
- T_{nom} must be $N \times 2$ seconds with $N > 1$ and

| Mode | max T_{nom} |
|--------|---------------|
| S-Mode | 90 min |
| T-Mode | 15 min |

- Min and max test-temperatures are the operation temperatures, and must be declared in the R&TTE test report.
- For device types 04h (heat), 05h (steam), and 0Ch (heat, volume measured at flow temperature inlet) the manufacturer must state whether the device is used for "district heating" or "sub metering". Depending on this information the maximum average update interval is set.
- Statement of the manufacturer whether the DUT sends asynchronous transmission or not.

The following steps shall be run through for the test:

1. Initialize DUT and set it to begin with transmissions
2. Place DUT in temperature chamber. Set start-temperature to 20 °C.
- 125 3. Wait until temperature in chamber has stabilized.
4. Set Ident. Nr., manufacturer, version, and device type of DUT in test-tool. Using this information the test-tool shall only monitor the DUT. Other devices shall not be monitored.
5. Start the test-tool and monitor the transmissions for at least 24 hours.
 - 130 • Accept only devices with the defined identification and message types SND_NR (44h), ACC-DMD³ (48h) or ACC-NR (47h)
 - Transmissions must be monitored with a time-resolution of 1ms.
 - Deviation of the time of the test-system compared to world-time must not exceed 0.1s over 24h.
- 135 6. During test, cool and heat the DUT using the following ramp:

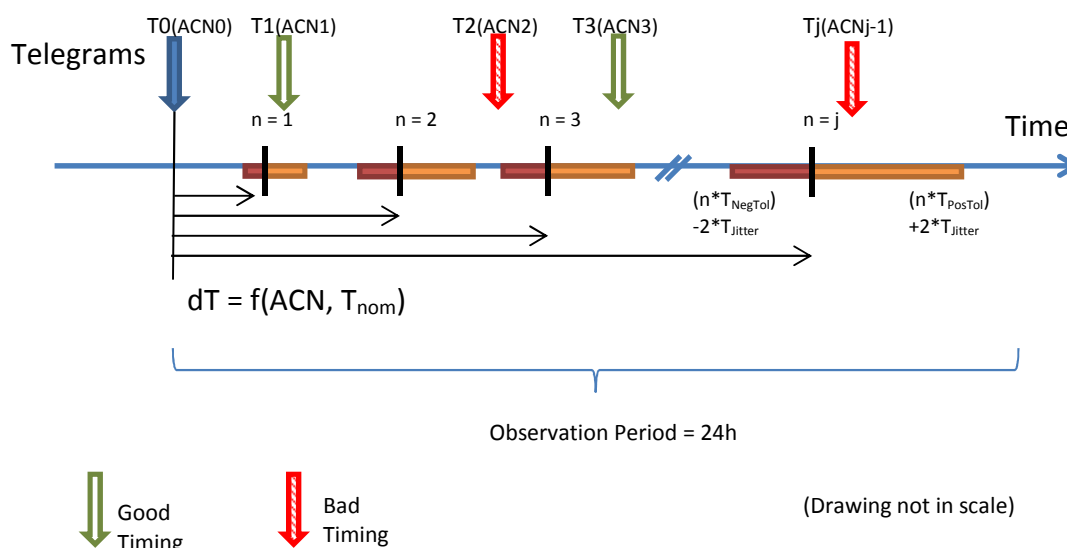


Min and max temperatures are taken from the R&TTE report.

Keep relative humidity below 10%.

7. After monitoring, analyze received transmissions:
 - 140 a. Check the allowed tolerance by the following scheme over the observation period:

³ ACC-DMD can only be used for bidirectional devices



(ACN0 was chosen deliberately and could have any other number.)

The time between synchronous transmissions with set S-bit in Configuration Word shall be:

$$T_{TX}(n+1) = T_{TX}(n) + T_{ACC}(n+1)$$

$$T_{ACC}(n+1) = (1 + (|ACC-128| - 64) / 2048) \times T_{nom}$$

The tolerance for T_{TX} must be

- $T_{PosTol} = +110$ ppm
 $T_{NegTol} = -30$ ppm
for operating temperatures within range -15 ... +65 °C
- $T_{PosTol} = +230$ ppm
 $T_{NegTol} = -30$ ppm
for all other

The tolerance for T_{TX} shall be in tolerance (T_{PosTol} , T_{NegTol}) for two **consecutive** transmissions.

The operating temperature is taken from the R&TTE report.

The additional jitter for T_{TX} must be:

- non accumulative
- $T_{Jitter} = \pm 1$ ms for $T_{nom} < 300$ sec
- $T_{Jitter} = \pm 3$ ms otherwise

If at least one time-interval is out of tolerance → ERROR

- Check the tolerances between adjacent transmissions using the tolerances described above.

If time-interval is out of tolerance → ERROR

- 170 c. Check whether for every synchronous transmission the access counter was incremented by one.
Otherwise → ERROR
- If a synchronous transmission is omitted by the device under test or missed by the sniffer tool, then the access counter must be incremented by one as if the transmission had occurred.
- 175 d. If the OMS-CT Tool detects asynchronous transmissions (S-bit not set in Configuration Word) then:
Confirm that asynchronous transmissions do not alter the access counter.
Otherwise → ERROR
- 180 e. Check whether the rate of omitted synchronous transmissions over a (sliding) 24hour period does not exceed 6.25%.
Otherwise → ERROR
- During test no other transmitters shall interfere with the test condition.
- 185 f. Check whether a synchronous transmission with message type SND-NR is transmitted in a time-interval less or equal to T_{update} (depending on metering media, see Table 2).
Otherwise → ERROR
- 190 g. If synchronous transmissions with message types ACC-NR (or ACC-DMD) are transmitted in between of synchronous transmissions with message type SND-NR then:
- Count the number of transmissions with types ACC-NR (or ACC-DMD) that are transmitted in between of synchronous transmissions with message type SND-NR.
 - 195 • Check whether the ratio $n/1$ for ACC-NR (or ACC-DMD) to SND-NR telegrams does not change and is within 0/1 to 15/1.
Otherwise → ERROR

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| Metering media | Media number | Average update interval maximum [min], T_{update} |
|----------------------------|------------------------------|--|
| Electricity | 02h | 7.5 |
| Gas | 03h | 30.0 |
| Heat (district heating) | 04h, 05h, 0Ch | 30.0 |
| Water / Warm water | 06h, 07h, 15h, 16h, 17h | 240.0 |
| Heat cost allocators | 08h | 240.0 |
| Heat / Cold (sub metering) | 04h, 05h, 0Ah, 0Bh, 0Ch, 0Dh | 240.0 |
| Repeater | 32h | 240.0 |

Table 2: Update interval of consumption data for different media

4.5.4 [T31-TIM4] Transmission of static messages

Applies to: unidirectional meter, bidirectional meter

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If the [OMSCT-ManDec] defines Installation telegram as active this test has to be passed.

It shall be verified by using a sniffer tool that:

- The device under test sends at least 2 static telegrams within a test period of 24 hours
- The static messages are signaled by the Config field according [OMSS-Vol2] ch.4.2.5.4 Tab.12.

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4.6 Access number

4.6.1 [T31-ACN1] Access number meter generic

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Applies to: unidirectional meter, bidirectional meter

It shall be verified using a sniffer tool that the access number of at least 6 transmissions in a row of the device under test is incremented by 1 from one new synchronous transmission to the next.

It has to be verified that the Access Number is increased by at least one at least once in the visualisation interval given in [OMSS-Vol2] Table 1.

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It shall be verified using a sniffer tool that all SND-IR messages sent after a manual installation start event are using the same access number as used in the latest new telegram.

Appendix A: Applicable Test cases of OMS-CT (Normative)

1. Test cases of Wireless M-Bus devices

| Test case | Description | UDM ¹⁾ | BDM ²⁾ | UDR ³⁾ | MUC ⁴⁾ |
|---|--|-------------------|-------------------|-------------------|-------------------|
| [T31-MAC1] | MAC Test | X | X | X | X |
| [T31-ADR1] | Address structure | X | X | X | X |
| [T31-C1] | Supported C fields | X | X | | |
| [T31-DC1] | Duty Cycle | X | | | |
| [T31-TIM1] | Transmission intervals of meters: Data Telegram | | | | |
| [T31-TIM2] | Transmission intervals of meters: Installation Telegram | X | X | | |
| [T31-TIM3] | Transmission intervals of meters: Synchronous Transmission | X | X | | |
| [T31-TIM4] | Transmission of static messages | | | | |
| [T31-ACN1] | Access number generic | X | X | | X |
| <p>Note:</p> <p>X This Test case is mandatory</p> <p>1) UDM = Unidirectional Meter</p> <p>2) BDM = Bidirectional Meter</p> <p>3) UDR = Unidirectional Repeater</p> <p>4) MUC = Multi utility communication controller</p> | | | | | |

Table 3: Test Cases related to DUT type

