



Open Metering System Specification

Requirements for OIMS use case support

**Annex M to
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M.1 General

M.1.1 Scope

The [OMS-S2] defines requirements to be fulfilled by OMS devices. Beside these requirements, the OMS device may also support additional use cases described in this annex.

If the manufacturer declares the support of a use case in the [ManDec], then the OMS device shall fulfil all respective requirements in this annex in order to pass the tests in the [OMS-CT]. Additionally, if at least one bidirectional use case (see OMS-UC-00) is declared, the use case OMS-UC-00 shall also be supported.

M.1.2 Description of a General Understanding of Roles for Use Cases

The general roles of the market players according to the European legislation for the internal energy markets are described in [OMS-S1] 3.1 and Annex A.

To process a use case, the role-owner requires appropriate system related rights and the required metering point related information such as Ident. No. and related communication and application access rights.

It is not in the scope of this document to allocate any use cases to any market roles. It is the responsibility of the market players to execute the roles as needed and to distribute the correlated communication and application keys accordingly.

The use cases and their related security requirements described in this document will provide a tool-set of functions for the different market players to fulfil their roles.

Each use case defines security requirements for the meter/actuator and a set of KeyIDs as defined in [OMS-S2], 9.2.2. Security profiles protecting applicative functions are defined in [OMS-S2], 9.1. The meter/actuator shall fulfil these requirements in order to serve and react according to the use case. However, it is not up to the individual meter/actuator to allocate and distribute the various rights to each user.

M.1.3 Unidirectional Modes (wireless M-Bus)

Unidirectional operation modes are only supported by wireless meters/actuators. In this mode the meter/actuator frequently transmits datagrams containing meter/actuator identification together with meter/actuator data.

M.1.4 Bidirectional Modes

Bidirectional meters/actuators provide the possibility of a gateway to meter communication.

For wireless meters the EN 13757-4 defines rules how to access such meters (EN 13757-4:2019 subclause 12.6.3).

The accessibility of wired meters is defined in Annex P.

A bidirectional wireless meter/actuator additionally applies unidirectional communication sequences like SND-NR. Parts of a use case or a complete use case can be fulfilled by unidirectional sequences.

The minimum requirement for a meter/actuator to support bidirectional use cases is to process one command per message. Sending several commands per message is not recommended and may lead to an unexpected behaviour of the meter/actuator.

M.1.5 Commands and Command Responses

This chapter provides general information on command handling related topics. It explains communication rules and the possibility to recognise successful or not successful commands.

The gateway may send commands to the meter/actuator. After the command execution, the gateway may request the command response. The communication partner shall identify a corresponding command response by a matching TPL access number of the meter message (RSP-UD) with the TPL access number of the corresponding request (SND-UD2 or REQ-UD2, see [OMS-S2], 7.2.2).

A successful command results in a command response (acc. to [OMS-S2], 8.2.5). A command response shall either be a dedicated response providing the specified MB-Data-Tags or an unspecific response if there are “no requirements” in the data elements from the meter/actuator. An unspecific response shall be either:

- the standard response,
- a response with other M-Bus tags or
- an empty response.

An empty response shall provide at least one idle filler byte in the application layer (e.g. 2Fh for the M-Bus protocol).

NOTE: The idle filler ensures at least one encrypted block in case of encryption. If no encryption is applied, the idle filler ensures that the application layer is not empty.

A not successful command results in an error response (acc. to [OMS-S2], 8.2.5). An error response contains an error according to [OMS-S2], 8.2, Table 34.

The successful or erroneous execution of the command is also indicated by the status byte of the corresponding ACK/RSP-UD (see [OMS-S2], 7.2.3). As long as the application does not finish the processing of the command the Transport layer shall respond with the command state “application busy”.

Note that the indication of the command state in the status byte is a new feature supported from OMS-Spec. Volume 2 V4.2.1. Devices conforming to an older version of the OMS-specification are responding a “no error” even if the command execution fails. For such devices, the RSP-UD should always be requested.

Annex N provides example datagrams of commands and command responses.

M.1.6 Data Points

The MB-Tags (MB-Data-Tag for data points, MB-Command-Tag for commands) used in this document to describe data points are defined in Annex B.

M.1.7 Basic Communication Sequences

Table M.1 lists the basic uni- and bidirectional Link Layer communication sequences used to implement the OMS use cases. The Link Layer message types used in the sequences between the gateway and the meter/actuator are described as well as the respective error treatment on both sides.

For timing details see EN 13757-4:2019 Annex E. The dependencies of message types are shown in [OMS-S2], Table 12 and Table 13.

Table M.1 – Basic Link Layer communication sequences

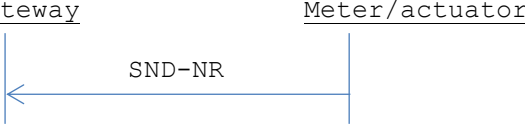
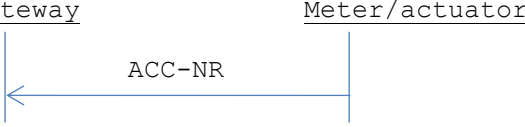
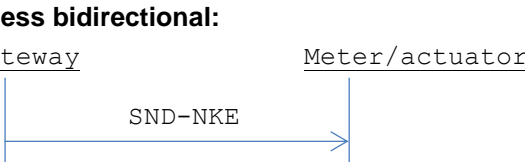
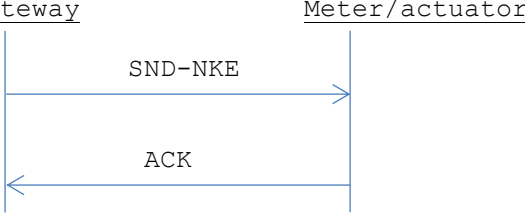
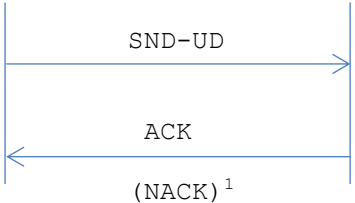
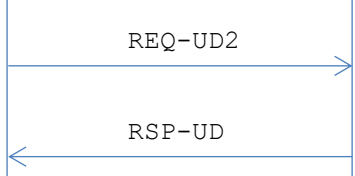
Sequence name	Description	Wireless unidir.	Wireless bidir.	Wired
Seq_SND-NR	<p style="text-align: center;">  </p> <p><u>Description:</u> Transmits standard data in wireless communication. Informs about the accessibility of a wireless meter/actuator.</p>	X	X	
Seq_ACC-NR	<p style="text-align: center;">  </p> <p><u>Description:</u> Informs about the accessibility of a wireless meter/actuator. May be used by unidirectional wireless meters/actuators to maintain the synchronous transmission timing without sending metering data.</p>	X	X	
Seq_SND-NKE	<p>Wireless bidirectional:</p> <p style="text-align: center;">  </p> <p><u>Description:</u> Resets the link and ends the FAC. Each communication session shall be terminated by the gateway sending a SND-NKE. In this document, Seq_SND-NKE is not mentioned explicitly in the description of the use-cases.</p> <p>Wired:</p> <p style="text-align: center;">  </p> <p><u>Description:</u> Presets the internal last received FCB-bit and clears the optional selection bit.</p>		X	X

Table M.1 – Basic Link Layer communication sequences (cont.)

Sequence name	Description	Wireless unidir.	Wireless bidir.	Wired
Seq_SND-UD	<p style="text-align: center;"> <u>Gateway</u> <u>Meter/actuator</u> </p>  <p><u>Description:</u> The gateway sends data or a command to the meter/actuator. The meter/actuator acknowledges the reception of the data or the command (link layer acknowledgement).</p> <p><u>Error treatment gateway (wireless only):</u> As long as the gateway does not receive an ACK or NACK response, it tries to repeat the SND-UD as specified in [OMS-S2], Annex I.</p> <p><u>Error treatment wireless meter/actuator:</u> The meter/actuator responds with a NACK as specified in [OMS-S2], 5.2.3.</p>		X	X
Seq_REQ-UD2	<p style="text-align: center;"> <u>Gateway</u> <u>Meter/actuator</u> </p>  <p><u>Description:</u> The gateway requests the meter's application data. The meter/actuator responds with its application data.</p> <p><u>Error treatment gateway (wireless only):</u> As long as the gateway does not receive an RSP-UD, it tries to repeat the REQ-UD2 (number of repetitions according to Annex I).</p>		X	X

¹ The NACK message is supported by wireless bidirectional meters/actuators only.

Table M.1 – Basic Link Layer communication sequences (cont.)

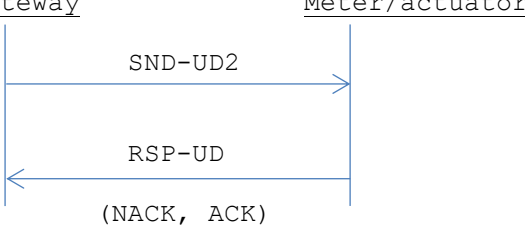
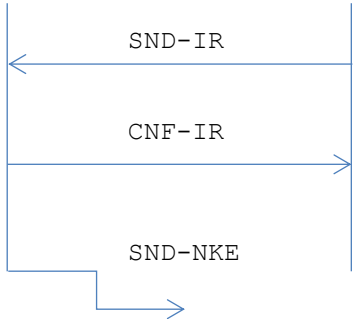
Sequence name	Description	Wireless unidir.	Wireless bidir.	Wired
Seq_SND-UD2	<div style="text-align: center;">  </div> <p><u>Description:</u> The gateway sends data or a command to the meter/actuator. The meter/actuator responds with its application data. This sequence may replace the combination of a SND-UD – ACK and a subsequent REQ-UD2 - RSP-UD sequence. A meter/actuator implementing this sequence shall also support the combination of a SND-UD – ACK and a subsequent REQ-UD2 - RSP-UD sequence.</p> <p><u>Error treatment gateway (wireless only):</u> As long as the gateway does not receive a RSP-UD or NACK response, it tries to repeat the SND-UD2. If the meter/actuator responds with ACK, the gateway shall assume that the meter/actuator does not support SND-UD2 and thus retry with SND-UD.</p> <p><u>Error treatment meter/actuator (wireless only):</u> The meter/actuator responds with a NACK as specified in [OMS-S2], 5.2.3.</p>		X	X
Seq_SND-UDx	This sequence can be implemented <ul style="list-style-type: none"> • either by the combination of a Seq_SND-UD and a subsequent Seq_REQ-UD2 • or by the Seq_SND-UD2 		X	X

Table M.1 – Basic Link Layer communication sequences (cont.)

Sequence name	Description	Wireless unidir.	Wireless bidir.	Wired
Seq_SND-IR	<div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <u>Gateway</u> <u>Meter/actuator</u> </div>  <p><u>Description:</u> The meter/actuator sends an installation request to the gateway. The gateway may confirm with a CNF-IR in case it accepts the meter's installation request, see [OMS-S2], 5.2.5. The SND-NKE may be received by an installation tool.</p>	X	X	

M.1.8 Application Protocols

The message types SND-UD, SND-UD2 or RSP-UD are used in different use cases and in different application protocols. The following table introduces the name of the application protocol and its meaning according to the definitions of [OMS-S2], Table 1.

Table M.2 – Application protocols

Name of Application protocol	Explanation (refer to [OMS-S2] Table 1)	CI-Field for Wireless M-Bus	CI-Field for Wired M-Bus
App-Select	Command “Application Reset or Select” followed by some subfield to select a special application	53h	50h
App-Reset	Command “Application Reset or Select” without some subfield used to reset application to standard response	53h	50h
App-Error	Response “Application Error” signalling an error in command execution	6Eh, 6Fh	70h
Dev-Select	“Selection of Device” used for secondary addressing	-	52h
MBus-Cmd	Command of M-Bus protocol	5Bh	51h, 5Ah
MBus-Data	Response of M-Bus protocol	7Ah ,72h	72h
Clock-Sync	Command of Clock Synchronization protocol	6Ch, 6Dh	6Ch, 6Dh
ITP-Cmd	Command of Image Transfer protocol	C0h	C0h
ITP-Rsp	Response of Image Transfer protocol	C1h, C2h	C2h
SITP-Cmd	Command of Security Information Transport protocol	C3h	C3h
SITP-Rsp	Response of Security Information Transport protocol	C4h, C5h	C5h

M.2 Functional Requirements per Individual Use-Case

M.2.1 Description

The tables in the following chapters list the functional requirements (like data items and protocols) for the respective use-case.

M.2.2 [OMS-UC-00] Conformance Test (mandatory)

OMS-UC-00 is designed to check the bidirectional functionality of an OMS device according to [OMS-S2], 8.2.5 during the OMS conformance test. Therefore this use case becomes mandatory if at least one other bidirectional use case is implemented. These are all use case of this annex except the use case:

- UC-01 and
- UC-07 (in case data are provided only by unidirectional communication sequences).

The OMS Conformance Test command is an extension of the standardised remote control command according to [EN13757-3:2018], Annex E.2.

The first parameter byte RC1 has during conformance test a fix value to disable all radio specific tests (see [EN13757-3:2018] Tables E.8 to E10).

The second parameter byte RC2 shall be according to Table M.3.

Table M.3 – OMS-CT Value RC2

b7	b6	b5	b4	b3	b2	b1	b0
0 ^a	0 ^a	1 ^a	1 ^a	Function of OMS-CT command (see "Value RC2" in Table M.4)			
^a reserved for future use							

The OMS conformance test command allows following test functions:

Table M.4 – OMS conformance test command

Name	MB-Command tag acc. to Annex B	Set of values			Response of test device	Access rights
		Value RC1	Value RC2	Test function		
OMC-CT command	XCT1	40h/ C0h ^a	30h	Application error	The parameter value 30h shall intentionally not be supported. The meter shall react with an application error 15h acc. to [OMS-S2], 8.8.	R
		40h/ C0h ^a	31h	Empty or standard response	The device responds the typical unspecific response acc. to M.1.5.	R
		40h/ C0h ^a	32h	Test response short	The device responds this MB-Tag with a fix 2 byte pattern '42h 42h'	R
		40h/ C0h ^a	33h	Test response long	The device responds this MB-Tag with a pattern N times '43h', where N must be selected in a manner that the response corresponds to the maximum supported datagram length that can be transmitted.	R
		40h/ C0h ^a	34h	Test command long	The sender transmits test pattern ^b in a datagram with max. package size acc. to [OMS-S2], 5.2.2 The receiver shall respond with the last 4 byte of the test pattern sequence.	R
		40h/ C0h ^a	35h.. 3Fh	Reserved for future use		-
^a Bit7 in RC1 is currently marked as reserved in EN13757-3:2018. The meter shall support the OMS-CT command independent of this bit state and responds the same RC1 value. ^b The applied test pattern in the command shall be in the range 20h to 7Eh. (Type LVAR according to EN13757-3:2018, Table 5).						

The OMS conformance test command shall be applied according to Table M.5.

Table M.5 – Requirements for OMS-UC-00; OMS CT command

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [Mbus-Cmd]	Seq_SND-UDx [Mbus-Cmd]
Data elements to the meter/actuator	MB.Command-Tag: <ul style="list-style-type: none"> XCT1! 	
Data elements from the meter/actuator	MB-Data-Tag: <ul style="list-style-type: none"> CT1!, the value depends on command function (see Table M.4). 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38, Encryption and Authentication according to [OMS-S2], Table 36 Optionally, the device may apply Application security with: <ul style="list-style-type: none"> ASP10 according to [OMS-S2], Table 40 BCF=20h/A0h acc. to [EN13757-7:2018], Table A.3 PID=01h acc. to [EN13757-7:2018], Table A.14 KeyID=1Fh TargetTime set to "zero" (3000000000_h) for immediate action 	
NOTE: If the device supports ASP10, it may refuse the execution of the OMS-CT command without application security to protect against misuse of the OMS conformance test command.		

The lifetime of the OMS CT response shall be like any other command response acc. to [OMS-S2], 8.2.5.

Table M.6 provide examples of the M-Bus records in the command and related response message with OMS conformance test commands.

Table M.6 – Example sequences of OMS conformance test command/response

Test function	Command (hex)	Response (hex)
Test response short	02 FD 9F 1D 40 32	04 FD 9F 1D 40 32 42 42
Test response long	02 FD 9F 1D C0 33	0D FD 9F 1D A1 C0 33 43 ... 43 (A0 times 43)
Test command long	0D FD 9F 1D 50 40 34 6E 6D 6C ... 25 24 23 22 21	06 FD 9F 1D 40 34 24 23 22 21

M.2.3 [OMS-UC-01] Meter Registration

Meter registration is the process of detecting new meters/actuators and registering a meter/actuator to a master (see [OMS-S2], 8.2.2).

If a wireless meter/actuator receives a valid CNF-IR it may stop the transmission of SND-IR even if less than 6 times SND-IR has been sent.

Table M.7 – Requirements for OMS-UC-01; requirements for Meter Registration

Functional	Wireless	Wired
Communication sequences unidirectional	Seq_SND-IR (manually initiated)	n.a.
Communication sequences bidirectional	Seq_SND-IR (manually initiated)	Primary addresses: Seq_REQ-UD2 [MBus-Data] or Secondary address: Seq_SND-UDx [Dev-Select, MBus-Data] or Wildcard searching procedure: Seq_SND-UDx [Dev-Select, MBus-Data]
Data elements to the meter/actuator	Not applicable	MB-Data-Tag: <ul style="list-style-type: none"> • ID1! (optional)
Data elements from the meter/actuator	No requirements	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38, Encryption and Authentication according to [OMS-S2], Table 36	



M.2.4 [OMS-UC-02] Reserved

This use case is reserved for future usage.

M.2.5 [OMS-UC-03] Disconnection & Reconnection

This use case describes how a gateway obtains or sets control state of a disconnector (breaker or valve).

Devices such as breakers or valves can switch the flow of a medium. Such devices (disconnectors) share their current physical status with DC2! (output state) and their internal status of the control object with DC1! (control state). The master shall use XDC1! as content of a SND-UD to change the control state.

Two different types of disconnectors are available.

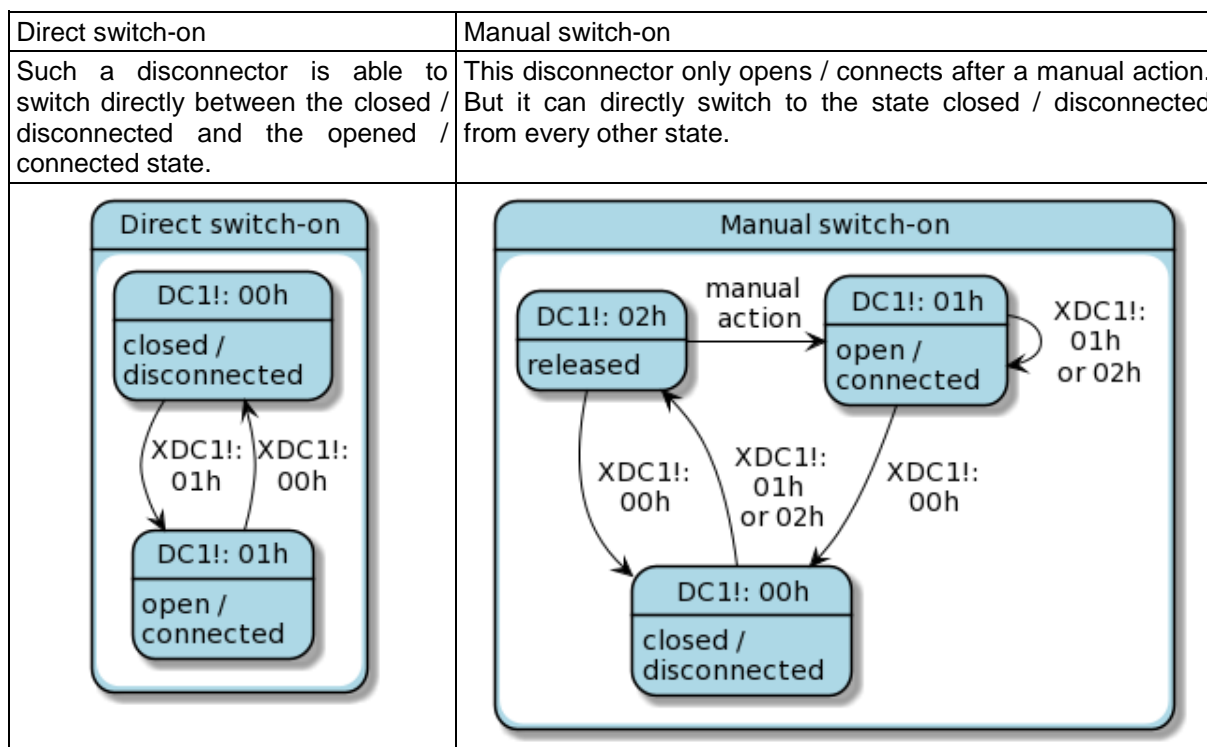


Figure 1 – Disconnector overview

Figure 1 shows the control states of the disconnector only.

For a disconnector, as the typical actuator, the maximum time interval between transmissions shall be the same as the maximum update interval for meter transmissions of the same medium (i.e. electricity or others) as shown in [OMS-S2], 4.3.2.2.

The disconnector states shall be applied according to the following definitions:

Table M.8 – State definitions

Name	MB- Tag acc. to Annex B	Set of values			Access rights
		Value	Valve	Breaker	
Internal state of the disconnector control object	DC1!	00b	closed	disconnected	R
		01b	opened	connected	R
		10b ^a	released	released	R
Output state of the disconnector	DC2!	00b	closed	disconnected	R
		01b	opened	connected	R
Set control state of disconnector	XDC1!	00b	close	disconnect	W
		01b	open	connect	W
		10b ^a	release	release	W

^a Service is only available for type “Manual switch-on”.

If the disconnecter functionality is a function of a meter (using the device type of a meter), subunit 1 shall be used in data information block (according to [EN 13757-3:2018], Annex C.3).

Table M.9 delivers the current states of the breaker / valve according to [EN13757-3:2018], Annex C.3

Table M.9 – Requirements for OMS-UC-03; get state information

Functional	Wireless	Wired
Communication sequences unidirectional	Seq_SND-NR	n.a.
Communication sequences bidirectional	Seq_SND-UDx [App-Reset, MBus-Data]	Seq_SND-UDx [App-Reset, MBus-Data]
Data elements to the meter/actuator	No requirements	
Data elements from the meter/actuator	MB-Data-Tag: <ul style="list-style-type: none"> • DC1! (control state) • DC2! (output state) The MB-Data-Tags shall be presented in the RSP-UD (standard response) and in SND-NR (except static messages).	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38, Encryption and Authentication according to [OMS-S2], Table 36	

The new state of breaker / valve can be set by using described M-Bus command according to Table M.10.

Table M.10 – Requirements for OMS-UC-03; set control state

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [Mbus-Cmd]	Seq_SND-UDx [Mbus-Cmd]
Data elements to the meter/actuator	MB.Command-Tag: <ul style="list-style-type: none"> • XDC1! 	
Data elements from the meter/actuator	MB-Data-Tag: <ul style="list-style-type: none"> • DC1! (control state) • DC2! (output state) 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38, Encryption and Authentication according to [OMS-S2], Table 36 Application security shall be applied with: <ul style="list-style-type: none"> • ASP10 according to [OMS-S2], Table 40 • BCF=20h/A0h acc. to [EN13757-7:2018], Table A.3 • PID=01h acc. to [EN13757-7:2018], Table A.14 • KeyID=20h • TargetTime set to "zero" (3000000000_h) for immediate action; TargetTime for a delayed action can optionally also be supported ^a 	
^a A not supported TargetTime value shall be replied with a SITP status response using value 23h, "Data structure content error: TargetTime error".		

M.2.6 [OMS-UC-04] Clock Management

This use case describes the synchronisation of the clock of a meter/actuator, which can only be applied for bidirectional communicating meters/actuators. It can be provided by adjusting or by absolute setting of the clock.

Both ways apply the Clock Synchronisation Protocol (see [OMS-S2], clause 8.7). The “Reserved” and “Command verification” fields of this protocol are optional and should be ignored in case they are provided.

Adjust Clock Time

The Adjust Clock Time command allows the device to correct the internal clock without time leaps and thus without the loss of time-controlled events. Time taken for adjustment of the clock depends on individual implementation, but shall be completed within 12 hours after reception of the Adjust Clock Time command. To validate the setting a readout after 12 hours is recommended.

As only one Adjust Clock Time command can be active, a further Adjust Clock Time command shall be not accepted as long as a previous adjustment is in process. In this case, an Adjust Clock Time command shall be ignored and replied with the Application error 10h (“Command cannot be executed at this time”).

Adjust Clock Time can use two parameter formats:

- “Time adjustment”
- “Time correction”

Time adjustment adds or subtracts a number of seconds. Therefore, it is necessary to request the current device time in advance for calculating the time deviation. For deviations up to ± 60 seconds (respectively ± 1 minute), the command processing shall be applied. Larger deviations shall not be accepted, the command shall be ignored and replied with the Application error 15h (“Parameter is missing or wrong”). This may lead to further time adjustment commands (after another 12 hours) until the desired time is reached.

Time correction provides an absolute time with the expected device time. This procedure is optimized for a broadcast approach. The meter/actuator has to calculate the deviation between the expected time and the current internal time. Only a maximum of ± 60 seconds (respectively ± 1 minute) shall be applied even if the calculated deviation is larger. This may lead to further time correction commands (after another 12 hours) until the desired time is reached.

NOTE: The maximum deviation of 60 seconds within 12 hours limits the maximum time variation.

The execution of the Adjust Clock Time command however shall not impact the synchronous transmission timing limits according to [OMS-S2], 4.3.2 and [EN13757-4:2019], 12.6.2.

The Adjust Clock Time command can be initiated either by the gateway or by the Head-End. Both variants provide different security levels. The gateway applies transport layer security only. The Head-End uses additional application layer security.

Set Date and Time

The Set Date and Time command allows the meter/actuator clock to be set to any desired time. It is seen as more critical than the Adjust Clock Time command and can only be provided by the Head-End with application layer security using a different key than the Adjust Clock Time command. An absolute setting of the meter’s/actuator’s clock shall be

processed immediately and, if necessary, should stop a currently running Adjust Clock Time command.

Applicable Use Cases

Only one of the listed use cases shown in Table M.11 shall be active. The meter/actuator may offer several use cases to be selected by configuration. The respective use case number has to be provided in the ManDec.

Table M.11 – Requirements for OMS-UC-04; Allowed combinations of functions

Use case number	Function			
	Read Time	Adjust Clock Time by Gateway	Adjust Clock Time by Head-End	Set Date and Time by Head-End
OMS-UC-04a	x	x		
OMS-UC-04b	x	x	x	x
OMS-UC-04c ^a	x		x	x
^a It shall be ensured that a meter/actuator providing “Adjust Clock Time by Head-End” does not accept a command “Adjust Clock Time by Gateway”.				

Table M.12 – Requirements for function ”Read Time”

Functional	Wireless	Wired
Communication sequences unidirectional	Seq_SND-NR	n.a.
Communication sequences bidirectional	Seq_SND-UDx [App-Reset, MBus-Data]	Seq_SND-UDx [App-Reset, MBus-Data]
Data elements to the meter/actuator	No requirements	
Data elements from the meter/actuator	MB-Data-Tag: <ul style="list-style-type: none"> DT1! The MB-Data-Tags shall be presented in the RSP-UD (standard response) and in SND-NR (except static messages).	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38, Encryption and Authentication according to [OMS-S2], Table 36	

Table M.13 – Requirements for function “Adjust Clock Time by Gateway”

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [Clock-Sync]	Seq_SND-UDx [Clock-Sync]
Data elements to the meter/actuator	Clock Synchronization Protocol according to [OMS-S2] 8.7, shall support both functions: <ul style="list-style-type: none"> • “Time adjustment” (TC-field 01h or 02h and time format type J) • “Time correction” (TC-field 03h and time format type J)^a 	
Data elements from the meter/actuator	No requirements	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38, Encryption and Authentication according to [OMS-S2], Table 36.	
^a This value is currently not covered by EN 13757-3:2018. TC = 03 _h defines a time correction with an absolute time applying CI-Field 6D _h . The use of “Reserved” and “Command verification” fields of EN 13757-3:2018 Table E.14 are optional.		

Table M.14 – Requirements for function “Adjust Clock Time by Head-End”

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [Clock-Sync]	Seq_SND-UDx [Clock-Sync]
Data elements to the meter/actuator	Clock Synchronization Protocol according to [OMS-S2] 8.7, shall support both functions: <ul style="list-style-type: none"> • “Time adjustment” (TC-field 01h or 02h and time format type J) • “Time correction” (TC-field 03h and time format type J)^a 	
Data elements from the meter/actuator	No requirements ^d	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38, Encryption and Authentication according to [OMS-S2], Table 36. Application security shall be applied with: <ul style="list-style-type: none"> • ASP10 according to [OMS-S2], Table 40. • BCF=20h/A0h acc. to [EN13757-7:2018], Table A.3 • PID=04h acc. to [EN13757-7:2018], Table A.14^c • KeyID=21h • TargetTime = 3000000000_h (immediate action)^b 	
^a	This value is currently not covered by EN 13757-3:2018. TC = 03 _h defines a time correction with an absolute time.	
^b	A not supported TargetTime value should be replied with a SITP status response using value 23h, “Data structure content error: TargetTime error”.	
^c	The APDU shall only consist of TC-Field and respective time format. The use of “Reserved” and “Command verification” fields of EN 13757-3:2018 Table E.14 are optional.	
^d	A SITP status response (DSI 22) shall be responded.	

NOTE: The applied application security profile ensures that a command will be executed only once even if the message has been received several times (see EN13757-7:2018, A.9.1).

Table M.15 – Requirements for function “Set Date and Time by Head-End”

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [Clock-Sync]	Seq_SND-UDx [Clock-Sync]
Data elements to the meter/actuator	Clock Synchronization Protocol according to [OMS-S2] 8.7, only function “Time setting” with TC-field 00h and time format type I shall be supported.	
Data elements from the meter/actuator	No requirements ^c	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38, Encryption and Authentication according to [OMS-S2], Table 36. Application security shall be applied with: <ul style="list-style-type: none"> • ASP10 according to [OMS-S2], Table 40. • BCF=20h/A0h acc. to [EN13757-7:2018], Table A.3 • PID=04h acc. to [EN13757-7:2018], Table A.14 ^b • KeyID=22h • TargetTime = 3000000000_h (immediate action) ^a 	
^a	A not supported TargetTime value should be replied with a SITP status response using value 23h, “Data structure content error: TargetTime error”.	
^b	The APDU shall only consist of TC-Field and respective time format. The use of “Reserved” and “Command verification” fields of EN 13757-3:2018 Table E.13 are optional.	
^c	A SITP status response (DSI 22) shall be responded.	

NOTE: The function “Set Date and Time by HeadEnd” is mainly intended for devices, which may lose their date and time information during operation. It can also be used for initial time setting e.g. in a different time zone.

NOTE: The function “Set Date and Time by HeadEnd” may lead to imprecise time in the meter/actuator due to transmission delays of the command. The residual time deviation can be corrected by the function “Adjust Clock Time”.

M.2.7 [OMS-UC-05] Firmware Update

This use case describes which message sequences will be used for transferring a new firmware to a meter/actuator. To this end, the image transfer protocol as specified in EN 13757-3:2018 Annex I will be used.

The image transfer consists of several phases. A prerequisite is that the new image is first uploaded from a HES system to the gateway and afterwards the gateway will transfer the new image to the meter/actuator. Here will only be described which message shall be used for the image transfer process between the gateway and the meter/actuator.

NOTE: Only the point-to-point Image transfer process is described, i.e. the gateway only transfers an image to one meter/actuator at a time and multicast is not used.

Tables for the different phases of the image transfer process are given in the following sections.

The state command and response can be used in any phase of the process to check the current status. The possible states are listed in EN 13757-3:2018 Table I.29. It is recommended to use it especially at the end of phase 2 to check the successful transmission.

Table M.16 – Requirements for OMS-UC-05; State Command & Response

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]
Data elements to the meter/actuator	State Command: See EN 13757-3:2018 Annex I, section I.2.11 <ul style="list-style-type: none"> • Function field 04h • Image Identifier Field: mandatory • Add. Info: optional. 	
Data elements from the meter/actuator	State Response: See EN 13757-3:2018 Annex I, section I.2.12 <ul style="list-style-type: none"> • Function field 84h • Image Identifier Field: mandatory 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication shall be used according to [OMS-S2], Table 36.	

Phase 1: Transfer Preparation

The command sets up the condition for image transfer. The included MAC field allows securing the transmission of the image to the meter/actuator. The meter/actuator shall check the integrity of the image during the image validation step.

Table M.17 – Requirements for OMS-UC-05; Prepare Command & Response

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]
Data elements to the meter/actuator	Prepare Command: See EN 13757-3:2018 Annex I, section I.2.4 <ul style="list-style-type: none"> • Function field 00h • Date and Time: shall not be used • Pace: shall not be used • Size information: mandatory^a • Image Identifier field: mandatory • MAC field: mandatory <ul style="list-style-type: none"> ○ MAC Algorithm ID = 04h ○ KeyID = 18h • Add. Info: optional 	
Data elements from the meter/actuator	Prepare Response: See EN 13757-3:2018 Annex I, section I.2.5 <ul style="list-style-type: none"> • Function field 80h • Image Identifier field: mandatory • Size Information: optional • Add. Info: optional 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption/Authentication shall be used according to [OMS-S2], Table 36. Application security shall be applied with: <ul style="list-style-type: none"> • ASP10 according to [OMS-S2], Table 40 • BCF=20h/A0h acc. to [EN13757-7:2018], Table A.3 • PID=06h acc. to [EN13757-7:2018], Table A.14 • KeyID = 23h • TargetTime = 3000000000h (immediate action)^b 	
^a	The meter/actuator shall support a minimum block size of 190 bytes. Fragmentation by AFL is optional.	
^b	A not supported TargetTime value should be replied with a SITP status response using value 23h, "Data structure content error: TargetTime error".	

Phase 2: Image Transfer

The transfer command is used for the actual transfer of the image. This phase consists of:

- Transferring the complete image from the gateway to the meter/actuator
- Checking the completeness of the image transfer and possibly retransferring missing blocks. This is an iterative process until all image blocks are successfully transferred
- Checking the state of the image transfer

Table M.18 – Requirements for OMS-UC-05; Transfer Command

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UD [ITP-Cmd]	Seq_SND-UD [ITP-Cmd]
Data elements to the meter/actuator	Transfer Command: See EN 13757-3:2018 Annex I, section I.2.7 <ul style="list-style-type: none"> • Function field 02h • Image Identifier Field: mandatory • Block number: mandatory • Remaining: optional • Add. Info: optional. 	
Data elements from the meter/actuator	Transfer Response: See EN 13757-3:2018 Annex I, section I.2.8 <ul style="list-style-type: none"> • Function field 82h • Image Identifier field: mandatory 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication shall be used according to [OMS-S2], Table 36. To reduce the overhead by security elements a fragmentation of larger Image blocks is recommended. In order to ensure end-to-end security from manufacturer to meter/actuator it is recommended to additionally protect the image.	

The completion command is used to check if all the blocks of the image have been successfully transferred. In case the meter/actuator signals that there are blocks missing, the gateway must retransfer the missing blocks.

Table M.19 – Requirements for OMS-UC-05; Completion Command & Response

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]
Data elements to the meter/actuator	Completion Command: See EN 13757-3:2018 Annex I, section I.2.9 <ul style="list-style-type: none"> • Function field 03h • Image Identifier Field: mandatory • Add. Info: optional 	
Data elements from the meter/actuator	Completion Response: See EN 13757-3:2018 Annex I, section I.2.10 <ul style="list-style-type: none"> • Function field 83h • Image Identifier Field: mandatory • Total Number of lost blocks: mandatory • Lost Blocks field: shall only be present if Total Number of lost blocks > 0 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication shall be used according to [OMS-S2], Table 36.	

NOTE: Since the transmission of each block was confirmed by the meter, the gateway may skip the completion check.

Phase 3: Image Validation

According to EN 13757-3:2018 Annex I, section I.1.5 the image validation is triggered by the AMMHES, and forwarded by the gateway to the meter/actuator.

Table M.20 – Requirements for OMS-UC-05; Validate Command & Response

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]
Data elements to the meter/actuator	Validate Command: See EN 13757-3:2018 Annex I, section I.2.13 <ul style="list-style-type: none"> • Function field 05h • Image Identifier Field: mandatory • Add. Info: optional. During this image validation step, the meter/actuator must recalculate the MAC value over the received image and compare this MAC value with the value received in the Prepare Command. Image validation is successful if both MAC values match and additional manufacturer tests are passed. Otherwise, the status will be “Validation failed”.	
Data elements from the meter/actuator	Validate Response: See EN 13757-3:2018 Annex I, section I.2.14 <ul style="list-style-type: none"> • Function field 85h • Image Identifier Field: mandatory 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication shall be used according to [OMS-S2], Table 36.	

Phase 4: Image Activation

According to EN 13757-3:2018 Annex I, section I.1.6 the image activation is triggered by the AMMHES, and forwarded by the gateway to the meter/actuator. The device shall accept an activation command only if image validation in phase 3 has been finished with state “Validation successful”.

Table M.21 – Requirements for OMS-UC-05; Activate Command & Response

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]
Data elements to the meter/actuator	Activate Command: See EN 13757-3:2018 Annex I, section I.2.15 <ul style="list-style-type: none"> • Function field 06h • Image Identifier Field: mandatory • Date and Time: mandatory 	
Data elements from the meter/actuator	Activate Response: See EN 13757-3:2018 Annex I, section I.2.16 <ul style="list-style-type: none"> • Function field 86h • Image Identifier Field: mandatory 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication shall be used according to [OMS-S2], Table 36. Application security profile should be applied with: <ul style="list-style-type: none"> • ASP10 according to [OMS-S2], Table 40 • BCF=20h/A0h acc. to [EN13757-7:2018], Table A.3 • PID=06h acc. to [EN13757-7:2018], Table A.14 • KeyID = 23h • TargetTime = 3080000000h (The Image Transfer Protocol provides an own “Date and Time” field for the image activation.) <p>NOTE: In case Annex E.2 is supported by the meter/actuator, the Application security is not applicable by an IDIS gateway. Otherwise the application of ASP 10 is recommended.</p>	

Optional messages: Terminate Command & Response

The terminate command is used to terminate the image transfer phase or to terminate the whole image transfer process.

Table M.22 – Requirements for OMS-UC-05; Terminate Command & Response

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]	Seq_SND-UDx [ITP-Cmd, ITP-Rsp]
Data elements to the meter/actuator	Terminate Command: See EN 13757-3:2018 Annex I, section I.2.17 <ul style="list-style-type: none"> • Function field 07h • Image Identifier Field: mandatory 	
Data elements from the meter/actuator	Terminate Response: See EN 13757-3:2018 Annex I, section I.2.18 <ul style="list-style-type: none"> • Function field 87h • Image Identifier Field: mandatory 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication shall be used according to [OMS-S2], Table 36. Application security should be applied with: <ul style="list-style-type: none"> • ASP10 according to [OMS-S2], Table 40 • BCF=20h/A0h acc. to [EN13757-7:2018], Table A.3 • PID=06h acc. to [EN13757-7:2018], Table A.14 • KeyID = 23h • TargetTime = 3000000000h (immediate action) ^a NOTE: In case Annex E.2 is supported by the meter/actuator, the Application security is not applicable by an IDIS gateway. Otherwise the application of ASP 10 is recommended.	
^a	A not supported TargetTime value should be replied with a SITP status response using value 23h, "Data structure content error: TargetTime error".	

M.2.8 [OMS-UC-06] Meter Supervision

Status information of the meter/actuator can be obtained by analysing the Status Byte or by interpreting the data points error flags and/or battery lifetime. This use case explains how to get this information and how to clear respective error flags of the meter/actuator.

Table M.23 – Requirements for OMS-UC-06; get status information

Functional	Wireless	Wired
Communication sequences unidirectional	Seq_SND-NR	n.a.
Communication sequences bidirectional	Seq_SND-UDx [App-Reset/App-Select, MBus-Data]	Seq_SND-UDx [App-Reset/App-Select, MBus-Data]
Data elements to the meter/actuator	No requirements	
Data elements from the meter/actuator	MB-Data-Tag: <ul style="list-style-type: none"> • Error flag MM2! or MM3! (mandatory) • Battery life time MM8! (optional). The Status Byte is always present in TPL. The MB-Data-Tags shall be presented in the RSP-UD (standard response) and in SND-NR (except static messages). The Status Byte is always present in TPL.	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication shall be used according to [OMS-S2], Table 36.	

There are two possibilities to clear status information. Either clear dedicated (bitwise) states or clear all possible states. It may not be possible to clear all errors as some can be permanent or the reason for the error is still present. The result can be checked in the command response where the respective data point will be delivered.

Note that clearing a bit in data point error flags may also change the Status Byte whereas there is no chance to clear the Status Byte itself.

Table M.24 – Requirements for OMS-UC-06; clear status information

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [MBus-Cmd, MBus-Data]	Seq_SND-UDx [MBus-Cmd, MBus-Data]
Data elements to the meter/actuator	MB-Command: <ul style="list-style-type: none"> • XMM2! or XMM3! (clear bitwise) • XMM4! (clear all) 	
Data elements from the meter/actuator	MB-Data-Tag: <ul style="list-style-type: none"> • MM2! or MM3! 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication shall be used according to [OMS-S2], Table 36. Application security shall be applied with: <ul style="list-style-type: none"> • ASP10 according to [OMS-S2], Table 40 • BCF=20h/A0h acc. to [EN13757-7:2018], Table A.3 • PID=01h acc. to [EN13757-7:2018], Table A.14 • KeyID=24h • TargetTime = 3000000000h (immediate action) ^a 	
^a A not supported TargetTime value should be replied with a SITP status response using value 23h, "Data structure content error: TargetTime error".		



M.2.9 [OMS-UC-07] Reserved

This use case is reserved for future usage.

M.2.10 [OMS-UC-08] Key Management

This use case describes how to change a key in a wired or wireless meter/actuator.

The key management is separated into three different steps.

1. Transfer of new key material to the meter/actuator.
2. Activate new key and deactivate old key.
3. Optionally, destroy the old key.

The remote key management process requires wrapper keys (WK) in the meter/actuator. This wrapper key must be provided to the meter/actuator and to the operator prior to executing this use case.

All necessary commands for the key management shall use the Security Information Transfer Protocol (according to [EN 13757-7:2018], Annex A). The SITP can only be applied for bidirectional communicating meters/actuators.

To exchange a key at least the first two steps shall be performed. The first step may be skipped, if new key material is already available in the meter/actuator (preloaded in the factory).

The exchange of the master key needs some special treatment as it affects the transport security. Appendix M.A (informative) shows the message flow between the Head End, the Gateway and the meter/actuator for all three steps of master key renewal.

Note 1: If the gateway (or the operator) is not aware of the currently used key material, the SITP can also be used to get a list of active key information. The current key version of the master key can be requested by the gateway with activating the AFL.KI flag in any command (see [OMS-S2], 6.2.2).

Note 2: If a key exchange is requested with an older key version than the current one, then the meter/actuator may refuse the key renewal.

Table M.27 – Requirements for OMS-UC-08; Get list of keys

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [SITP-Cmd, SITP-Rsp]	Seq_SND-UDx [SITP-Cmd, SITP-Rsp]
Data elements to the meter/actuator	<p>Command “Get list of active key information”:</p> <ul style="list-style-type: none"> BCF = 08h acc. to [EN13757-7:2018], Table A.3 <p>Command “Get list of active keys and key counter information”:</p> <ul style="list-style-type: none"> BCF = 09h acc. to [OMS-S2], Annex F, F.A.5 	
Data elements from the meter/actuator	<p>Response “Get list of active key information”:</p> <ul style="list-style-type: none"> BCF = 88h acc. to [EN13757-7:2018], Table A.3 DSI = 21h acc. to [EN13757-7:2018], Table A.5^b <p>Response “Get list of active keys and key counter information”:</p> <ul style="list-style-type: none"> BCF = 89h acc. to [OMS-S2], Annex F, F.A.5^a DSI = 23h acc. to [OMS-S2], Annex F, Table F.A.5^{a, b} 	
Security requirements	<p>Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication according to [OMS-S2], Table 36.</p> <p>Application security shall be applied with:</p> <ul style="list-style-type: none"> ASP01 according to [OMS-S2], Table 40 BCF according to the data elements 	
^a	This value is currently not covered by EN 13757-3:2018.	
^b	Or DSI = 22h in case of an error	

Table M.28 – Requirements for OMS-UC-08; Transfer of key material

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [SITP-Cmd, SITP-Rsp]	Seq_SND-UDx [SITP-Cmd, SITP-Rsp]
Data elements to the meter/actuator	Command “Transfer security information”: <ul style="list-style-type: none"> • BCF = 00h acc. to [EN13757-7:2018], Table A.3 • DSI = 01h acc. to [EN13757-7:2018], Table A.5 • DSH1 = KeyID 10h to 15h acc. to [OMS-S2], 9.2.2 • DSH2 = KeyVersion of DSH1 KeyID • Data structure content: <ul style="list-style-type: none"> ○ “Key” is the transferred key (acc. to [EN13757-7:2018], A.8.3). ○ “Target Time” = 3080000000h (Setting “invalid” in order to avoid immediate key activation.) ○ “Key ID” is the KeyID of the transferred key ○ “Key Version” is the KeyVersion of the transferred key, KeyVersion shall be managed by AMMHES. This means KeyVersion = FFh is not allowed. 	
Data elements from the meter/actuator	Response “Transfer security information”: <ul style="list-style-type: none"> • BCF = 80h acc. to [EN13757-7:2018], Table A.3 • DSI = 22h acc. to [EN13757-7:2018], Table A.5 	
Security requirements	Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication according to [OMS-S2], Table 36. Application security shall be applied with: <ul style="list-style-type: none"> • ASP01 according to [OMS-S2], Table 41 	

Table M.29 – Requirements for OMS-UC-08; Activation/Deactivation of key material

Functional	Wireless	Wired
Communication sequences unidirectional	n.a.	n.a.
Communication sequences bidirectional	Seq_SND-UDx [SITP-Cmd, SITP-Rsp]	Seq_SND-UDx [SITP-Cmd, SITP-Rsp]
Data elements to the meter/actuator	<p>Command “Combined activation/deactivation of security information”:</p> <ul style="list-style-type: none"> • BCF = 04h acc. to [EN13757-7:2018], Table A.3 • DSI = 03h acc. to [EN13757-7:2018], Table A.5 • DSH1 = KeyID 10h to 15h acc. to [OMS-S2], Table 39 • DSH2 = KeyVersion of DSH1 KeyID • Data structure content: <ul style="list-style-type: none"> ○ “Target Time” = 3000000000h (immediate action) ○ “Activated Key ID” shall be set acc. to [OMS-S2], 9.2.3 ○ “Activated Key Version” is the version number of the new key to be activated ○ “Deactivated Key ID” shall be identical to “Activated Key ID” ○ “Deactivated Key Version” is the version number of the currently active key ○ “Option” shall be set to 1 in case of KeyID=00h (MK) to perform the message counter reset of CM. ○ “Option” should be set to 1 in case of KeyID>=10h to perform the key counter reset. 	
Data elements from the meter/actuator	<p>Response “Combined activation/deactivation of security information”:</p> <ul style="list-style-type: none"> • BCF = 84h acc. to [EN13757-7:2018], Table A.3 • DSI = 22h acc. to [EN13757-7:2018], Table A.5 	
Security requirements	<p>Selection of Security profile according to [OMS-S2], Table 38. Encryption and Authentication according to [OMS-S2], Table 36. Application security shall be applied with:</p> <ul style="list-style-type: none"> • ASP01 according to [OMS-S2] Table 41 • BCF according to the data elements 	



M.2.11 [OMS-UC-09] Reserved

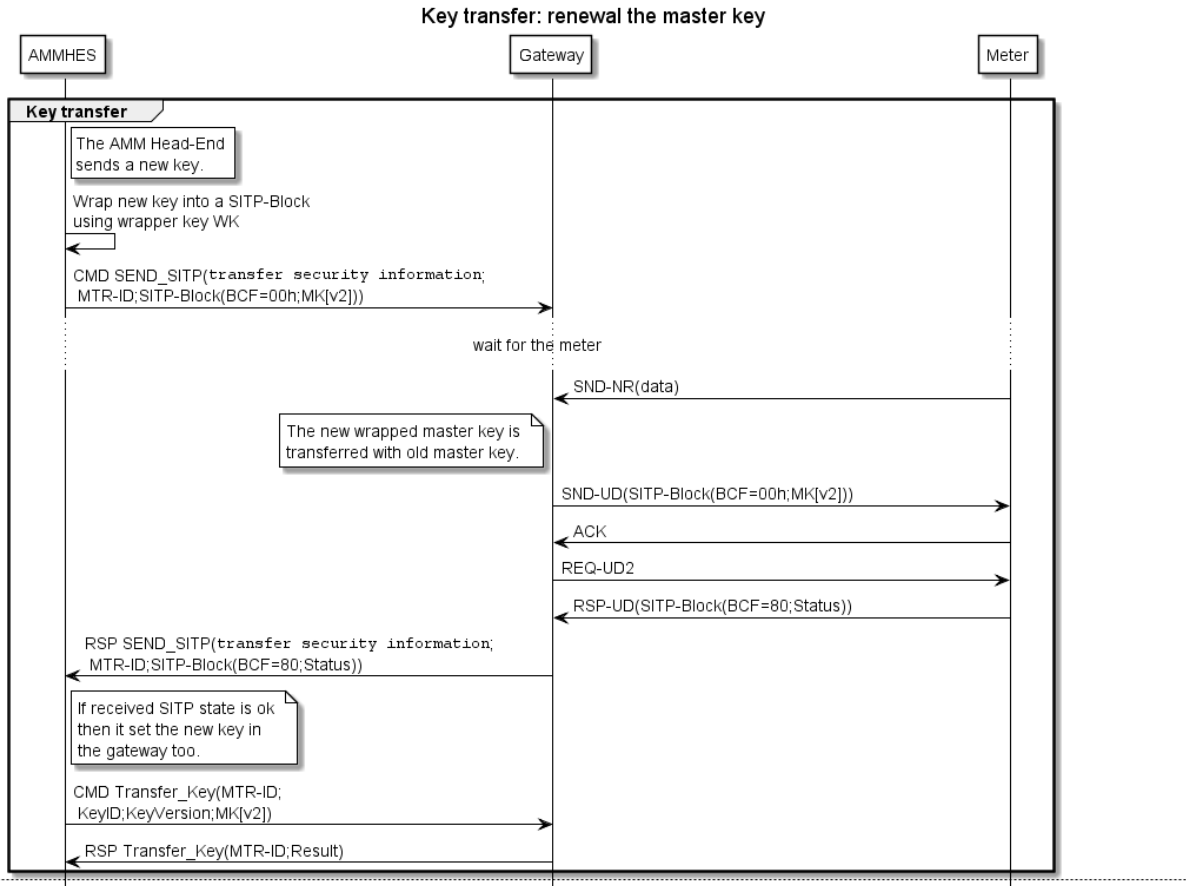
This use case is reserved for future usage.

M.3 References

Ref. Nr.	References
1.	[OMS-S1]: OMS Specification Volume 1, Version 2.1
2.	[OMS-S2]: OMS Specification Volume 2, Version 4.3
3.	[OMS-TR4]: OMS Technical Report “Use Cases”
4.	[ManDec]: see [OMS-S1], Annex A
5.	[OMS-CT]: see [OMS-S1], Annex A

Appendix M.A (informative)

Example for the renewal of the master key [OMS-UC-08]



Key activation of the new master key

