IDIS
Interoperability Specification

Package 3
IP Profile X (extended functionality)

Edition 2.0

EXCERPT

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1. Foreword

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THE USE OF THE IDIS LOGO AND THE IDIS TEST LABEL

The IDIS logo is a registered trademark. The use of the logo is regulated by the IDIS Industry Association.

The IDIS test label is granted by the IDIS Industry Association for registered equipment which has passed the IDIS interoperability test. The interoperability testing and the use of the test label is regulated by the IDIS Industry Association.

2. Scope

2.1 Scope of IDIS

The IDIS Association develops, maintains, and promotes publicly available technical interoperability specifications (“IDIS Specifications”) based on open standards and supports their implementation in interoperable products. The Association manages, administers, and protects the IDIS quality label (IDIS = “Interoperable Device Interface Specifications”) and supports rigorous interoperability testing to ensure high quality standards.

The IDIS specifications are completely based on existing standards. In order to ensure true interoperability between the IDIS devices the IDIS specifications define specific choices of the different options offered by the standards. The purpose of the IDIS specifications is to close the gaps left by the standards and thus reducing integration and operation costs (comp. Figure 1)

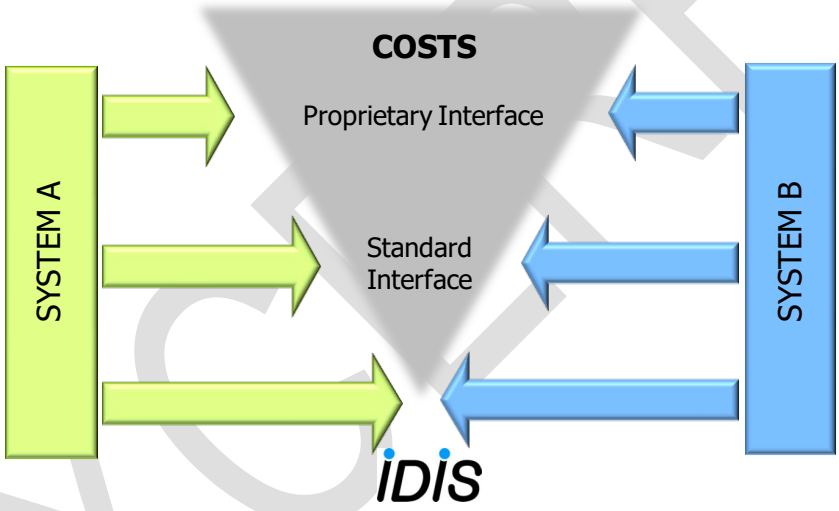


Figure 1 - Costs to integrate and operate different types of interfaces

2.2 Scope of this document

This document is part of the IDIS Interoperability Package 3. It specifies the functionality of an IDIS device integrated into an IP communication network.

IDIS package 3 devices offer extended functionality compared to package 2 devices (comp. 3.3).

The functionality of the IDIS device is based on the DLMS/COSEM standards.

3. Introduction

3.1 Referenced Documents

Ref.	Title
DLMS UA 1000-2 Ed. 11	DLMS/COSEM Architecture and Protocols, the "Green Book" Ed.11
DLMS UA 1000-1 Part 1 Ed. 15	OBIS Codes, the "Blue Book" Part 1Ed. 15
DLMS UA 1000-1 Part 2 Ed. 15	COSEM Interface Classes, the "Blue Book" Part 2 Ed. 15
IDIS P3-OBJ Ed.1.0	IDIS Package 3, Smart metering Objects, Ed.1.0
IDIS P1-PLC-P Ed.1.1	IDIS Package 1, PLC Profile Specification, Ed.1.1
EN 13757-1:2014	Communication system for meters and remote reading of meters – Part 1: Data exchange
EN 13757-2:2018	Communication system for meters and remote reading of meters – Part 2: Physical and Link layer
EN 13757-3:2018	Communication systems for and remote reading of meters – Part 3: Dedicated application layer
EN 13757-4:2019	Communication systems for meters - Part 4: Wireless M-Bus communication
EN 13757-7:2018	Communication systems for meters -Part 7: Transport and security services
IEC 62056-1-0 Ed.1:2014	ELECTRICITY METERING DATA EXCHANGE – The DLMS/COSEM suite – Part 1-0: Smart metering standardisation framewor
IEC 62056-21 Ed. 1.0:2002	Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange
IEC 62056-46 Ed. 1.1:2007	Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol
IEC 62056-5-3 Ed. 3.0:2017	ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE – Part 5-3: DLMS/COSEM application layer – Amendment 1
IEC 62056-6-1 Ed. 3.0:2017	ELECTRICITY METERING DATA EXCHANGE - The DLMS/COSEM SUITE - Part 6-1: Object Identification System (OBIS) – Amendment 1
IEC 62056-6-2 Ed. 3.0:2017	ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE – Part 6-2: COSEM interface classes – Amendment 1
STD0006 (1980)	User Datagram Protocol. Also: RFC0768
STD0007 (1981)	Transmission Control Protocol. Also: RFC0793
IETF STD 0005:1981	Internet Engineering Task Force (IETF): Internet Protocol. J. Postel. September 1981. (Also IETF RFC0791, RFC0792, RFC0919, RFC0922, RFC0950, RFC1112) Available from: http://www.faqs.org/rfcs/std/std5.html
IETF STD 0051:1994	Internet Engineering Task Force (IETF): The Point-to-Point Protocol (PPP). W. Simpson, Ed.. July 1994. (Also RFC1661, RFC1662) Available from: http://www.faqs.org/rfcs/std/std51.html
"How to get the IDIS Test Label ", R1.10, October 2020"	"How to get the IDIS Test Label ", R1.10, October 2020, IDIS association Available from http://www.idis-association.com
ITU-T G.9903 (05/2013)	SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS, Access networks – In premises networks -Narrowband orthogonal frequency division multiplexing power line communication transceivers for G3-PLC networks.
IEEE Std 1901.2-2013	IEEE Standard for Low-Frequency (less than 500 kHz) Narrowband Power Line Communication for Smart Grid Applications
OMS Vol 2	Volume 2 Primary Communication Issue 4.3.1
OMS Vol 2 Annex E	Volume 2 Issue 4.3.1 Annex E: Communication profiles for compliance with national regulations and international associations
OMS Vol 2 Annex M	Volume 2 Issue 4.3.1 Annex M: Requirements for OMS use case support

3.2 Terms, Definitions and Abbreviations

Abbreviation	Explanation
AA	Application Association
AARE	Application Association Response
AARQ	Application Association ReQuest
ACSE	Association Control Service Element
APDU	Application Protocol Data Unit
ASE	Application Service Element
A-XDR	Adapted Extended Data Representation
CII	Consumer Information Interface
CIP	Consumer Information Push
class_id	Interface class identification code
COSEM	Companion Specification for Energy Metering
COSEM object	An instance of a COSEM interface class
DC	Data Concentrator used for PLC communication
DLMS	Device Language Message Specification
ERP	Enterprise Resource Planning
FC	Frame Counter
G3	G3 PLC supporting IPv6
GCM	Galois/Counter Mode, an algorithm for authenticated encryption with associated data
UTC	Coordinated Universal Time (replaces GMT in IDIS package 1)
CSD	Circuit Switched Data
HDLC	High-level Data Link Control
HES	Head End System similar to MDC
HLS	COSEM High Level Security
IC	COSEM Interface Class
IEC	International Electrotechnical Commission
LLC	Logical Link Control (Sublayer)
LLS	COSEM Low Level Security
LN	COSEM Logical Name
MDC	Meter Data Collect similar to HES
MDM	Meter Data Management
NN	Neighborhood Network as defined in IEC 62056-1-0 IEC 62056-1-0 IEC 62056-1-0
OBIS	Object Identification System
OMS	Open Metering Specification
PDU	Protocol Data Unit
PUSH	the data is pushed by the meter to the HES using the Data Notification service
SAP	Service Access Point
SMS	Short Message Service
L_SAP	Link layer Service Access Point

3.2.1 Expressions/Definitions used throughout the document

Expression	Definition
“reserved” or “reserved for future use”	Strictly reserved for IDIS use, i.e. these values must NOT be used for any manufacturer specific extensions.
“manufacturer specific”	The choice of this parameter is left to the manufacturer: The manufacturer is responsible to avoid any inconsistencies.
“optional“ (features)	These features may be implemented by the manufacturer. The testing of these features is not part of the conformance test.
“optional objects”	The implementation of the “optional objects” is left to the manufacturer. If optional objects are identified in the “Optional Objects List” by the manufacturer they will become part of the conformance test.
“default values”	For conformance testing, the manufacturer has to set the attributes to the default values as defined in IDIS P3-OBJ . For attributes where no default value is defined, the manufacturer may set any value within the allowed range.

3.3 New features supported by IDIS package 3

3.3.1 Compatibility to package 2 devices

In package 3, new features are added to the functionality of package 2; i.e.most of the functionality of package 2 is a subset of the funtionality of package 3. A client designed to support package 2 devices may also support package 2 features of a package 3 device.

<section deleted in excerpt>

3.3.2 New use cases

The existing use cases are extended as follows:

UC03	Meter reading (On demand) For multi-utility meters	Wired and wireless M-Bus devices are supported. Security for wired and wireless M-bus is supported.
UC04	Meter reading (for billing) For multi-utility meters	Wired and wireless M-Bus devices are supported. Security for wired and wireless M-bus is supported.
UC07	Quality of Supply Reporting	QoS parameters are logged in a Power Quality profile.
UC11	Consumer Information	The local consumer display can be configured remotely.
UC12	Communication Supervision	Communication parameters are logged in the “Communication Log”. Access types and number of accesses are logged in the “Communication Details Log”.

Table 1 – Extended use cases

The following new use cases are supported:

UC13	Function control	Consumer can opt-in or opt-out (scheduled or on demand) on the profile registration of his consumption values. Enabling/disabling of display functions, Enabling/disabling of communication interfaces, enabling/disabling specific security mechanisms.

Table 2 – New use cases

3.3.3 New DLMS/COSEM features

The following new DLMS/COSEM features are supported:

Extended security	Security suite 1 is supported.
Additional DLMS/COSEM features	The following new xDLMS services are supported: ACCESS service General Block Transfer General ciphering General signing DataNotification.confirm

Table 3 – New DLMS/COSEM features

3.4 Revision History

Version	Date	Editor	Comment
Edition 1.0	15.01.2018	IDIS Association	Public release based on w1.20
Edition 2.0	04.11.2022	DLMS UA	Alignment on latest specifications: - DLMS UA 1000-1 Ed. 15 - DLMS UA 1000-2 Ed. 9 - EN 13757-7:2018 - EN 13757-4:2019 - OMS Vol 2

4. IDIS Conformance Testing

IDIS components are tested for conformity according to the rules set by the IDIS Industry Association. More details can be found in “How to get the IDIS Test Label “, R1.10, October 2020”.

By introducing new mandatory functionalities with a new package N+k a device conforming to package N cannot conform to the specifications of package N+k.

Every IDIS devices carries an **IDIS Test Label** which identifies:

- the *Extensions* (comp. 7.2) to the minimal IDIS functionality implemented in this device
- the *Test Report* produced by the type-testing of this device

Examples of the IDIS test labels:

Device supporting Basic functionality of IDIS Package 3

IDIS 3

No 100820

Device supporting Basic, Disconnector and Multi-Utility functionality of IDIS Package 3

IDIS 3DM

No 100840

Device supporting Basic, Disconnector. Load Management and Multi-utility functionality of IDIS Package 3

IDIS 3DLM

No 100110

The **Test Report** clearly identifies:

- The type and manufacturer of the device
- The Extensions supported by the device
- The additional *Options* supported by the device

Test Reports are available through the IDIS association.

NB: depending on the IP supporting medium, additional medium specific tests may be required by the IDIS association.

5. IDIS System Architecture

5.1 Basic principles

IDIS Package 3 supports direct communication between the electricity meter and the HES via interface I3. Further, PLC communication between the meter and the concentrator via interface I3.1 is supported.

The green parts shown in Figure 2 - are supported by IDIS Package 3.

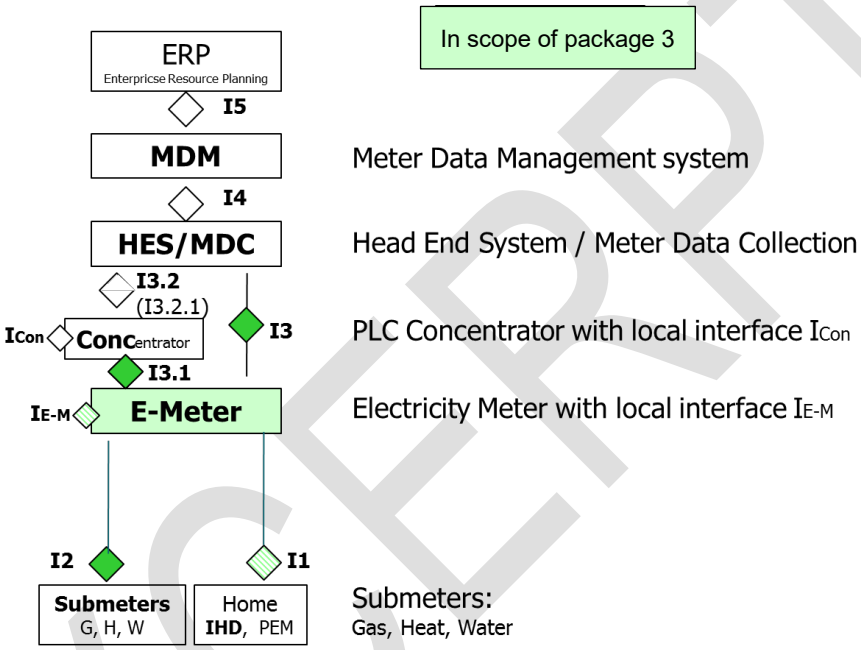


Figure 2 - System architecture supported by IDIS Package 3

For I1 and I_{E-M} IDIS Package 3 defines the required functionality, but the choice of the physical interface is left to the manufacturer.

The following interfaces are *NOT* in scope of IDIS Package 3: I5, I4, I3.2, and the local interface: Icon.

Remark:
The support of interface I3.1 is restricted to PLC technologies based on IPv4/6 communication. IP and the communication layers above are the same for I3.1 and I3. The COSEM client may be located in the HES or in the DC.

5.2 Interface I3

IDIS Package 3 supports communication via

- IP networks as specified in DLMS UA 1000-2 and shown in ….

- SMS service (limited to unconfirmed xDLMS services for PLMN[1] networks)
- CSD / CLIP (limited to wake up calls via PLMN networks)

The following “Supporting Layers” are covered by Package 3:

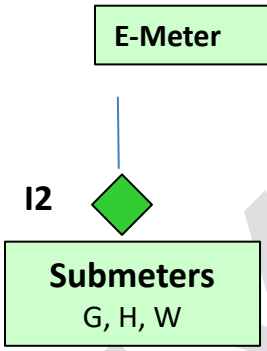
- GSM: CSD/CLIP (for wake up only), SMS, GPRS
- 3G, 4G (LTE)
- Ethernet
- G3-PLC

Communication between the HES and the Meter is supported in the following operation modes:

- PULL for 1-way or 2-way communications *initiated by the HES*
- PUSH[2] for 1-way communication *initiated by the Meter*

<section deleted in excerpt>

5.3 Interface I2 (submeters)



- The M-Bus is used to connect the submeters (such as Gas, Heat and Water) to the E-Meter (M-Bus master).
- The data of the M-Bus devices (according to EN 13757-3) is mapped to COSEM objects in the E-Meter.
- M-Bus devices are always accessed via the COSEM objects in the E-meter (no transparent access through the E-meter)
- An IDIS meter supporting option M shall support either wired *or* wireless M-Bus, or wired *and* wireless M-Bus.

[1] Public Land Mobile Network
[2] Comp. 7.8

5.3.1 M-Bus

5.3.1.1 Uniqueness of M-bus device identification

According to EN 13757-7 sect. 7 the following 4 parameters are needed to guarantee uniqueness of the M-Bus device identification:

- Fabrication Number (DIF/VIF)
- Manufacturer (header of M-Bus frame)
- Version (header of M-Bus frame)
- Medium (header of M-Bus frame)

<section deleted in excerpt>

5.3.1.2 Conversion of M-Bus VIF into COSEM scaler_unit

At least one of the following two scenarios must be supported by the E-meter:

<section deleted in excerpt>

5.3.1.3 M-Bus data security (based on EN 13757-7)

5.3.1.3.1 General

IDIS Package 3 supports data security on the M-Bus link between the IDIS meter and the M-Bus sub meters. M-Bus data security is provided by encryption of the M-Bus frames according to EN 13757-7.

5.3.1.3.2 Security material

5.3.1.3.2.1 Cryptographic algorithm

<section deleted in excerpt>

5.3.1.3.3 Security configuration

<section deleted in excerpt>

5.3.1.3.4 M-Bus firmware update

<section deleted in excerpt>

5.3.1.3.5 M-Bus Key Transfer (based on EN 13757-7)

IDIS Package 3 supports the M-Bus Key Transfer according to EN 13757-7 Annex A Security Information Transfer Protocol (SITP).

<section deleted in excerpt>

5.3.1.3.5.1 M-Bus Key Transfer using SITP

Figure 4 shows an example of an M-Bus Key Transfer using SITP Protocol with TPL Security and used services:

<section deleted in excerpt>

5.3.1.4 Wired M-Bus

- The wired M-Bus is based on the EN 13757-2 physical and link layer.
- The format class FT1.2 of EN 60870-5-1 and the telegram structure according to EN 60870-5-2 is used.
- The baud rate is 2400 b/s, E,8,1.

5.3.1.5 Wireless M-Bus

- The wireless M-Bus is based on the EN 13757-4 wireless meter readout using mode C1/C2 and T1/T2 (other modes may be supported optionally).
- The format class FT3 of EN 60870-5-1 and the telegram structure according to EN 60870-5-2 is used.

Specific behavior of the M-Bus client:

<section deleted in excerpt>

5.3.1.6 M-Bus OMS Adapter

A M-Bus OMS adapter can be used between the IDIS E-Meter and sub devices. As shown on the following diagram, in the implementation of IDIS Package 3 the IDIS Meter will only allow the adaptor to connect with one device. From the IDIS meter, the MBUS adapter and its slave meter are seen as a single logical MBUS device.

<section deleted in excerpt>

5.3.1.7 M-Bus Supported Modes

IDIS certified devices with M-Bus interface must support the following modes:

<section deleted in excerpt>

6. Use Cases supported by IDIS Package 3

The following Use Cases (comp. Table 4) are supported by IDIS Package 3.

NB: The meter acts as a COSEM server, the HES acts as COSEM client.

	Use Case	Description	IDIS Package 3 specific remarks
UC01	Meter Registration	Process of incorporating devices (E-meters, submeters, ...) into the system.	• Registration at the HES or MDM, or DC level is performed in conjunction with the PUSH operation. • Submeters must be configured and registered.
UC02	Remote Tariff Programming	Process of remotely programming the parameters necessary to support a time of use (TOU) based tariff contract.	• Downloading and activation of TOU tables.
UC03	Meter reading (On demand) For multi-utility meters	Process of spontaneously collecting meter readings upon a specific request. Wired and wireless M-Bus devices are supported. Security for wired and wireless M-bus is supported.	• Total/Rated-Registers • Profiles and Event-Logs
UC04	Meter reading (for billing) For multi-utility meters	Process of periodically collecting meter readings for billing purposes (periodic reading) Wired and wireless M-Bus devices are supported. Security for wired and wireless M-bus is supported.	• Total/Rated-Registers • Profiles and Event-Logs
UC05	Disconnection and Reconnection (E, G)	Process of disconnecting or reconnecting the electricity (E) or gas (G) supply of a consumer	• Remote controlled (E,G) • Time (local) controlled (E,G) • Load (local) controlled (E)
UC06	Clock Synchronization	Process of adjusting the internal clock of the metering equipment	• For E-meters only • Source of sync HES, NTP server, Data Concentrator (where applicable)
UC07	Quality of Supply (QoS) Reporting	Process of supervising Power Outages, Sags and Swells. QoS parameters are logged in a Power Quality profile.	• Event-Logs and counters • current/power/voltage instantaneous and average values.
UC08	Load Management by relay (E only)	Process of controlling specific local loads by means of relays.	• Remote controlled • Time (local) controlled • Load (local) controlled
UC09	Firmware update	Process of downloading new firmware to a device	• For E-meters only • Only remote upgrade

	Use Case	Description	IDIS Package 3 specific remarks
			• interoperability restricted to the downloading process
UC10	Meter supervision	Process of supervising any events which could compromise the meter and the system.	• For E-meters only • Security event logs
UC11	Consumer Information	• Periodic transmission of consumer information via a local interface. • Configuration of the local meter display.	• For E-meters only • The local meter display can be configured remotely.
UC12	Communication Supervision	Process of supervising events affecting the meter to HES communication.	• Communication parameters are logged in the “Communication Log”. • Access types and number of accesses are logged in the “Communication Details Log”.
UC13	enabling / disabling functionalities	• Consumer can opt-in or opt-out (scheduled or on demand) on the profile registration of his consumption values. • Enabling/disabling of display functions. • Enabling/disabling of communication interfaces. • Enabling/disabling specific security mechanisms.	

Table 4 - Use Cases supported by IDIS Package 3

6.1 Meter Registration

In contrast to package 1 where meter registration is part of the PLC network management in Package 3 IP profile meter registration is limited to the logical registration at HES level. Establishment of the IP network connectivity is achieved following standard IP rules.

<section deleted in excerpt>

6.1.1 System Title

<section deleted in excerpt>

6.1.2 COSEM Logical Device Name

<section deleted in excerpt>

6.1.3 Meter Registration using Data-Notification

After commissioning the meter sends its IP address and its system title to the HES (or DC) using the Data-Notification service.

<section deleted in excerpt>

6.2 Remote Tariff Programming

In Package 3 Remote Tariff Programming is performed in the same way as in package 1.

<section deleted in excerpt>

6.2.1 Activity Calendar

Tariffs are controlled by an instance of the IC “Activity Calendar” (class_id =20) with the attributes and methods as displayed below:

<section deleted in excerpt>

6.2.2 Script table

For tariffication there is exactly one Script table

Tariffication script table (class_id 9) logical_name: 0-0:10.0.100.255

The attribute script has at least 4 entries representing the tariffs as shown in Table 5:

Script selector	Script definition
0	NOT USED
1	Registers and actions corresponding to tariff 1 are activated
2	Registers and actions corresponding to tariff 2 are activated
3	Registers and actions corresponding to tariff 3 are activated
4	Registers and actions corresponding to tariff 4 are activated
...	Further script selectors may be used for additional tariffs

Table 5 - Assignment of tariffs to scripts

6.2.2.1 Default tariff

In case of an invalid clock and/or inconsistent calendar (and no valid special day table) script 1 will be activated.

6.2.3 Register activation

Two Register activation objects are used for tariff management.

<section deleted in excerpt>

6.2.4 Remote Tariff programming using PUSH operation

Services provided by PUSH operation are not used in this use case.

6.3 Meter Reading on Demand

Meter Reading on Demand may be performed by the GET or the ACCESS service or, by invoking the Data-Notification service.

Precondition: if the meter is not on-line then the HES issues a wake up.

6.3.1 Electricity meter

At least the following types of registers are supported by the IDIS meter:

<section deleted in excerpt>

6.3.1.1 Load Profiles for electricity metering

Two instances of the IC Profile Generic are supporting Electricity related registration. The status of the LP entries is encoded into 1 byte according to 6.3.4.

A detailed description of the Load Profiles for electricity metering can be found in sect. 0.

<section deleted in excerpt>

6.3.2 Submeters

<section deleted in excerpt>

6.3.2.1 M-Bus Master Load profile for channel 1..4

<section deleted in excerpt>

6.3.3 Billing Profile for general metering

One instance of the IC Profile Generic is supporting Electricity and/or Multi-utility (submeters) related registration.

A more detailed description of the billing profiles can be found in sect 0.

<section deleted in excerpt>

6.3.4 Profile Status

The status of a buffer entry consists of a one byte (type *Unsigned*) where the bits have the meaning according to section 0.

6.3.5 Meter Reading on Demand using PUSH operation

PUSH operation offers the HES (or DC) the possibility to (re)trigger a Data-Notification service to retrieve missing data from the last reading period(s). If the meter is not on-line then the precondition for the triggering of the Data-Notification service is a successful wake up of the meter.

<section deleted in excerpt>

6.4 Meter Reading for Billing

Meter Reading for Billing may be performed by the GET service, by the ACCESS service or, by invoking the Data-Notification service.

Precondition: if the meter is not on-line then the HES issues a wake up or the push operation is triggered by the meter's scheduler.

6.4.1 Meter Reading for Billing using PUSH operation

PUSH operation offers the possibility to periodically trigger Data-Notification services to transmit billing data to the HES (or the DC).

<section deleted in excerpt>

6.5 Meter Disconnection and Reconnection

Disconnection and reconnection of the electricity supply is supported by the following objects:

<section deleted in excerpt>

6.5.1 Disconnector script table

The disconnector script table contains the scripts which act on the Disconnect Control object 0-0:96.3.10.255 as follows:

<section deleted in excerpt>

6.5.2 M-Bus Disconnector script table

The M-Bus disconnector script table contains the scripts which act on the M-Bus Disconnect Control objects 0-1:24.4.0.255, 0-2:24.4.0.255, 0-3:24.4.0.255 and 0-4:24.4.0.255 as follows:

<section deleted in excerpt>

6.5.3 Relation between the status attributes of the disconnect control object and the M-Bus valve

The status of the M-Bus device valve is mapped to the control_state and the output_state attributes as follows:

<section deleted in excerpt>

6.5.4 Meter Disconnection and Reconnection using PUSH operation

Services provided by PUSH operation are not used in this use case.

6.6 Meter Clock Synchronization

In Package 3 Meter Clock Synchronization is performed in the same way as in package 1. In addition, NTP synchronization is possible as an option.

6.6.1 Mandatory Time Server: HES or DC

The time in the electricity meters is set/synchronized by applying the SET or ACCESS service to the attribute “time” of the “clock” object (logical_name: 0-0:1.0.0.255). In IDIS Package 3 the time may be regularly set by the HES (or by the DC).

<section deleted in excerpt>

6.6.1.1 Relation between the different time parameters

The following clarifications concern the time parameters as used in DLMS UA 1000-1 Part 2

<section deleted in excerpt>

6.6.2 Meter Clock Synchronization using PUSH operation

Services provided by PUSH operation are not used in this use case.

6.6.3 NTP Time Server

For IDIS Package 3 the meter may support an NTP client for clock synchronization.

The settings for the NTP server are contained in the following object:

<section deleted in excerpt>

6.6.4 Automatic M-Bus clock synchronization (for option M only)

The M-Bus clock is synchronized by the E-meter whenever the E-meter clock is synchronized (or shifted) but at least every 24 hours. The actual execution of the synchronization process depends on the availability of the M-Bus channel.

6.7 Quality of Supply Reporting

Quality of Supply Reporting may be performed by the GET service, by the ACCESS service or, by invoking the Data-Notification service.

Precondition: if the meter is not on-line then the HES issues a wake up or the push operation is triggered by the meter’s scheduler.

The quality of supply is reported by means of the following objects:

<section deleted in excerpt>

6.7.1 Power Quality Profile

<section deleted in excerpt>

6.7.2 Quality of Supply Reporting using PUSH operation

PUSH operation offers the possibility to send periodically or event triggered (comp. 0) Data-Notification services to transmit Quality of Supply data to the HES.

<section deleted in excerpt>

6.8 Load Management by Relay

Loads may be disconnected and reconnected with the help of relay(s). The relay(s) are controlled with the following objects:

<section deleted in excerpt>

6.8.1 Load Management script table

The Load Management script table contains the scripts which act on the Load Management – Relay Control objects 0-k:96.3.10.255 (k=1,2, …) as follows:

<section deleted in excerpt>

6.8.2 Load Management by Relay using PUSH operation

Services provided by PUSH operation are not used in this use case.

6.9 Firmware Update

The following section is inherited from IDIS Package 1.

The raw image for firmware download must be provided to the COSEM client as a binary file. The COSEM client then uses the services provided by the objects listed below to transfer the binary file into the meter and to activate the new firmware.

<section deleted in excerpt>

6.9.1 Firmware Update for M-Bus Devices (for option M only)

IDIS Package 3 supports firmware update of the M-Bus devices according to EN 13757-3 Annex I Image Transfer.

<section deleted in excerpt>

6.9.2 Firmware Update using PUSH operation

Services provided by PUSH operation are not used in this use case.

6.10 Meter Supervision

Meter Supervision may be performed by invoking the Data-Notification, by the GET service or by the ACCESS service.

Precondition: if the meter is not on-line then the HES issues a wake up or the push operation is triggered by the meter's scheduler.

The meter automatically supervises critical actions and logs them in the corresponding objects.

<section deleted in excerpt>

6.10.1 Meter Supervision using PUSH operation

PUSH operation offers the possibility to send periodically or event triggered (comp. 0) Data-Notification services to transmit Meter Supervision data to the HES (or to the DC).

Periodically transmitted Meter Supervision data is configured by the following objects where the Meter Supervision data is added next to the Billing data:

<section deleted in excerpt>

6.11 Consumer Information

6.11.1 Consumer Information Push (CIP) via local port

In conjunction with PUSH operation IDIS Package 3 meters may support the provision of local Consumer Information (as an option). This information consists of a predefined set of attributes which are periodically transmitted to a local port serving as Consumer Information Interface (CII). Depending on the market request, this local port may be connected to a suitable home gateway.

<section deleted in excerpt>

6.11.1.1 Client - Server structure for the optional CIP client

In order to support the optional CIP functionality the general Client Server architecture described in **section 8.1** is extended with a CIP client as shown in…

The Consumer Information Push (CIP) shall use a dedicated Client [**103**] with at minimum Data-Notification service supported. The Client is **pre-established** and has its own security context.

<section deleted in excerpt>

6.11.1.2 CIP protocol stack

6.11.1.2.1 HDLC based protocol stack

- The protocol stack is of three layer collapsed type.
- Frame type 3 and the non-basic frame format transparency according to IEC 13239, sect. 4.3.3 is used.
- <section deleted in excerpt>

6.11.1.2.2 IP based protocol stack

- For a CIP interface supporting IP communication the architecture shown in Figure 2 - (right hand side) is used.
- <section deleted in excerpt>

6.11.1.3 Security on the Consumer Information Interface

The data *from the meter* pushed to the CII (via CIP) may be secured (encryption and/or authentication) *by the meter*.

<section deleted in excerpt>

6.11.1.4 CIP System Title and Error Handling

<section deleted in excerpt>

6.11.1.5 Object model and Use cases covered

Instance name	IC	OBIS	Use Case
Consumer Message Text - Consumer Information	1	0-0:96.13.0.255	Sending a text message from HES to the Consumer Information interface (CII). The HES accesses the register on the meter via Management Client [1] or Pre-established Client [102]. The meter will - immediately after receiving the message - forward the data to the CII via the Consumer Information Push to the CIP client [103] using the Data-Notification service.

If the optional CIP functionality is supported then the following objects are mandatory:

<section deleted in excerpt>

6.11.2 Consumer information via meter display

The instance below allows the configuration of data shown on the meter display where the attribute “capture_objects” defines attributes (non exhaustive) which are shown on the meter display.

<section deleted in excerpt>

6.12 Communication Supervision

The meter automatically supervises critical events concerning the WAN and the NN (in case of G3 communication) connectivity (comp. 0). The events are logged in the object “Communication Log” via the Event Object –Communication Log.

<section deleted in excerpt>

6.13 Function Control

IDIS package 3 allows the activation or deactivation of specific functions by means of the objects “IDIS function control” (0-0:44.1.0.255) and "M-Bus function control" (0-1:44.1.0.255). The enabling and disabling is recorded in the corresponding event logs (standard event log and M-Bus event logs) according to section 0.

<section deleted in excerpt>

6.13.1 IDIS defined function names

In IDIS package 3 the following functions are supported.

<section deleted in excerpt>

6.13.2 Opt in/out on consumption profile registration

The consumer can opt-in or opt-out (scheduled or on demand) on the profile registration of his consumption values.

<section deleted in excerpt>

6.13.3 Enable/Disable 2 way Communication on Optical Interface

The utility can remotely enable or disable the 2-way communication of the optical interface.

<section deleted in excerpt>

6.13.4 IDIS function control script table

<section deleted in excerpt>

6.13.5 M-Bus function control script table

<section deleted in excerpt>

7. E-Meter Functionality

7.1 Data Model

The entire functionality of the IDIS meter is modeled by means of COSEM objects as described in DLMS UA 1000-1 Part 2 .

IDIS P3-OBJ provides a complete list of the mandatory and optional objects used in IDIS Package 3. The objects are described in all details, in particular:

<section deleted in excerpt>

An IDIS server must support ALL IDIS objects, attributes, methods, and ranges of attributes as defined in IDIS P3-OBJ .

7.2 IDIS Meter customization

Every IDIS meter must support the complete set of BASIC objects. Further, the minimal (basic) functionality may be extended with any combination of:

- Disconnector,
- Load Management,
- Multi-Utility functionality,

In all cases the IDIS meter must support all *mandatory objects* in the set of the corresponding extension.

The implemented extensions become part of the IDIS test label (see 4).

In addition, the manufacturer of an IDIS meter may implement also *optional objects* (comp. IDIS P3-OBJ). The *optional objects* must be identified for the IDIS conformance testing and will be listed in the test report.

7.2.1 BASIC objects

The following COSEM objects are mandatory for every IDIS Package 3 device. Not all rated registers are mandatory. For details on the mandatory rated registers comp. 6.3.1.

<section deleted in excerpt>

7.2.1.1 Communication profile and media specific objects

Table 6 shows the Communication Profile specific BASIC (*mandatory)* objects.

Instance Name	OBIS	IC
TCP-UDP setup	0-0:25.0.0.255	41
IPv4 setup	0-0:25.1.0.255	42
IPv6 setup (alternatively to IPv4)	0-0:25.7.0.255	48

Table 6 - Communication Profile specific BASIC (mandatory) objects

<section deleted in excerpt>

7.2.2 Extension D objects

The following objects are foreseen for all IDIS devices supporting the Disconnector functionality. Detailed information on mandatory/optional objects and attributes can be found in IDIS P3-OBJ .

<section deleted in excerpt>

7.2.3 Extension L objects

<section deleted in excerpt>

7.2.4 Extension M objects

<section deleted in excerpt>

7.2.5 Optional objects

Optional objects according to IDIS P3-OBJ . may be added by the IDIS device manufacturer. They must be tested as described in sect. 4.

Conformance testing of optional objects and attributes:

<section deleted in excerpt>

7.3 Handling Events

A lot of events are generated by the meter itself or by its environment. All these events are logged in several event logs. Additionally, they are also used to set and clear errors as well as to trigger alarms.

An event is triggered (and logged) at the point in time the root cause occurs. As long as the root-cause exists the event will not be re-triggered.

7.3.1 Events

<section deleted in excerpt>

7.3.2 Alarms

<section deleted in excerpt>

7.3.2.1 Alarming Process

<section deleted in excerpt>

7.3.2.1.1 Alarm Registers (AR)

<section deleted in excerpt>

7.3.2.1.2 Alarm Descriptors (AD)

<section deleted in excerpt>

7.3.2.1.3 Alarming Process

<section deleted in excerpt>

7.3.2.2 COSEM Objects supporting Alarms

<section deleted in excerpt>

7.3.2.3 Assignment of Alarm Register 1 bits

<section deleted in excerpt>

7.3.2.4 Assignment of Alarm Register 2 bits

<section deleted in excerpt>

7.3.2.4.1 Voltage Level Monitoring based on EN50160

For quality assessment purposes there is also a possibility to monitor the voltage level more in detail.

<section deleted in excerpt>

7.4 Load Profiles

Different profiles are available in the IDIS meters:

- Load Profiles for electricity metering (Load profile 1, Load profile 2)
- M-Bus Master load profiles (multi utility profiles)
- Billing profile for general metering

<section deleted in excerpt>

7.5 Synchronous Load Profiles

7.5.1 Structure

<section deleted in excerpt>

7.5.2 Sort Order

<section deleted in excerpt>

7.5.2.1 Sorted

<section deleted in excerpt>

7.5.2.2 Unsorted

<section deleted in excerpt>

7.5.3 Reset

<section deleted in excerpt>

7.5.4 Capture period

<section deleted in excerpt>

7.5.5 Timestamp

<section deleted in excerpt>

7.5.6 Access to the stored values

<section deleted in excerpt>

7.5.6.1 Normal Read

Every row in the table below shows how the profile should look like when read out. A 'from…to' readout (selective access) request will return a response containing the buffer entries within the 'from…to' range (including the values at the boundaries of the range)

<section deleted in excerpt>

7.5.6.2 Compressed Read

In order to reduce the amount of transmitted data an IDIS meter may support "compressed" readout of the profile.

<section deleted in excerpt>

7.5.6.2.1 Example for time "compression"

<section deleted in excerpt>

7.5.6.2.2 Example for time and status "compression"

<section deleted in excerpt>

7.5.6.2.3 Example for time status and register value compression

<section deleted in excerpt>

7.5.6.3 Compact Array

<section deleted in excerpt>

7.5.6.4 Selective access

<section deleted in excerpt>

7.5.7 Profile Status Register

<section deleted in excerpt>

7.5.8 Events

The following section describes the behavior of the profile and the setting of the status bits considering different events.

<section deleted in excerpt>

7.5.8.1 Season Change

<section deleted in excerpt>

7.5.8.2 Power Down

The following section describes the behavior of the profile and the setting of the status bits considering different power down events. A “Power Down” event starts with the complete loss of power in all connected phases and ends with the restoration of the power in at least one of the connected phases.

7.5.8.2.1 Power Down within one capture period

<section deleted in excerpt>

7.5.8.2.2 Power Down across several capture periods

<section deleted in excerpt>

7.5.8.2.3 Power Down over a season change

<section deleted in excerpt>

7.5.8.2.4 Exhaust of power reserve

<section deleted in excerpt>

7.5.8.3 Setting Time

<section deleted in excerpt>

7.5.8.3.1 Time changes within capture period

<section deleted in excerpt>

7.5.8.3.2 Advancing the time over the end of the period

<section deleted in excerpt>

7.5.8.3.3 Advancing the time over several periods

<section deleted in excerpt>

7.5.8.3.4 Advancing the time over a season change

<section deleted in excerpt>

7.5.8.3.5 Setting the time back - sorted

<section deleted in excerpt>

7.5.8.3.6 Setting the time back - unsorted

<section deleted in excerpt>

7.5.8.4 Profile Reset

<section deleted in excerpt>

7.6 Billing profile for general metering

The billing profile differs from the other profiles by the way data capturing is performed.

<section deleted in excerpt>

7.6.1 Power down

7.6.1.1 Power failure across capture periods

<section deleted in excerpt>

7.6.2 Setting Time

7.6.2.1 Advancing the time over the end of the billing interval

<section deleted in excerpt>

7.6.2.2 Setting the time back over the start of billing interval

<section deleted in excerpt>

7.6.2.3 Asynchronous billing period reset/end

<section deleted in excerpt>

7.7 Reading profiles with parameterized access “from”-“to”

The following specifications are valid for any IDIS object which is an instantiation of the interface class “Profile Generic” (e.g. profiles, logs, …).

7.7.1 Interval boundaries

If the requested interval boundaries (“from”, “to”) match the timestamps of profile entries, then the response contains the buffer entries *including the boundaries* of the requested interval.

7.7.2 Covering the DST switchover interval with partly defined time parameters

<section deleted in excerpt>

7.8 PUSH operation

IDIS Package 3 supports PUSH operation triggered:

- on connectivity
- on alarm,
- on installation,
- scheduled.

<section deleted in excerpt>

7.9 Power down/resume and clock setting

This section describes the behavior of the instances of the interface classes “activity calendar”, “single action scheduler”

<section deleted in excerpt>

7.10 Activation and deactivation of specific metering functions

IDIS package 3 allows the activation or deactivation of specific functions by means of the object “IDIS function control”.

8. E-Meter Communication

8.1 IDIS Client and Server Architecture

The IDIS Server consists of one COSEM Logical Device (LD name: 0-0:42.0.0.255, SAP: 001) which supports a Pre-established Client (SAP: 102), a Public Client (SAP: 016), and a Management Client (SAP: 001).

<section deleted in excerpt>

8.2 Application Layer

The E-Meter communicates with the upper system (via I3) using the IEC 62056-53 COSEM Application Layer with extension documented in DLMS UA 1000-2 .

8.2.1 Minimal set of services

Logical name services are supported. The Conformance Block (IEC 62056-5-3 Ed. 3.0:2017) defines the minimal set of supported application layer services:

- General-protection (1)
- General-block-transfer (2)
- Block-transfer-with-get (11)
- Block-transfer-with-set (12)
- Multiple-references (14)
- Data-Notification (16)
- Access (17)
- Get (19)
- Set (20)
- Selective-access (21)
- Action (23)

<section deleted in excerpt>

8.2.2 Minimal set of Associations

<section deleted in excerpt>

8.2.2.1 Enciphering of the InitiateRequest field in the RLRQ and AARQ PDUs

<section deleted in excerpt>

8.2.2.2 Power-down

<section deleted in excerpt>

8.2.2.3 Pre-established Association

Used by the pre-established client.

<section deleted in excerpt>

8.2.2.4 Association Release Request RLRQ

If in the “Association Release Request “service (sent by the client) the optional parameter “user information” is present, ….

<section deleted in excerpt>

8.2.2.5 Application association object

In IDIS there exists one current association object representing the information on the currently open association.

<section deleted in excerpt>

8.2.2.6 Handling lost Associations

<section deleted in excerpt>

8.2.2.7 Associations on different communication ports

The following rules apply:

<section deleted in excerpt>

8.2.3 Error handling in the application layer

The protocol error management copes with situations where the peer station does not act/react in the way normally expected. The following specifications of the error situations and the corresponding error information allow the recipient of the information to react in the appropriate way.

8.2.3.1 General rule

The server always answers to a service request: either with the proper response or with an EXCEPTION response or confirmed service error.

8.2.3.2 Errors related to the AARQ service

<section deleted in excerpt>

8.2.3.3 Errors related to the Get/Set/Action/Access services

Errors related to the Get/Set/Action services are shown ..

<section deleted in excerpt>

8.2.3.4 Errors related to the Data-Notification service

There are no error messages foreseen.

8.2.3.5 Errors related to the RLRQ service

<section deleted in excerpt>

8.2.3.6 Errors in secured services

The following tables are related to application association when the security policy is higher than 0.

8.2.3.6.1 Errors in the secured AARQ service

Errors in the secured AARQ service are shown

<section deleted in excerpt>

8.2.3.6.2 Errors in the secured RLRQ service

Errors in the secured RLRQ service are shown

<section deleted in excerpt>

8.3 Network Connectivity

The network connectivity of an IDIS meter is controlled by the auto connect objects (see also 11) and the Push setup – On Connectivity:

<section deleted in excerpt>

8.3.1 Wake-Up Process

In conjunction with GPRS (or GSM/PPP) communication the meter may not always be connected to the IP network.

<section deleted in excerpt>

8.3.1.1 LTE, UMTS, GPRS or GSM/PPP connection to the IP network

The HES may initiate a connection of the meter to the IP network via a digital connection (e.g. GPRS) or via an analog modem (e.g. GSM/PPP) by choosing the corresponding caller_id.

<section deleted in excerpt>

8.4 Lower layers for IP communication

At minimum one IP channel must be supported. On this channel either the IPv4 or IPv6 protocol may be used

<section deleted in excerpt>

8.4.1 IPv4

<section deleted in excerpt>

8.4.2 IPv6

<section deleted in excerpt>

8.4.3 TCP

<section deleted in excerpt>

8.4.4 UDP

<section deleted in excerpt>

8.4.5 Physical channels

8.4.5.1 GSM

<section deleted in excerpt>

8.4.5.2 GPRS/UMTS/LTE

<section deleted in excerpt>

8.4.5.3 Ethernet

<section deleted in excerpt>

8.4.5.4 G3-PLC

<section deleted in excerpt>

8.5 SMS as a general communication channel

The SMS channel supports xDLMS services with the following restrictions:

<section deleted in excerpt>

9. E-Meter Security Features

IDIS package 3 applies the information security methods described in sect. 9.2 of DLMS UA 1000-2 . Security methods are compatible with IDIS packages 1 and 2 and in addition provide new methods for authentication mechanisms, access rights, message security and key management.

<section deleted in excerpt>

9.1 Security for Wake-Up

9.1.1 Security for CSD (Circuit Switched Data) call wake-up

Only CSD calls which are explicitly whitelisted…

<section deleted in excerpt>

9.1.2 Security for SMS wake-up

Only SMS which are explicitly whitelisted …

<section deleted in excerpt>

9.2 Security for SMS as a general communication channel

Only SMS which are explicitly whitelisted….

<section deleted in excerpt>

9.2.1 Receiving unconfirmed services from HES

- Only possible in pre-established association;
- <section deleted in excerpt>

9.2.2 Transmitting unconfirmed services to HES

- Only possible in pre-established association
- <section deleted in excerpt>

9.3 Security for PUSH/PULL

<section deleted in excerpt>

9.3.1 Use of the Frame counters

Depending on the security policy and access rights applied the meter uses the Global Unicast Key to protect outgoing messages. Therefore the transmit frame counter is incremented for every

message sent independently of the channel [3](to “Pre-established Client via SMS”, to “Pre-established Client via IP” or to “Management Client via IP”;….

<section deleted in excerpt>

9.4 Security setup object

The IDIS server may support several security contexts.

<section deleted in excerpt>

9.4.1 Security Setup

Management Client on remote communication:

<section deleted in excerpt>

9.4.2 The use of Master key, Global keys and Dedicated keys

The following rules concerning the keys apply:

- At a given point of time there exists one specific set of keys (dedicated[4], global) per security context.
- <section deleted in excerpt>

9.4.3 Frame counters

The following applies for security context shared by the pre-established client and the management client. For the optional security context of the CIP client the frame counter is implicit.

<section deleted in excerpt>

9.4.3.1 Re-synchronizing the FCs

When operating with *global keys* then the HES re-synchronizes its FCs by reading the FCs from the meters (via public client).

<section deleted in excerpt>

9.4.3.2 In case of local access using security:

<section deleted in excerpt>

[3] A specific “Channel” consists of the combination of a specific Client and a specific communication medium

[4] Dedicated keys are assigned only during the establishment of the Association

9.4.4 Application association establishment:

<section deleted in excerpt>

9.4.4.1 Default passwords and global keys for interoperability testing

For testing purposes the following (comp.) default security material should be used:

<section deleted in excerpt>

9.4.5 Putting a meter into field

The following process is performed[5]:

<section deleted in excerpt>

[5] The described process is used for IDIS conformance testing. However, to meet project specific security requirements other „putting into the field“ procedures may be performed. In particular, it may be requested that in the factory the security policy is set to >0.

9.4.6 Using Keys

The keys are used as shown in…..

<section deleted in excerpt>

9.4.6.1 Rules to change the Key

- All global keys are changed by using the security_setup.key_transfer or method security_setup.key_agreement. The methods are accessible only via the Management Client.
- <section deleted in excerpt>

9.4.7 Changing the Security Policy

The Security Policy may be changed by invoking the security_activate method of the security setup object, or by setting the security_policy attribute of the security setup object.

<section deleted in excerpt>

10. Appendix: Event Codes

The following section list the event codes used in Package 3. The list is a copy of the corresponding list in IDIS P3-OBJ .

The support of some event codes is mandatory for the BASIC IDIS functionality, the support of some events is dependent on the implemented IDIS extensions as shown in Table 7.

<section deleted in excerpt>

Table 7 - Event Codes from 256 to 65535

11. Appendix: Attribute restrictions used in IDIS Package 3

The following specifications are necessary to achieve semantic interoperability in IDIS Package 3. The additional specifications do not create any conflict with the specifications of the Interface Classes.

<section deleted in excerpt>

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