

DIN EN 62056-6-2

ICS 91.140.50

Ersatz für
DIN EN 62056-6-2:2014-10
Siehe Anwendungsbeginn

**Datenkommunikation der elektrischen Energiemessung –
DLMS/COSEM –
Teil 6-2: COSEM Interface-Klassen
(IEC 62056-6-2:2016);
Englische Fassung EN 62056-6-2:2016**

Electricity metering data exchange –
The DLMS/COSEM suite –
Part 6-2: COSEM interface classes
(IEC 62056-6-2:2016);
English version EN 62056-6-2:2016

Échange des données de comptage de l'électricité –
La suite DLMS/COSEM –
Partie 6-2: Classes d'interfaces COSEM
(IEC 62056-6-2:2016);
Version anglaise EN 62056-6-2:2016

Gesamtumfang 332 Seiten

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE

Anwendungsbeginn

Anwendungsbeginn für die von CENELEC am 2016-03-29 angenommene Europäische Norm als DIN-Norm ist 2017-06-01.

Für DIN EN 62056-6-2:2014-10 besteht eine Übergangsfrist bis 2019-12-09.

Nationales Vorwort

Vorausgegangener Norm-Entwurf: E DIN EN 62056-6-2/A1:2015-05.

Für dieses Dokument ist das nationale Arbeitsgremium K 461 „Messeinrichtungen und -systeme für Elektrizität“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE (www.dke.de) zuständig.

Die enthaltene IEC-Publikation wurde vom TC 13 „Electrical energy measurement and control“ erarbeitet.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zu dem Datum (stability date) unverändert bleiben soll, das auf der IEC-Website unter „<http://webstore.iec.ch>“ zu dieser Publikation angegeben ist. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

- bestätigt,
- zurückgezogen,
- durch eine Folgeausgabe ersetzt oder
- geändert.

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf ein Dokument ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils aktuellste Ausgabe des in Bezug genommenen Dokuments.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe des Dokuments.

Der Zusammenhang der zitierten Dokumente mit den entsprechenden Deutschen Dokumenten ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für die vorliegende Norm erfüllt.

Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird die englische Fassung der EN 62056-6-2:2016 veröffentlicht. Zu deren Abschnitt 1, der den Anwendungsbereich festlegt, und Abschnitt 3, der die Begriffe festlegt, wurde eine Übersetzung angefertigt und als informativer Nationaler Anhang NA der vorliegenden Norm hinzugefügt. Für die meisten der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen. Diese Norm steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen.

Das Original-Dokument enthält Bilder in Farbe, die in der Papierversion in einer Graustufen-Darstellung wiedergegeben werden. Elektronische Versionen dieses Dokuments enthalten die Bilder in der originalen Farbdarstellung.

Änderungen

Gegenüber DIN EN 62056-6-2:2014-10 wurden folgende Änderungen vorgenommen:

- a) COSEM-Schnittstellenklassen zur Modellierung neuer Funktionalitäten für die intelligente Messung sowie die Verknüpfung dieser Schnittstellenklassen mit OBIS wurden festgelegt;
- b) Änderungen an den vorhandenen Schnittstellenklassen wurden vorgenommen.

Frühere Ausgaben

DIN EN 62056-62: 2003-01, 2007-08

DIN EN 62056-6-2: 2014-10

Nationaler Anhang NA (informativ)

Auszugsweise Übersetzung^{N1)}

Die deutschen Übersetzungen haben Empfehlungscharakter und können nur die ungefähre Begrifflichkeit in Deutsch wiedergeben. Unter Experten wird empfohlen, ausschließlich die englischen Fachbegriffe zu verwenden, um die Gefahr von Missverständnissen zu reduzieren.

1 Anwendungsbereich

Dieser Teil der IEC 62056 legt COSEM-Schnittstellenklassen zur Modellierung neuer Funktionalitäten für die intelligente Messung sowie die Verknüpfung dieser Schnittstellenklassen mit OBIS fest.

Die informativen Anhänge A bis F enthalten Änderungen an den vorhandenen Schnittstellenklassen.

3 Begriffe und Abkürzungen

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe und Abkürzungen.

3.1 Begriffe im Zusammenhang mit dem Abbildübertragungsprozess (siehe 5.3.6)

3.1.1

Abbild

(en: Image)

Binärdaten einer bestimmten Größe

Anmerkung 1 zum Begriff: Ein „Image“ kann als Container betrachtet werden. Es kann aus einem oder mehreren Elementen bestehen („image_to_activate“), die zusammen übertragen, überprüft oder aktiviert werden.

3.1.2

Abbildgröße

(en: ImageSize)

Größe des gesamten zu übertragenden „Images“

Anmerkung 1 zum Begriff: Die „ImageSize“ wird in Oktetten ausgedrückt.

^{N1)} Nationale Fußnote: Die Nummerierung aus IEC 62056-6-2:2016-02 wurde beibehalten.

3.1.3

Abbildblock

(en: ImageBlock)

Teil des „Images“ mit einer bestimmten „ImageBlockSize“

Anmerkung 1 zum Begriff: Das „Image“ wird in Form von „ImageBlocks“ übertragen. Jeder Block ist durch seine „Image BlockNumber“ gekennzeichnet.

3.1.4

Abbildblockgröße

(en: ImageBlockSize)

Größe des „ImageBlocks“, ausgedrückt in Oktetten

3.1.5

Abbildblocknummer

(en: ImageBlockNumber)

Kenntnis eines „ImageBlocks“. „ImageBlocks“ werden fortlaufend nummeriert, beginnend bei 0.

Die Bedeutung der oben genannten Begriffe ist in Bild 1 veranschaulicht.

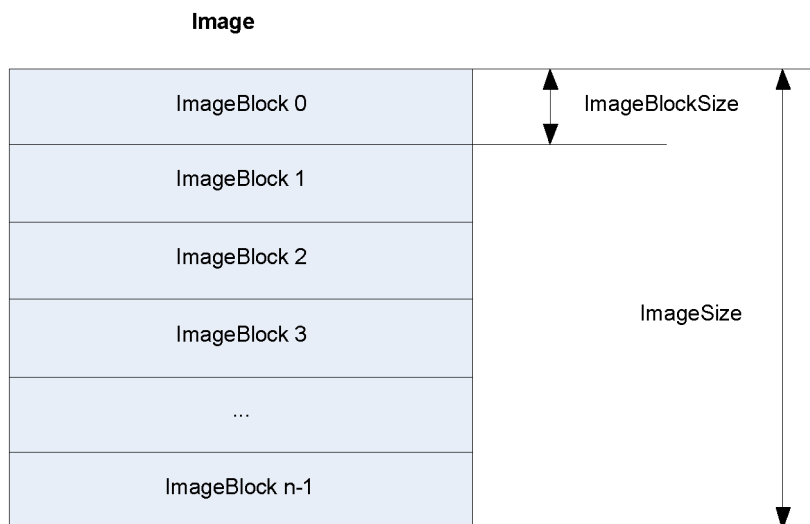


Bild 1 – Die Bedeutung der Begriffe im Hinblick auf das „Image“

3.2 Begriffe im Zusammenhang mit den S-FSK-PLC-Einrichtungsklassen (siehe 5.8)

3.2.1

Initiator

(en: Initiator)

Nutzerelement einer Client-SMAE (Systemmanagement-Anwendungseinheit)

Anmerkung 1 zum Begriff: Der Initiator verwendet die CIASE und xDLMS ASE und ist durch seinen Systemnamen gekennzeichnet.

[QUELLE: IEC 61334-4-511:2000, 3.8.1]

3.2.2

aktiver Initiator

(en: active initiator)

Initiator, der eine CIASE-Register-Anforderung ausgibt oder ausgegeben hat, wenn der Server sich im nicht konfigurierten Zustand befindet

[QUELLE: IEC 61334-4-511:2000, 3.9.1]

3.2.3**neues System**

(en: new system)

Serversystem, das sich im nicht konfigurierten Zustand befindet: seine MAC-Adresse ist gleich „NEW-address“

[QUELLE: IEC 61334-4-511:2000, 3.9.3]

3.2.4**neuer Systemtitel**

(en: new system title)

Systemtitel eines neuen Systems

Anmerkung 1 zum Begriff: Dies ist der Systemtitel eines neuen Systems, das sich im neuen Zustand befindet.

[QUELLE: IEC 61334-4-511:2000, 3.9.4]

3.2.5**registriertes System**

(en: registered system)

Serversystem, das eine individuelle, gültige MAC-Adresse hat (deshalb nicht identisch mit der „NEW Address“, siehe IEC 61334-5-1:2001: Medium Access Control)

[QUELLE: IEC 61334-4-511:2000, 3.9.5]

3.2.6**Berichtersystem**

(en: reporting system)

Serversystem, das einen Discover-Bericht ausgibt

[QUELLE: IEC 61334-4-511:2000, 3.9.6, modifiziert, um einen Fehler in IEC 61334-4-511:2000 zu berichtigen]

3.2.7**Subslot**

(en: sub-slot)

erforderliche Zeit, um zwei Bytes durch die physikalische Schicht zu übertragen

Anmerkung 1 zum Begriff: Zeitschlitze sind im RepeaterCall-Modus der physikalischen Schicht in Subslots eingeteilt.

3.2.8**Zeitschlitz**

(en: timeslot)

Zeit, die zur Übertragung eines physikalischen Rahmens erforderlich ist

Anmerkung 1 zum Begriff: Wie in IEC 61334-5-1, 3.3.1 festgelegt, umfasst ein physikalischer Rahmen 2 Byte Präambel, 2 Byte Start-Subrahmenbegrenzer, 38 Byte PSDU und 3 Byte Pause.

3.3 Begriffe im Zusammenhang mit den Einrichtungs-ICs für PRIME-NB-OFDM-PLC (siehe 5.10)

Begriffe im Zusammenhang mit der Bitübertragungsschicht

3.3.1**Basisknoten**

(en: base node)

Masterknoten, der die Ressourcen eines Teilnetzes steuert und verwaltet

[QUELLE: ITU-T G.9904:2012, 3.2.1]

3.3.2

Beacon-Slot

(en: beacon slot)

Stelle der Beacon-PDU innerhalb eines Rahmens

[QUELLE: ITU-T G.9904:2012, 3.2.2]

3.3.3

Knoten

(en: node)

jedes Element eines Teilnetzes, das Daten an andere Teilnetzelemente übertragen und Daten von diesen empfangen kann

[QUELLE: ITU-T G.9904:2012, 3.2.9]

3.3.4

Registrierung

(en: registration)

Prozess, durch den ein Dienstknoten als Teilnehmer des Teilnetzes akzeptiert und ihm eine LNID zugewiesen wird

[QUELLE: ITU-T G.9904:2012, 3.2.12]

3.3.5

Dienstknoten

(en: service node)

jeder Knoten eines Teilnetzes, der kein Basisknoten ist

[QUELLE: ITU-T G.9904:2012, 3.2.13]

3.3.6

Teilnetz

(en: subnetwork)

Menge von Elementen, die durch Einhaltung dieser Spezifikation kommunizieren können und einen einzigen Basisknoten gemeinsam nutzen

[QUELLE: ITU-T G.9904:2012, 3.2.15]

Begriffe im Zusammenhang mit der MAC-Schicht

3.3.7

Zustand „Getrennt“ <eines Dienstknotens>

(en: disconnected state <of a service node>)

anfänglicher funktionaler Zustand aller Dienstknoten. Im Zustand „Getrennt“ kann ein Dienstknoten keine Daten übermitteln oder Daten anderer Knoten weitergeben; seine Hauptfunktion besteht darin, ein Teilnetz in Reichweite zu suchen und sich in diesem Netz zu registrieren.

[QUELLE: ITU-T G.9904:2012, 8.1]

3.3.8

Zustand „Endgerät“ <eines Dienstknotens>

(en: terminal state <of a service node>)

in diesem funktionalen Zustand kann ein Dienstknoten Verbindungen aufbauen und Daten übermitteln; er kann aber keine Daten anderer Knoten weitergeben

[QUELLE: ITU-T G.9904:2012, 8.1]

3.3.9**Zustand „Schalter“ <eines Dienstknotens>**

(en: switch state <of a service node>)

in diesem funktionalen Zustand kann ein Dienstknoten alle Funktionen eines Endgerätes ausführen. Zusätzlich kann er Daten an andere und von anderen Knoten in demselben Teilnetz weiterleiten. Er bildet einen Zweigpunkt in der Baumstruktur.

[QUELLE: ITU-T G.9904:2012, 8.1]

3.3.10**Beförderung**

(en: promotion)

Prozess, durch den ein Dienstknoten die Berechtigung erhält, Datenverkehr von anderen Knoten umzulenken (zu wiederholen, weiterzuleiten) und als Zweigpunkt in der Baumstruktur des Teilnetzes zu agieren. Eine erfolgreiche Beförderung stellt den Übergang vom Zustand „Endgerät“ in den Zustand „Schalter“ dar. Befindet sich ein Dienstknoten im Zustand „Getrennt“, kann er nicht direkt in den Zustand „Schalter“ übergehen.

[QUELLE: ITU-T G.9904:2012, 8.1]

3.3.11**Herabstufung**

(en: demotion)

Prozess, durch den ein Dienstknoten die Berechtigung, ein Zweigpunkt in der Baumstruktur des Teilnetzes zu sein, verliert. Eine erfolgreiche Herabstufung stellt den Übergang vom Zustand „Schalter“ in den Zustand „Endgerät“ dar.

[QUELLE: ITU-T G.9904:2012, 8.1]

3.4 Begriffe im Zusammenhang mit ZigBee® (siehe 5.12)

ANMERKUNG Begriffe, die mit * gekennzeichnet sind, entstammen der Zigbee®-Spezifikation.

3.4.1**CAD**

(en: Consumer Access Device)

Kundenzugangsgerät; ZigBee®-Gateway-Gerät, das innerhalb des ZigBee®-Netzes als IHD agiert, aber über eine zusätzliche Verbindung zu einem anderen Netz (d. h. WiFi) verfügt

3.4.2**IHD**

(en: In-Home Display)

Heimanzeige; Gerät mit einem Bildschirm zur Anzeige von Energie-Informationen für den Kunden

3.4.3**Installationscode**

(en: install code)

vorkonfigurierter Verbindungsschlüssel (PCLK) mit Hash (über MMO), der einem Trust-Center über band-externe Kommunikation bereitgestellt wird.

Anmerkung 1 zum Begriff: Ein neues Gerät, das dem Netz beitreten möchte, muss diesen Installationscode an das Trust-Center senden, damit dieses den Beitrittsprozess ausführen kann, wobei der Installationscode als Teil der Sicherheitsinformationen verwendet wird.

3.4.4**Verbindungsschlüssel***

(en: link key*)

Schlüssel, der exklusiv von zwei – und ausschließlich von diesen zwei – Entitäten der Anwendungsschicht innerhalb eines PAN gemeinsam genutzt wird

3.4.5

MAC-Adresse/IEEE-Adresse

diese Benennungen werden synonym verwendet und repräsentieren den EUI-64-Code, der dem ZigBee®-Funkgerät zugewiesen ist

3.4.6

ZigBee®

Spezifikation für eine Reihe von Kommunikationsprotokollen höherer Schichten, die eingesetzt werden, um persönliche Netzwerke von kleinen digitalen Funkgeräten mit geringer Sendeleistung ausgehend aufzubauen. ZigBee® setzt auf der Norm IEEE 802.15 auf. Trotz der geringen Sendeleistung übertragen ZigBee®-Geräte oft Daten über größere Entfernungen hinweg, indem sie die Daten über Zwischengeräte weiterleiten, um weiter entfernte Geräte zu erreichen und auf diese Weise ein Maschennetz aufzubauen.

3.4.7

ZigBee®-Client

entspricht in etwa der Rolle des DLMS/COSEM-Clients.

Anmerkung 1 zum Begriff: Zum besseren Verständnis der Interaktion zwischen Client und Server sollte die ZigBee®-PRO-Spezifikation gelesen werden.

3.4.8

ZigBee®-Koordinator*

PAN-Koordinator nach IEEE 802.15.4-2003, der als Hauptsteuereinheit eines auf IEEE 802.15.4-2003 basierenden Netzes für den Netzaufbau verantwortlich ist. Der PAN-Koordinator muss ein Gerät mit voller Funktionalität (FFD) sein.

3.4.9

ZigBee®-Cluster

Satz von Nachrichtentypen für eine bestimmte Gerätefunktion (z. B. Messung, Strombegrenzung)

3.4.10

ZigBee®-Spiegel

Gerät, das die von einem batteriebetriebenen ZigBee®-Gerät veröffentlichten Daten wiederholt, damit andere Netzteilnehmer Daten erhalten können, wenn das batteriebetriebene Gerät aufgrund des Energiesparmodus nicht verfügbar ist

3.4.11

ZigBee® PRO

alternativer Name für das ZigBee®-2007-Protokoll. ZigBee® 2007, das aktuelle Stack-Release, umfasst zwei Stackprofile: Stackprofil 1 (ZigBee®) für die private und geringe gewerbliche Nutzung und Stackprofil 2 (ZigBee® PRO). ZigBee® PRO stellt mehr Funktionen bereit, z. B. Multicasting, Many-To-One-Routing und Hochsicherheit durch SKKE (en: Symmetric-Key Key Exchange), während ZigBee® (Stackprofil 1) einen geringen Funktionsumfang in Bezug auf RAM und Flash bietet. Beide Stackprofile stellen die volle Maschen-netzbildung bereit und sind mit allen ZigBee®-Anwendungsprofilen einsetzbar.

3.4.12

ZigBee®-Router*

FFD nach IEEE 802.15.4-2003 in einem ZigBee®-Netz, das nicht als ZigBee®-Koordinator, aber möglicherweise als Koordinator nach IEEE 802.15.4-2003 innerhalb seiner Netzausdehnung agiert und Nachrichten zwischen Geräten und unterstützenden Assoziationen weiterleiten kann

3.4.13

ZigBee®-Server

entspricht in etwa der Rolle des DLMS/COSEM-Servers

Anmerkung 1 zum Begriff: Zum besseren Verständnis der Interaktion zwischen Client und Server sollte die ZigBee®-PRO-Spezifikation gelesen werden.

3.4.14

ZigBee®-Trust-Center*

Gerät, das von anderen Geräten innerhalb eines ZigBee®-Netzes dazu ermächtigt wurde, Schlüssel zum Zweck der Verwaltung des Netzes und der Anwendungskonfiguration zwischen Endpunkten zu verteilen

3.5 Abkürzungen

Abkürzung	Erklärung
6LoWPAN	IPv6 over Low-Power Wireless Personal Area Network
AA	Anwendungsassoziation
AARE	A-Associate Response – eine APDU des ACSE
AARQ	A-Associate Request – eine APDU des ACSE
ACSE	Assoziationssteuerungs-Dienstelement (en: Association Control Service Element)
ADP	primäre Stationsadresse
ADS	sekundäre Stationsadresse
AGC	automatische Verstärkungsregelung (en: Automatic Gain Control)
AL	Anwendungsschicht (en: Application Layer)
AP	Anwendungsprozess
APDU	Protokolldateneinheit der Anwendungsschicht (en: Application Protocol Data Unit)
APS	Anwendungsunterstützungs-Teilschicht (ZigBee®-Begriff) (en: Application Support Sublayer)
ASE	Anwendungsdienstelement (en: Application Service Element)
A-XDR	Adapted Extended Data Representation (IEC 61334-6)
base_name	„short_name“ (de: Kurzname) zum ersten Attribut („logical_name“) eines COSEM-Objekts
BCD	binär codierte Dezimalzahlen
BER	Bitfehlerquote
CBCP	CallBack Control Protocol (PPP)
CC	Current-Credit (S-FSK-PLC-Profil)
CENELEC	Europäisches Komitee für elektrotechnische Normung
CHAP	Challenge Handshake Authentication Protocol
CIASE	Anwendungsdienstelement zur Initiierung der Konfiguration (S-FSK-PLC-Profil) (en: Configuration Initiation Application Service Element)
class_id	Identifikationscode der Schnittstellenklasse
CLI	Rufnummernanzeige (en: Calling Line Identity)
COSEM	COmpanion Specification for Energy Metering
COSEM-Objekt	Instanz einer COSEM-Schnittstellenklasse

CRC	zyklische Redundanzprüfung (en: Cyclic Redundancy Check)
CSD	Circuit Switched Data
CSMA	Carrier Sense Multiple Access
CtoS	Anforderung vom Client an den Server (en: Client To Server Challenge)
CU	aktuell nicht genutzt (en: Currently Unused)
DC	Delta-Credit (S-FSK-PLC-Profil)
DHCP	Dynamic Host Control Protocol
DIB	Dateninformationsblock (M-Bus)
DIF	Dateninformationsfeld (M-Bus)
DL	Sicherungsschicht (en: Data Link)
DLMS	standardisierte Sprache für die Zählerkommunikation (en: Device Language Message Specification)
DLMS UA	DLMS User Association
DNS	Domänennamen-Server
DSCP	Differentiated Services Code Point
DSSID	direkte Schalterkennung (en: Direct Switch ID)
EAP	Extensible Authentication Protocol
EDGE	Enhanced Data rates for GSM Evolution
EUI-48	erweiterte eindeutige Kennung (en: Extended Unique Identifier) mit einer Länge von 48 Bit
EUI-64	erweiterte eindeutige Kennung (en: Extended Unique Identifier) mit einer Länge von 64 Bit
FCC	Federal Communications Commission
FFD	Gerät mit voller Funktionalität (en: Full-Function Device)
FIFO	First-In, First-Out
FTP	File Transfer Protocol
GCM	Galois/Counter Mode; Algorithmus für die authentifizierte Verschlüsselung mit assoziierten Daten
GMT	Mittlere Greenwich-Zeit (en: Greenwich Mean Time). Ersetzt durch die koordinierte Weltzeit (UTC).
GPRS	General Packet Radio Service
GPS	globales Positionsbestimmungssystem
GSM	Global System for Mobile Communications
HAN	Home Area Network
HART	Highway Addressable Remote Transducer; siehe < http://www.hartcomm.org/ > (im Zusammenhang mit der Sensormanager-Schnittstellenklasse)

HDLC	High-level Data Link Control
HES	Kopfstellensystem (en: Head End System)
HHT	Hand Held Terminal
HLS	Authentifizierung mit hohem Sicherheitsniveau (en: High Level Security Authentication)
HSDPA	High-Speed Downlink Packet Access
IANA	Internet Assigned Numbers Authority
IB	Informationsdatenbank (en: Information Base)
IC	Schnittstellenklasse (COSEM) (en: Interface Class)
IC	Initial-Credit (S-FSK-PLC-Profil)
IEC	Internationale Elektrotechnische Kommission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IPCP	Internet Protocol Control Protocol
IPv4	Internet Protocol, Version 4
IPv6	Internet Protocol, Version 6
ISO	Internationale Normungsorganisation
ISP	Internetdiensteanbieter (en: Internet Service Provider)
IT	Informationstechnik
ITU-T	Internationale Fernmeldeunion – Sektor „Telekommunikation“
KEK	Key Encryption Key
LA	lokaler Bereich (en: Local Area)
LAC	Kennzahl des lokalen Bereiches (en: Local Area Code)
LCID	lokale Verbindungskennung (en: Local Connection Identifier)
LCP	Link Control Protocol
LDN	logischer Geräteiname (en: Logical Device Name)
LLC	logische Verbindungssteuerung (Teilschicht) (en: Logical Link Control)
LLS	niedriges Sicherheitsniveau (en: Low Level Security)
LN	logischer Name
LNID	lokale Knotenkennung (en: Local Node Identifier)
LOADng	6LoWPAN Ad Hoc On-Demand Distance Vector Routing Next Generation

LQI	Verbindungsqualitätsindikator (ZigBee®-Begriff) (en: Link Quality Indicator)
LSB	niedrigstwertiges Bit (en: Least Significant Bit)
LSID	lokale Schalterkennung (en: Local Switch Identifier)
LTE	Long Term Evolution (drahtlose Kommunikation)
m	obligatorisch (en: mandatory)
MAC	Medium Access Control
M-Bus	Zählerbus
MD5	Message Digest Algorithm 5
MIB	Management-Informationsdatenbank (S-FSK-PLC-Profil) (en: Management Information Base)
MID	Richtlinie 2004/22/EG des Europäischen Parlaments und des Rates über Messgeräte
MMO	Matyas-Meyer-Oseas-Hashfunktion (ZigBee®-Begriff)
MPAN	Großbritannien: Meter Point Access Number (entspricht in etwa der Zählpunktnummer in Deutschland) – Verweis auf den Punkt des Stromzählers im Stromversorgungsnetz
MPDU	MAC-Protokolldateneinheit
MSB	höchstwertiges Bit (en: Most Significant Bit)
MSDU	MAC-Dienstdateneinheit (en: MAC Service Data Unit)
MT	Anrufzustellung (en: Mobile Termination)
NB	Schmalband (en: Narrow-band)
ND	Erkennung von Nachbarn (en: Neighbour Discovery)
NTP	Network Time Protocol
o	optional
OBIS	OBject Identification System
OFDM	orthogonales Frequenzmultiplexverfahren (en: Orthogonal Frequency Division Multiplexing)
OTA	Over the Air – bezieht sich auf Firmware-Upgrades unter Verwendung von ZigBee®
PAN	persönliches Netzwerk (Begriff, der im Zusammenhang mit G3-NB-OFDM-PLC ^a und ZigBee® verwendet wird) (en: Personal Area Network)
Pad	Padding
PAP	Password Authentication Protocol
PCLK	vorkonfigurierter Verbindungsschlüssel (ZigBee®-Begriff) (en: Pre-Configured Link Key)

PDU	Protokolldateneinheit (en: Protocol Data Unit)
PhL, PHY	Bitübertragungsschicht (en: Physical Layer)
PIB	PLC-Informationsdatenbank (en: PLC Information Base)
PIN	Persönliche Identifikationsnummer
PLC	Trägerfrequenzanlage (en: Power Line Carrier)
PLMN	öffentliches landgestütztes Mobilfunknetz (en: Public Land Mobile Network)
PNPDU	Promotion-Needed-PDU
POS	Netzausdehnung (en: Personal Operating Space)
PPDU	Protokolldateneinheit der Bitübertragungsschicht (en: Physical Protocol Data Unit)
PPP	Point-to-Point Protocol
PSTN	öffentliches Wählnetz (en: Public Switched Telephone Network)
REJ PDU	Reject-Protokolldateneinheit
RFC	Request for Comments; von der Internet Engineering Task Force veröffentlichtes Dokument
RFD	Gerät mit eingeschränkter Funktionalität (en: Reduced Function Device)
ROHC	robuste Headerkompression (en: Robust Header Compression)
RREP	Route Reply
RREQ	Route Request
RRER	Route Error
RSSI	Indikator für Empfangsfeldstärke (ZigBee®-Begriff) (en: Receive Signal Strength Indication)
SAP	Dienstzugangspunkt (en: Service Access Point)
SAS	Attributsatz für die Konfiguration (ZigBee®-Begriff) (en: Startup Attribute Set)
SCP	Shared Contention Period
SE	Smart Energy
SEP	Smart-Energy-Profil (ZigBee®-Begriff)
S-FSK	Spread Frequency Shift Keying
SGERG88	Verfahren zur Berechnung der Kompressibilität (Gasmessung)
SHA	sicherer Hash-Algorithmus
SID	Schalterkennung (en: Switch Identifier)
SMS	Kurznachrichtendienst

	(en: Short Message Service)
SMTP	Simple Mail Transfer Protocol
SN	Kurzname (en: Short Name)
SNA	Teilnetzadresse (en: Subnetwork Address)
SSCS	dienstspezifische Konvergenzschicht (en: Service Specific Convergence Layer)
StoC	Anforderung vom Server an den Client (en: Server To Client Challenge)
TAB	Im Falle der EURIDIS-Profilen ohne DLMS und ohne DLMS/COSEM: Datencode. Im Falle von Profilen, die DLMS oder DLMS/COSEM verwenden: Wert, der für die Erkennung des Geräts verwendet wird.
TABi	Liste des TAB-Feldes
TCC	Transmission Control Code (IPv4)
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
TOU	Zeit der Nutzung (en: Time Of Use)
TTL	Lebenszeit (en: Time To Live)
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecommunications System
UNC	unkonfiguriert (S-FSK-PLC-Profil)
UTC	Koordinierte Weltzeit
VIB	Wertinformationsblock (M-Bus) (en: Value Information Block)
VIF	Wertinformationsfeld (M-Bus) (en: Value Information Field)
VZ	Vorwertzähler (siehe DIN 43863-3)
wake-up	löst aus, dass sich der Zähler mit dem Kommunikationsnetz verbindet, um für einen Client (z. B. HES) verfügbar zu sein
WAN	Wide Area Network
wM-Bus	Wireless M-Bus
ZTC	ZigBee®-Trust-Center
^a Im Fall der G3-NB-OFDM-PLC-Technologie kann „PAN“ als PLC-Netzwerk verstanden werden.	

English Version

**Electricity metering data exchange - The DLMS/COSEM suite -
Part 6-2: COSEM interface classes
(IEC 62056-6-2:2016)**

Échange des données de comptage de l'électricité -
La suite DLMS/COSEM - Partie 6-2: Classes d'interfaces
COSEM
(IEC 62056-6-2:2016)

Datenkommunikation der elektrischen Energiemessung -
DLMS/COSEM - Teil 6-2: COSEM Interface-Klassen
(IEC 62056-6-2:2016)

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European foreword

The text of document 13/1651A/FDIS, future edition 2 of IEC 62056-6-2, prepared by IEC/TC 13 "Electrical energy measurement and control" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62056-6-2:2016.

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 62056-4-7:2015	NOTE	Harmonized as EN 62056-4-7:2015 (not modified).
IEC 62056-7-6:2013	NOTE	Harmonized as EN 62056-7-6:2013 (not modified).
IEC 62056-8-3:2013	NOTE	Harmonized as EN 62056-8-3:2013 (not modified).
IEC 62056-9-7:2013	NOTE	Harmonized as EN 62056-9-7:2013 (not modified).

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INTRODUCTION

This second edition of IEC 62056-6-2 has been prepared by IEC TC13 WG14 with a significant contribution of the DLMS User Association, its D-type liaison partner.

This edition is in line with the DLMS UA Blue Book Edition 11.0. The main new features are the client user identification mechanism, the "Push setup", the "Parameter monitor", the "GSM diagnostic", the "IPv6 setup", the "Prime NB OFDM PLC setup", the "G3-PLC setup" and the "ZigBee® setup"¹ interface classes.

In 2014, the DLMS UA has published Blue Book Edition 12.0 adding several new features regarding functionality, efficiency and security while keeping full backwards compatibility.

The intention of the DLMS UA is to bring also these latest developments to international standardization. Therefore, IEC TC13 WG14 launched a project to bring these new elements also to the IEC 62056 suite that will lead to Edition 3.0 of the standard.

Object modelling and data identification

Driven by the business needs of the energy market participants – generally in a liberalized, competitive environment – and by the desire to manage natural resources efficiently and to involve the consumers, the utility meter became part of an integrated metering, control and billing system. The meter is not any more a simple data recording device but it relies critically on communication capabilities. Ease of system integration, interoperability and data security are important requirements.

COSEM, the Companion Specification for Energy Metering, addresses these challenges by looking at the utility meter as part of a complex measurement and control system. The meter has to be able to convey measurement results from the metering points to the business processes which use them. It also has to be able to provide information to the consumer and manage consumption and eventually local generation.

COSEM achieves this by using object modelling techniques to model all functions of the meter, without making any assumptions about which functions need to be supported, how those functions are implemented and how the data are transported. The formal specification of COSEM interface classes forms a major part of COSEM.

To process and manage the information it is necessary to uniquely identify all data items in a manufacturer-independent way. The definition of OBIS, the Object Identification System is another essential part of COSEM. It is based on DIN 43863-3:1997, *Electricity meters – Part 3: Tariff metering device as additional equipment for electricity meters – EDIS – Energy Data Identification System*. The set of OBIS codes has been considerably extended over the years to meet new needs.

COSEM models the utility meter as a server application – see 4.7 – used by client applications that retrieve data from, provide control information to, and instigate known actions within the meter via controlled access to the COSEM objects. The clients act as agents for third parties i.e. the business processes of energy market participants.

The standardized COSEM interface classes form an extensible library. Manufacturers use elements of this library to design their products that meet a wide variety of requirements.

¹ ZigBee® is a trademark owned by ZigBee corporation. This information is given for the convenience of users of this document and does not constitute an endorsement by the IEC of the product named.

The server offers means to retrieve the functions supported, i.e. the COSEM objects instantiated. The objects can be organized to logical devices and application associations and to provide specific access rights to various clients.

The concept of the standardized interface class library provides different users and manufacturers with a maximum of diversity while ensuring interoperability.

ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part 6-2: COSEM interface classes

1 Scope

This part of IEC 62056 specifies a model of a meter as it is seen through its communication interface(s). Generic building blocks are defined using object-oriented methods, in the form of interface classes to model meters from simple up to very complex functionality.

Annexes A to F (informative) provide additional information related to some interface classes.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61334-4-32:1996, *Distribution automation using distribution line carrier systems – Part 4: Data communication protocols – Section 32: Data link layer – Logical link control (LLC)*

IEC 61334-4-41:1996, *Distribution automation using distribution line carrier systems – Part 4: Data communication protocols – Section 41: Application protocols – Distribution line message specification*

IEC 61334-4-511:2000, *Distribution automation using distribution line carrier systems – Part 4-511: Data communication protocols – Systems management – CIASE protocol*

IEC 61334-4-512:2001, *Distribution automation using distribution line carrier systems – Part 4-512: Data communication protocols – System management using profile 61334-5-1 – Management Information Base (MIB)*

IEC 61334-5-1:2001, *Distribution automation using distribution line carrier systems – Part 5-1: Lower layer profiles – The spread frequency shift keying (S-FSK) profile*

IEC 61334-6:2000, *Distribution automation using distribution line carrier systems – Part 6: A-XDR encoding rule*

IEC 62056-21:2002, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange*

IEC 62056-31:1999, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 31: Using local area networks on twisted pair with carrier signalling*

NOTE This Edition is referenced in the interface class “IEC twisted pair (1) setup” (class_id: 24, version: 0).

IEC 62056-3-1:2013, *Electricity metering data exchange – The DLMS/COSEM suite – Part 3-1: Use of local area networks on twisted pair with carrier signalling*

NOTE This Edition is referenced in the interface class "IEC twisted pair (1) setup" (class_id: 24, version: 1).

IEC 62056-46:2007, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol*

IEC 62056-5-3:2016, *Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer*

IEC 62056-6-1:2015, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-1: Object identification system (OBIS)*

ISO/IEC 8802-2:1998, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical Link Control*

ISO/IEC/IEEE 60559:2011, *Information technology – Microprocessor Systems – Floating-Point arithmetic*

EN 13757-2:2004, *Communication system for and remote reading of meters – Part 2: Physical and link layer*

EN 13757-3:2004, *Communication systems for and remote reading of meters – Part 3: Dedicated application layer*

NOTE This standard is referenced in the "M-Bus client setup" interface class version 0.

EN 13757-3:2013, *Communication systems for and remote reading of meters – Part 3: Dedicated application layer*

NOTE This standard is referenced in the M-Bus client setup interface class version 1.

EN 13757-5:2015, *Communication systems for meters – Part 5: Wireless relaying*

IEEE 802.15.4:2006, *Standard for Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (WPANs)*

NOTE This standard is also available as ISO/IEC/IEEE 8802-15-4:2010.

ITU-T G.9901:2014, *SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS – Access Networks – In premises networks – Narrow-band orthogonal frequency division multiplexing power line communication transceivers – Power spectral density specification*

ITU-T G.9903 Amd. 1:2013, *SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS – Access networks – In premises networks – Narrow-band orthogonal frequency division multiplexing power line communication transceivers for G3-PLC networks*

ITU-T G.9903:2014, *SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS – Access networks – In premises networks – Narrow-band orthogonal frequency division multiplexing power line communication transceivers for G3-PLC networks*

ITU-T G.9904:2012, *SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS – Access networks – In premises networks – Narrow-band orthogonal frequency division multiplexing power line communication transceivers for PRIME networks*

ETSI GSM 05.08, *Digital cellular telecommunications system (Phase 2+); Radio subsystem link control*

ANSI C12.19:1997, *IEEE 1377:1997, Utility industry end device data tables*

The following RFCs are available online from the Internet Engineering Task Force (IETF):
<http://www.ietf.org/rfc/std-index.txt>, <http://www.ietf.org/rfc/>

IETF STD 51, *The Point-to-Point Protocol (PPP)*, 1994. (Also RFC 1661, RFC 1662)

RFC 791, *Internet Protocol* (Also: IETF STD 0005), 1981. RFC 1332, *The PPP Internet Protocol Control Protocol (IPCP)*, 1992, Updated by: RFC 3241. Obsoletes: RFC 1172

RFC 1570, *PPP LCP Extensions*, 1994

IETF STD 51 / RFC 1661, *The Point-to-Point Protocol (PPP)* (Also: IETF STD 0051), 1994, Updated by: RFC 2153, Obsoletes: RFC 1548

IETF STD 51 / RFC 1662, *PPP in HDLC-like Framing*, (Also: IETF STD 0051), 1994, Obsoletes: RFC 1549

RFC 1994, *PPP Challenge Handshake Authentication Protocol (CHAP)*, 1996. Obsoletes: RFC 1334

RFC 2433, *PPP CHAP Extension*, 1998

RFC 2474, *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*, 1998

RFC 2507, *IP Header Compression*, 1999

RFC 2759, *Microsoft PPP CHAP Extensions*, Version 2, 2000

RFC 3241 *Robust Header Compression (ROHC) over PPP*, 2002. Updates: RFC1332

RFC 3513, *Internet Protocol Version 6 (IPv6) Addressing Architecture*, 2003

RFC 3544, *IP Header Compression over PPP*, 2003

RFC 4861, *Neighbor Discovery for IP version 6 (IPv6)*, 2007

Point-to-Point (PPP) Protocol Field Assignments. Online database. Available from:
<http://www.iana.org/assignments/ppp-numbers/ppp-numbers.xhtml>

3 Terms, definitions and abbreviations

For the purposes of this document, the following terms, definitions and abbreviations apply.

3.1 Terms and definitions related to the Image transfer process (see 5.3.6)

3.1.1

Image

binary data of a specified size

Note 1 to entry: An Image can be seen as a container. It may consist of one or multiple elements (*image_to_activate*) which are transferred, verified and activated together.

3.1.2

ImageSize

size of the whole Image to be transferred

Note 1 to entry: ImageSize is expressed in octets.

3.1.3

ImageBlock

part of the Image of size ImageBlockSize

Note 1 to entry: The Image is transferred in ImageBlocks. Each block is identified by its ImageBlockNumber.

3.1.4

ImageBlockSize

size of ImageBlock expressed in octets

3.1.5

ImageBlockNumber

identifier of an ImageBlock. ImageBlocks are numbered sequentially, starting from 0.

The meaning of the definitions above is illustrated in Figure 1.

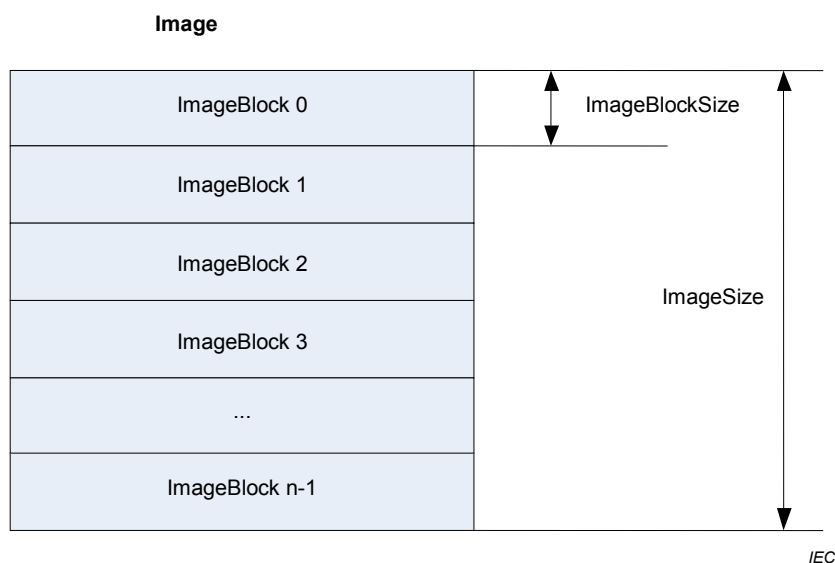


Figure 1 – Meaning of the definitions concerning the Image

3.2 Terms and definitions related to the S-FSK PLC setup classes (see 5.8)

3.2.1

initiator

user-element of a client System Management Application Entity (SMAE)

Note 1 to entry: The initiator uses the CIASE and xDLMS ASE and is identified by its system title.

[SOURCE: IEC 61334-4-511:2000, 3.8.1]

3.2.2

active initiator

initiator which issues or has last issued a CIASE Register request when the server is in the unconfigured state

[SOURCE: IEC 61334-4-511:2000, 3.9.1]

3.2.3

new system

server system which is in the unconfigured state: its MAC address equals "NEW-address"

[SOURCE: IEC 61334-4-511:2000, 3.9.3]

3.2.4

new system title

system-title of a new system

Note 1 to entry: This is the system title of a system, which is in the new state.

[SOURCE: IEC 61334-4-511:2000, 3.9.4]

3.2.5

registered system

server system which has an individual valid MAC address (therefore, different from "NEW Address", see IEC 61334-5-1:2001: Medium Access Control)

[SOURCE: IEC 61334-4-511:2000, 3.9.5]

3.2.6

reporting system

server system which issues a DiscoverReport

[SOURCE: IEC 61334-4-511:2000, 3.9.6, modified, to correct an error in IEC 61334-4-511:2000]

3.2.7

sub-slot

time needed to transmit two bytes by the physical layer

Note 1 to entry: Timeslots are divided to sub-slots in the RepeaterCall mode of the physical layer.

3.2.8

timeslot

time needed to transmit a physical frame

Note 1 to entry: As specified in IEC 61334-5-1, 3.3.1, a physical frame comprises 2 bytes preamble, 2 bytes start subframe delimiter, 38 bytes PSDU and 3 bytes pause.

3.3 Terms and definitions related to the PRIME NB OFDM PLC setup ICs (see 5.10)

Definitions related to the physical layer

3.3.1

base node

master node, which controls and manages the resources of a subnetwork

[SOURCE: ITU-T G.9904:2012, 3.2.1]

3.3.2

beacon slot

location of the beacon PDU within a frame

[SOURCE: ITU-T G.9904:2012, 3.2.2]

3.3.3

node

any one element of a subnetwork, which is able to transmit to and receive from other subnetwork elements

[SOURCE: ITU-T G.9904:2012, 3.2.9]

3.3.4

registration

process by which a service node is accepted as member of the subnetwork and allocated a LNID

[SOURCE: ITU-T G.9904:2012, 3.2.12]

3.3.5

service node

any one node of a subnetwork, which is not a base node

[SOURCE: ITU-T G.9904:2012, 3.2.13]

3.3.6

subnetwork

set of elements that can communicate by complying with this specification and share a single base node

[SOURCE: ITU-T G.9904:2012, 3.2.15]

Definitions related to the MAC layer

3.3.7

disconnected state <of a service node>

initial functional state for all service nodes. When disconnected, a service node is not able to communicate data or switch other nodes' data; its main function is to search for a subnetwork within its reach and try to register on it

[SOURCE: ITU-T G.9904:2012, 8.1]

3.3.8

terminal state <of a service node>

when in this functional state a service node is able to establish connections and communicate data, but it is not able to switch other nodes' data

[SOURCE: ITU-T G.9904:2012, 8.1]

3.3.9

switch state <of a service node>

when in this functional state a service node is able to perform all Terminal functions. Additionally, it is able to forward data to and from other nodes in the same subnetwork. It is a branch point on the tree structure

[SOURCE: ITU-T G.9904:2012, 8.1]

3.3.10 **promotion**

process by which a service node is qualified to switch (repeat, forward) data traffic from other nodes and act as a branch point on the subnetwork tree structure. A successful promotion represents the transition between Terminal and Switch state. When a service node is in the Disconnected state, it cannot directly transition to Switch state

[SOURCE: ITU-T G.9904:2012, 8.1]

3.3.11 **demotion**

process by which a service node ceases to be a branch point on the subnetwork tree structure. A successful demotion represents the transition between Switch and Terminal state

[SOURCE: ITU-T G.9904:2012, 8.1]

3.4 Terms and definitions related to ZigBee® (see 5.12)

NOTE Terms marked with * are from the ZigBee® Specification.

3.4.1 **CAD**

Consumer Access Device; a ZigBee® gateway device that acts like an IHD within the ZigBee® network, but has an additional connection to a different network (i.e. WiFi)

3.4.2 **IHD**

in Home Display; a device that has a screen for the displaying of Energy information to the consumer

3.4.3 **install code**

a Hashed (via MMO) Pre-Configured Linked Key (PCLK) that is provided to a Trust Center via out-of-band communications

Note 1 to entry: A new device wishing to join the network would need to send this install code to the Trust Center, which would allow the Trust Center to execute the joining process, using this install code as part of the security information.

3.4.4 **link key ***

key that is shared exclusively between two, and only two, peer application-layer entities within a PAN

3.4.5 **MAC address/IEEE address**

these are used synonymously to represent the EUI-64 code allocated to the ZigBee® Radio

3.4.6 **ZigBee®**

specification for a suite of high level communication protocols used to create personal area networks built from small, low-power digital radios. ZigBee® is based on an IEEE 802.15 standard. Though low-powered, ZigBee® devices often transmit data over longer distances by passing data through intermediate devices to reach more distant ones, creating a mesh network

3.4.7

ZigBee® client

this is similar to the role of the DLMS/COSEM Client

Note 1 to entry: For a greater understanding of the interaction between the client and server the ZigBee® PRO specification should be read.

3.4.8

ZigBee® coordinator *

an IEEE 802.15.4-2003 PAN coordinator that is the principal controller of an IEEE 802.15.4-2003-based network that is responsible for network formation. The PAN coordinator must be a full function device (FFD)

3.4.9

ZigBee® cluster

set of message types related to a certain device function (e.g. metering, ballast control)

3.4.10

ZigBee® mirror

device which echoes data being published by a battery operated ZigBee® device, allowing other network actors to obtain data while the battery operated device is unavailable due to power saving

3.4.11

ZigBee® PRO

alternative name for the ZigBee® 2007 protocol. ZigBee® 2007, now the current stack release, contains two stack profiles, stack profile 1 (simply called ZigBee®), for home and light commercial use, and stack profile 2 (called ZigBee® PRO). ZigBee® PRO offers more features, such as multi-casting, many-to-one routing and high security with Symmetric-Key Key Exchange (SKKE), while ZigBee® (stack profile 1) offers a smaller footprint in RAM and flash. Both offer full mesh networking and work with all ZigBee® application profiles

3.4.12

ZigBee® router *

an IEEE 802.15.4-2003 FFD participating in a ZigBee® network, which is not the ZigBee® coordinator but may act as an IEEE 802.15.4-2003 coordinator within its personal operating space, that is capable of routing messages between devices and supporting associations

3.4.13

ZigBee® server

this is similar to the role of the DLMS/COSEM Server

Note 1 to entry: For a greater understanding of the interaction between the client and server the ZigBee® PRO specification should be read.

3.4.14

ZigBee® Trust Center *

device trusted by devices within a ZigBee® network to distribute keys for the purpose of network and end-to-end application configuration management

3.5 Abbreviations

Abbreviation	Explanation
6LoWPAN	IPv6 over Low-Power Wireless Personal Area Network
AA	Application Association
AARE	A-Associate Response – an APDU of the ACSE
AARQ	A-Associate Request – an APDU of the ACSE
ACSE	Association Control Service Element
ADP	Primary Station Address
ADS	Secondary Station Address
AGC	Automatic Gain Control
AL	Application layer
AP	Application process
APDU	Application Protocol Data Unit
APS	Application Support Sublayer (ZigBee® term)
ASE	Application Service Element
A-XDR	Adapted Extended Data Representation (IEC 61334-6)
base_name	The short_name corresponding to the first attribute ("logical_name") of a COSEM object
BCD	Binary Coded Decimal
BER	Bit Error Rate
CBCP	CallBack Control Protocol (PPP)
CC	Current Credit (S-FSK PLC profile)
CENELEC	European Committee for Electrotechnical Standardization
CHAP	Challenge Handshake Authentication Protocol
CIASE	Configuration Initiation Application Service Element (S-FSK PLC profile)
class_id	Interface class identification code
CLI	Calling Line Identity
COSEM	Companion Specification for Energy Metering
COSEM object	An instance of a COSEM interface class
CRC	Cyclic Redundancy Check
CSD	Circuit Switched Data
CSMA	Carrier Sense Multiple Access
CtoS	Client to Server challenge
CU	Currently Unused
DC	Delta credit (S-FSK PLC profile)
DHCP	Dynamic Host Control Protocol
DIB	Data Information Block (M-Bus)
DIF	Data Information Field (M-Bus)
DL	Data Link
DLMS	Device Language Message Specification
DLMS UA	DLMS User Association
DNS	Domain Name Server
DSCP	Differentiated Services Code Point
DSSID	Direct Switch ID
EAP	Extensible Authentication Protocol

Abbreviation	Explanation
EDGE	Enhanced Data rates for GSM Evolution
EUI-48	48-bit Extended Unique Identifier
EUI-64	64-bit Extended Unique Identifier
FCC	Federal Communications Commission
FFD	Full-Function Device
FIFO	First-In-First-Out
FTP	File Transfer Protocol
GCM	Galois/Counter Mode, an algorithm for authenticated encryption with associated data
GMT	Greenwich Mean Time. Replaced by Coordinated Universal Time (UTC).
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HAN	Home Area Network
HART	Highway Addressable Remote Transducer see http://www.hartcomm.org/ (in relation with the Sensor manager interface class)
HDLC	High-level Data Link Control
HES	Head End System
HHT	Hand Held Terminal
HLS	High Level Security Authentication
HSDPA	High-Speed Downlink Packet Access
IANA	Internet Assigned Numbers Authority
IB	Information Base
IC	Interface Class (COSEM)
IC	Initial credit (S-FSK PLC profile)
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IPCP	Internet Protocol Control Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standardization
ISP	Internet Service Provider
IT	Information Technology
ITU-T	International Telecommunication Union – Telecommunication
KEK	Key Encryption Key
LA	Local Area
LAC	Local Area Code
LAN	Local Area Network
LCID	Local Connection Identifier
LCP	Link Control Protocol
LDN	Logical Device Name
LLC	Logical Link Control (sublayer)
LLS	Low Level Security

Abbreviation	Explanation
LN	Logical Name
LNID	Local Node Identifier
LOADng	6LoWPAN Ad Hoc On-Demand Distance Vector Routing Next Generation (LOADng)
LQI	Link Quality Indicator (ZigBee ® term)
LSB	Least Significant Bit
LSID	Local Switch Identifier
LTE	Long Term Evolution (Wireless communication)
m	mandatory
MAC	Medium Access Control
M-Bus	Meter Bus
MD5	Message Digest Algorithm 5
MIB	Management Information Base (S-FSK PLC profile)
MID	Measuring Instruments Directive 2004/22/EC of the European Parliament and of the Council
MMO	Matyas-Meyer-Oseas hash (ZigBee ® term)
MPAN	(UK term) Meter Point Access Number – reference of the location of the Electricity meter on the electricity distribution network.
MPDU	MAC Protocol Data Unit
MSB	Most Significant Bit
MSDU	MAC Service Data Unit
MT	Mobile Termination
NB	Narrow-band
ND	Neighbour Discovery
NTP	Network Time Protocol
o	optional
OBIS	OBject Identification System
OFDM	Orthogonal Frequency Division Multiplexing
OTA	Over the Air – Refers to Firmware Upgrade using ZigBee ®
PAN	Personal Area Network (Term used in relation to G3-PLC ¹) and ZigBee ®
Pad	Padding
PAP	Password Authentication Protocol
PCLK	Pre-Configured Link Key (ZigBee® term)
PDU	Protocol Data Unit
PhL, PHY	Physical Layer
PIB	PLC Information Base
PIN	Personal Identity Number
PLC	Power Line Carrier
PLMN	Public Land Mobile Network
PNPDU	Promotion Needed PDU
POS	Personal Operating Space (ZigBee ®)
PPDU	Physical Protocol Data Unit
PPP	Point-to-Point Protocol
PSTN	Public Switched Telephone Network
REJ PDU	Reject Protocol Data Unit

Abbreviation	Explanation
RFC	Request for Comments; a document published by the Internet Engineering Task Force
RFD	Reduced Function Device
ROHC	Robust Header Compression
RREP	Route Reply
RREQ	Route Request
RRER	Route Error
RSSI	Receive Signal Strength Indication (ZigBee® term)
SAP	Service Access Point
SAS	Startup Attribute Set (ZigBee® term)
SCP	Shared Contention Period
SE	Smart Energy
SEP	Smart Energy Profile (ZigBee® term)
S-FSK	Spread – Frequency Shift Keying
SGERG88	Method for calculation of compressibility (Gas metering)
SHA	Secure Hash Algorithm
SID	Switch identifier
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
SN	Short Name
SNA	Subnetwork Address
SSCS	Service Specific Convergence Layer
StoC	Server to Client Challenge
TAB	In the case of the EURIDIS profiles without DLMS and without DLMS/COSEM: data code. In the case of profiles using DLMS or DLMS/COSEM: value at which the equipment is programmed for Discovery
TABi	List of TAB field
TCC	Transmission Control Code (IPv4)
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
TOU	Time of use
TTL	Time To Live
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecommunications System
UNC	Unconfigured (S-FSK PLC profile)
UTC	Coordinated Universal Time
VIB	Value Information Block (M-Bus)
VIF	Value Information Field (M-Bus)
VZ	Billing period counter (Form <i>Vorwertzähler</i> in German, see DIN 43863-3)
wake-up	trigger the meter to connect to the communication network to be available to a client (e.g. HES)
WAN	Wide Area Network
wM-Bus	Wireless M-Bus
ZTC	ZigBee® Trust Center
1) In the case of the G3-PLC technology, PAN may be defined as PLC Area Network.	

4 Basic principles

4.1 General

This Clause 4 describes the basic principles on which the COSEM interface classes (ICs) are built. It also gives a short overview on how interface objects – instantiations of the ICs – are used for communication purposes. Data collection systems and metering equipment from different vendors, following these specifications, can exchange data in an interoperable way.

For specification purposes, this standard uses the technique of object modelling.

An object is a collection of attributes and methods. Attributes represent the characteristics of an object. The value of an attribute may affect the behaviour of an object. The first attribute of any object is the *logical_name*. It is one part of the identification of the object. An object may offer a number of methods to either examine or modify the values of the attributes.

Objects that share common characteristics are generalized as an interface class, identified with a *class_id*. Within a specific IC, the common characteristics (attributes and methods) are described once for all objects. Instantiations of ICs are called COSEM interface objects.

Manufacturers may add proprietary methods and attributes to any object; see 4.2.

Figure 2 illustrates these terms by means of an example:

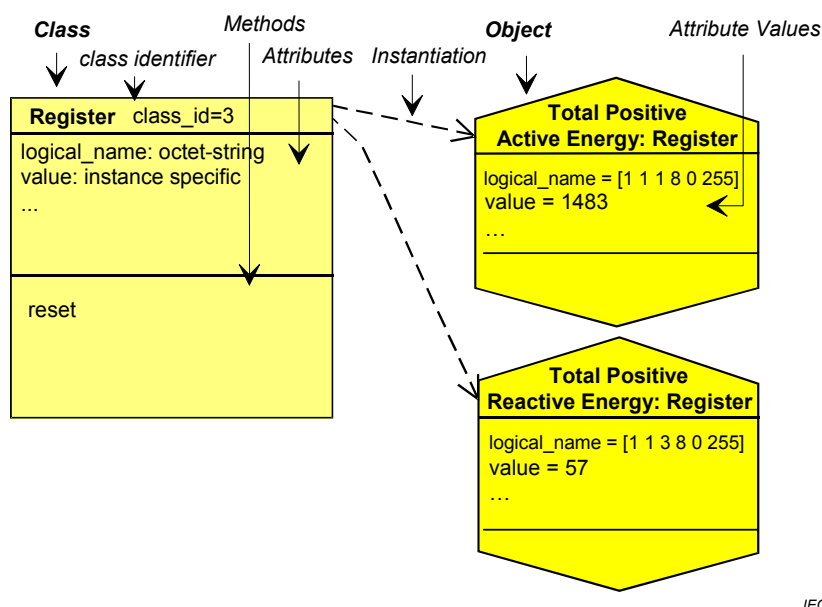


Figure 2 – An interface class and its instances

The IC “Register” is formed by combining the features necessary to model the behaviour of a generic register (containing measured or static information) as seen from the client (data collection system, hand held terminal). The contents of the register are identified by the attribute *logical_name*. The *logical_name* contains an OBIS identifier (see IEC 62056-6-1:2015). The actual (dynamic) content of the register is carried by its *value* attribute.

Defining a specific meter means defining several specific objects. In the example of Figure 2, the meter contains two registers; i.e. two specific instances of the IC “Register” are instantiated.

Through the instantiation, one COSEM object becomes a “total, positive, active energy register” whereas the other becomes a “total, positive, reactive energy register”.

NOTE The COSEM interface objects (instances of COSEM ICs) represent the behaviour of the meter as seen from the “outside”. Therefore, modifying the value of an attribute – for example resetting the *value* attribute of a register – is always initiated from the outside. Internally initiated changes of the attributes – for example updating the *value* attribute of a register – are not described in this model.

4.2 Referencing methods

Attributes and methods of COSEM objects can be referenced in two different ways:

Using logical names (LN referencing): In this case, the attributes and methods are referenced via the identifier of the COSEM object instance to which they belong.

The reference for an attribute is: class_id, value of the *logical_name* attribute, attribute_index.

The reference for a method is: class_id, value of the *logical_name* attribute, method_index, where:

- attribute_index is used as the identifier of the attribute required. Attribute indexes are specified in the definition of each IC. They are positive numbers starting with 1. Proprietary attributes may be added: these shall be identified with negative numbers;
- method_index is used as the identifier of the method required. Method indexes are specified in the definition of each IC. They are positive numbers starting with 1. Proprietary methods may be added: these shall be identified with negative numbers.

Using short names (SN referencing): This kind of referencing is intended for use in simple devices. In this case, each attribute and method of a COSEM object is identified with a 13-bit integer. The syntax for the short name is the same as the syntax of the name of a DLMS named variable. See IEC 61334-4-41:1996 and IEC 62056-5-3:2016, Clause 8.

4.3 Reserved base_names for special COSEM objects

In order to facilitate access to devices using SN referencing, some short_names are reserved as base_names for special COSEM objects. The range for reserved base_names is from 0xFA00 to 0xFF8. The following specific base_names are defined, see Table 1.

Table 1 – Reserved base_names for SN referencing

Base_name (objectName)	COSEM object
0xFA00	Association SN
0xFB00	Script table (instantiation: Broadcast “Script table”)
0xFC00	SAP assignment
0xFD00	“Data” or “Register” object containing the “COSEM logical device name” in the attribute “value”

4.4 Class description notation

This subclause describes the notation used to define the ICs.

A short text describes the functionality and application of the IC. A table gives an overview of the IC including the class name, the attributes, and the methods. Each attribute and method shall be described in detail. The template is shown below.

Class name	Cardinality	class_id, version			
Attributes	Data type	Min.	Max.	Def.	Short name
1. logical_name (static)	octet-string				x
2. ... (...)	...				x + 0x...
3. ... (...)	...				x + 0x...
Specific methods (if required)	m/o				
1.	...				
2.	...				
3.	...				

Class name Describes the interface class (e.g. "Register", "Clock", "Profile generic"...).

NOTE 1 Interface classes names are mentioned in quotation marks.

Cardinality Specifies the number of instances of the IC within a logical device (see 4.8).

value The IC shall be instantiated exactly "value" times.

min...max. The IC shall be instantiated at least "min." times and at most "max." times. If min. is zero (0) then the IC is optional, otherwise (min. > 0) "min." instantiations of the IC are mandatory.

class_id Identification code of the IC (range 0 to 65 535). The class_id of each object is retrieved together with the logical name by reading the *object_list* attribute of an "Association LN" / "Association SN" object.

- class_id-s from 0 to 8 191 are reserved to be specified by the DLMS UA.
- class_id-s from 8 192 to 32 767 are reserved for manufacturer specific ICs.
- class_id-s from 32 768 to 65 535 are reserved for user group specific ICs.

The DLMS UA reserves the right to assign ranges to individual manufacturers or user groups.

Version Identification code of the version of the IC. The version of each object is retrieved together with the class_id and the logical name by reading the *object_list* attribute of an "Association LN" / "Association SN" object.

Within one logical device, all instances of a certain IC shall be of the same version.

Attributes Specifies the attributes that belong to the IC.

(dyn.) Classifies an attribute that carries a process value, which is updated by the meter itself.

(static) Classifies an attribute, which is not updated by the meter itself (for example configuration data).

NOTE 2 There are some attributes which may be either static or dynamic depending on the application. In these cases this property is not indicated.

NOTE 3 Attribute names use the underscore notation. When mentioned in the text they are in *italic*. Example: *logical_name*

logical_name	octet-string	It is always the first attribute of an IC. It identifies the instantiation (COSEM object) of this IC. The value of the <i>logical_name</i> conforms to OBIS; see Clause 6 and IEC 62056-6-1:2015.
Data type	Defines the data type of an attribute; see 4.5.	
Min.	Specifies if the attribute has a minimum value.	
	x	The attribute has a minimum value.
	<empty>	The attribute has no minimum value.
Max.	Defines if the attribute has a maximum value.	
	x	The attribute has a maximum value.
	<empty>	The attribute has no maximum value.
Def.	Specifies if the attribute has a default value. This is the value of the attribute after reset.	
	x	The attribute has a default value.
	<empty>	The default value is not defined by the IC specification.
Short name	When Short Name (SN) referencing is used, each attribute and method of object instances has to be mapped to short names. The base_name x of each object instance is the DLMS named variable the logical name attribute is mapped to. It is selected in the implementation phase. The IC definition specifies the offsets for the other attributes and for the methods.	
Specific method(s)	Provides a list of the specific methods that belong to the object. Method Name () The method has to be described in the subsection "Method description". NOTE 4 Method names use the underscore notation. When mentioned in the text they are in <i>italic</i> . Example: <i>add_object</i> .	
m/o	Defines if the method is mandatory or optional.	
	m (<i>mandatory</i>)	The method is mandatory.
	o (<i>optional</i>)	The method is optional.

Attribute description

Describes each attribute with its data type (if the data type is not simple), its data format and its properties (minimum, maximum and default values).

Method description

Describes each method and the invoked behaviour of the COSEM object(s) instantiated.

NOTE Services for accessing attributes or methods by the protocol are specified in IEC 62056-5-3:2016, 6.6 to 6.16.

Selective access

The xDLMS attribute-related services typically reference the entire attribute. However, for certain attributes selective access to just a part of the attribute may be provided. The part of the attribute is identified by specific selective access parameters. These are defined as part of the attribute specification.

4.5 Common data types

Table 2 contains the list of data types usable for attributes of COSEM objects.

Table 2 – Common data types

Type description	Tag ^a	Definition	Value range
-- simple data types			
null-data	[0]		
boolean	[3]	boolean	TRUE or FALSE
bit-string	[4]	An ordered sequence of boolean values	
double-long	[5]	Integer32	-2 147 483 648... 2 147 483 647
double-long-unsigned	[6]	Unsigned32	0...4 294 967 295
	[7]	Tag of the "floating-point" type in IEC 61334-4-41:1996, not usable in DLMS/COSEM. See tags [23] and [24]	
octet-string	[9]	An ordered sequence of octets (8 bit bytes)	
visible-string	[10]	An ordered sequence of ASCII characters	
	[11]	Tag of the "time" type in IEC 61334-4-41:1996, not usable in DLMS/COSEM. See tag [27]	
utf8-string	[12]	An ordered sequence of characters encoded as UTF-8	
bcd	[13]	binary coded decimal	
integer	[15]	Integer8	-128...127
long	[16]	Integer16	-32 768...32 767
unsigned	[17]	Unsigned8	0...255
long-unsigned	[18]	Unsigned16	0...65 535
long64	[20]	Integer64	- 2 ⁶³ ...2 ⁶³ -1
long64-unsigned	[21]	Unsigned64	0...2 ⁶⁴ -1
enum	[22]	The elements of the enumeration type are defined in the <i>Attribute description</i> or <i>Method description</i> section of a COSEM IC specification.	0...255
float32	[23]	OCTET STRING (SIZE(4))	For formatting, see 4.6.2.
float64	[24]	OCTET STRING (SIZE(8))	
date-time	[25]	OCTET STRING SIZE(12))	
date	[26]	OCTET STRING (SIZE(5))	
time	[27]	OCTET STRING (SIZE(4))	For formatting, see 4.6.1.
-- complex data types			
array	[1]	The elements of the array are defined in the <i>Attribute</i> or <i>Method description</i> section of a COSEM IC specification.	
structure	[2]	The elements of the structure are defined in the <i>Attribute</i> or <i>Method description</i> section of a COSEM IC specification.	
compact array	[19]	Provides an alternative, compact encoding of complex data.	
-- CHOICE		For some COSEM interface objects attributes, the data type may be chosen at instantiation, in the implementation phase of the COSEM server. The server always shall send back the data type and the value of each attribute, so that together with the logical name an unambiguous interpretation is ensured. The list of possible data types is defined in the "Attribute description" section of a COSEM IC specification.	

^a The tags are as defined in IEC 62056-5-3:2016, Clause 8.

4.6 Data formats

4.6.1 Date and time formats

Date and time information may be represented using the data type *octet-string*.

NOTE 1 In this case the encoding includes the tag of the data type *octet-string*, the length of the octet-string and the elements of *date*, *time* and /or *date-time* as applicable.

Date and time information may be also represented using the data types *date*, *time* and *date-time*.

NOTE 2 In these cases, the encoding includes only the tag of the data types *date*, *time* or *date-time* as applicable and the elements of date, time or date-time.

NOTE 3 The (SIZE ()) specifications are applicable only when date, time or date time are represented by the data types *date*, *time* or *date-time*.

<i>date</i>	OCTET STRING (SIZE(5)) { year highbyte, year lowbyte, month, day of month, day of week } Where: year: interpreted as long-unsigned range 0...big 0xFFFF = not specified year highbyte and year lowbyte represent the 2 bytes of the long-unsigned month: interpreted as unsigned range 1...12, 0xFD, 0xFE, 0xFF 1 is January 0xFD = daylight_savings_end 0xFE = daylight_savings_begin 0xFF = not specified dayOfMonth: interpreted as unsigned range 1...31, 0xFD, 0xFE, 0xFF 0xFD = 2nd last day of month 0xFE = last day of month 0xE0 to 0xFC = reserved 0xFF = not specified dayOfWeek: interpreted as unsigned range 1...7, 0xFF 1 is Monday 0xFF = not specified For repetitive dates, the unused parts shall be set to "not specified".
-------------	--

The elements dayOfMonth and dayOfWeek shall be interpreted together:

- if last dayOfMonth is specified (0xFE) and dayOfWeek is wildcard, this specifies the last calendar day of the month;
- if last dayOfMonth is specified (0xFE) and an explicit dayOfWeek is specified (for example 7, Sunday) then it is the last occurrence of the weekday specified in the month, i.e. the last Sunday;
- if the year is not specified (0xFFFF), and dayOfMonth and dayOfWeek are both explicitly specified, this shall be interpreted as the dayOfWeek on, or following dayOfMonth;
- if the year and month are specified, and both the dayOfMonth and dayOfWeek are explicitly specified but the values are not consistent it shall be considered as an error.

Examples:

- 1) year = 0xFFFF, month = 0xFF, dayOfMonth = 0xFE, dayOfWeek = 0xFF: last day of the month in every year and month;
- 2) year = 0xFFFF, month = 0xFF, dayOfMonth = 0xFE, dayOfWeek = 0x07: last Sunday in every year and month;
- 3) year = 0xFFFF, month = 0x03, dayOfMonth = 0xFE, dayOfWeek = 0x07: last Sunday in March in every year;
- 4) year = 0xFFFF, month = 0x03, dayOfMonth = 0x01, dayOfWeek = 0x07: first Sunday in March in every year;
- 5) year = 0xFFFF, month = 0x03, dayOfMonth = 0x16, dayOfWeek = 0x05: fourth Friday in March in every year;
- 6) year = 0xFFFF, month = 0x0A, dayOfMonth = 0x16, dayOfWeek = 0x07: fourth Sunday in October in every year;
- 7) year = 0x07DE, month = 0x08, dayOfMonth = 0x13, (2014.08.13, Wednesday) dayOfWeek = 0x02 (Tuesday): error, as the dayOfMonth and dayOfWeek in the given year and month do not match.

time

OCTET STRING (SIZE(4))

```
{
    hour,
    minute,
    second,
    hundredths
}
```

Where:

hour: interpreted as unsigned range 0...23, 0xFF,
minute: interpreted as unsigned range 0...59, 0xFF,
second: interpreted as unsigned range 0...59, 0xFF,
hundredths: interpreted as unsigned range 0...99, 0xFF

For hour, minute, second and hundredths: 0xFF = not specified.

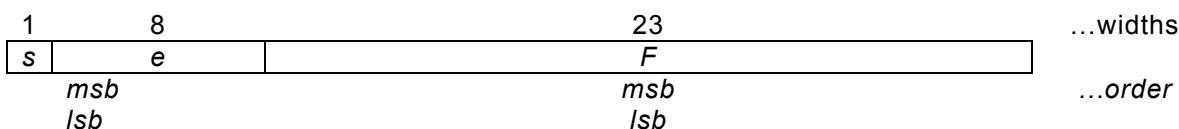
For repetitive times the unused parts shall be set to "not specified".

<i>date-time</i>	OCTET STRING (SIZE(12)) <pre>{ year highbyte, year lowbyte, month, day of month, day of week, hour, minute, second, hundredths of second, deviation highbyte, deviation lowbyte, clock status }</pre> The elements of <i>date</i> and <i>time</i> are encoded as defined above. Some may be set to "not specified" as defined above. In addition: deviation: interpreted as long range -720...+720 in minutes of local time to UTC 0x8000 = not specified Deviation highbyte and deviation lowbyte represent the 2 bytes of the long. clock_status interpreted as unsigned. The bits are defined as follows: bit 0 (LSB): invalid ^a value, bit 1: doubtful ^b value, bit 2: different clock base ^c, bit 3: invalid clock status ^d, bit 4: reserved, bit 5: reserved, bit 6: reserved, bit 7 (MSB): daylight saving active ^e 0xFF = not specified
^a Time could not be recovered after an incident. Detailed conditions are manufacturer specific (for example after the power to the clock has been interrupted). For a valid status, bit 0 shall not be set if bit 1 is set. ^b Time could be recovered after an incident but the value cannot be guaranteed. Detailed conditions are manufacturer specific. For a valid status, bit 1 shall not be set if bit 0 is set. ^c Bit is set if the basic timing information for the clock at the actual moment is taken from a timing source different from the source specified in clock_base. ^d This bit indicates that at least one bit of the clock status is invalid. Some bits may be correct. The exact meaning shall be explained in the manufacturer's documentation. ^e Flag set to true: the transmitted time contains the daylight saving deviation (summer time). Flag set to false: the transmitted time does not contain daylight saving deviation (normal time).	

4.6.2 Floating point number formats

Floating point number formats are defined in ISO/IEC/IEEE 60559:2011.

The single format is:



Where:

s is the sign bit;

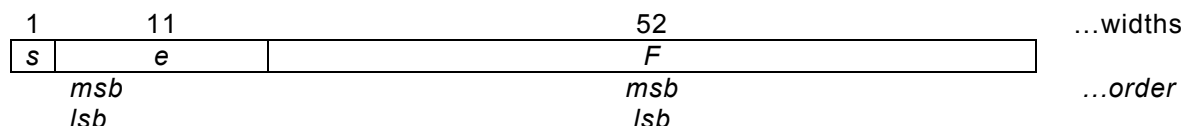
e is the exponent; it is 8 bits wide and the exponent bias is +127;

f is the fraction, it is 23 bits.

With this, the value is (if $0 < e < 255$):

$$v = (-1)^s \cdot 2^{e-127} \cdot (1.f)$$

The double format is:



Where:

s is the sign bit;

e is the exponent; it is 11 bits wide and the exponent bias is +1 023;

f is the fraction, it is 52 bits.

With this, the value is (if $0 < e < 2\ 047$):

$$v = (-1)^s \cdot 2^{e-1023} \cdot (1.f)$$

For details, see ISO/IEC/IEEE 60559:2011.

Floating-point numbers shall be represented as a fixed length octet-string, containing the 4 bytes (float32) of the single format or the 8 bytes (float64) of the double format floating-point number as specified above, most significant byte first.

EXAMPLE 1 The decimal value "1" represented in single floating-point format is:

Bit 31 Sign bit 0 0: + 1: -	Bits 30-23 Exponent field: 01111111 Decimal value of exponent field and exponent: 127 -127 = 0	Bits 22-0 Significand 1.000000000000000000000000 Decimal value of the significand: 1.0000000
--	--	--

NOTE The significand is the binary number 1 followed by the radix point followed by the binary bits of the fraction.

The encoding, including the tag of the data type is (all values are hexadecimal): 17 3F 80 00 00.

EXAMPLE 2 The decimal value "1" represented in double floating-point format is:

Bit 63 Sign bit 0 0: + 1: -	Bits 62-52 Exponent field: 0111111111 Decimal value of exponent field and exponent: 1023 -1023 = 0	Bits 51-0 Significand 1.0000000000000000000000000000000000000000000000000000000 Decimal value of the significand: 1.0000000000000000
--	--	--

The encoding, including the tag of the data type is (all values are hexadecimal): 18 3F F0 00 00 00 00 00.

EXAMPLE 3 The decimal value “62056” represented in single floating-point format is:

Bit 31 Sign bit 0 0: + 1: -	Bits 30-23 Exponent field: 10001110 Decimal value of exponent field and exponent: 142 -127 = 15	Bits 22-0 Significand 1.111001001101000000000000 Decimal value of the significand: 1.8937988
--	--	--

The encoding, including the tag of the data type is (all values are hexadecimal): 17 47 72 68 00.

EXAMPLE 4 The decimal value “62056” represented in double floating-point format is:

[illegible]

The encoding, including the tag of the data type is (all values are hexadecimal): 18 40 EE 4D 00 00 00 00 00.

4.7 The COSEM server model

The COSEM server is structured into three hierarchical levels as shown in Figure 3:

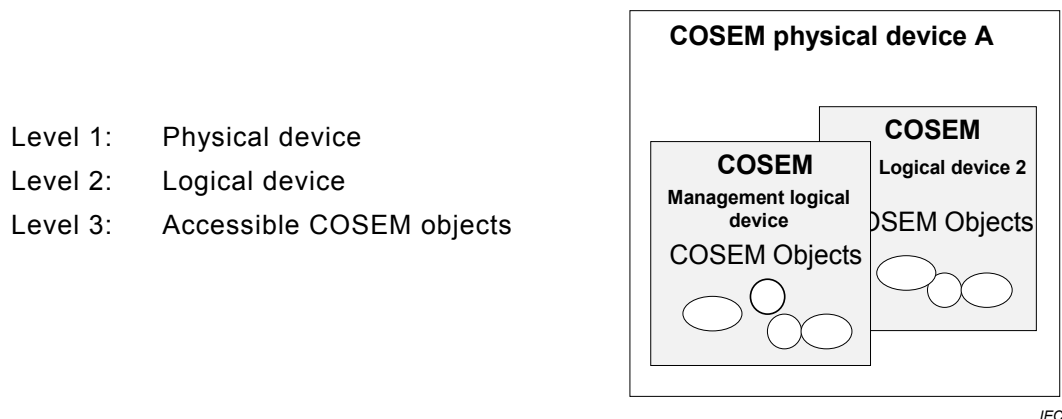


Figure 3 – The COSEM server model

The example in Figure 4 shows how a combined metering device can be structured using the COSEM server model.

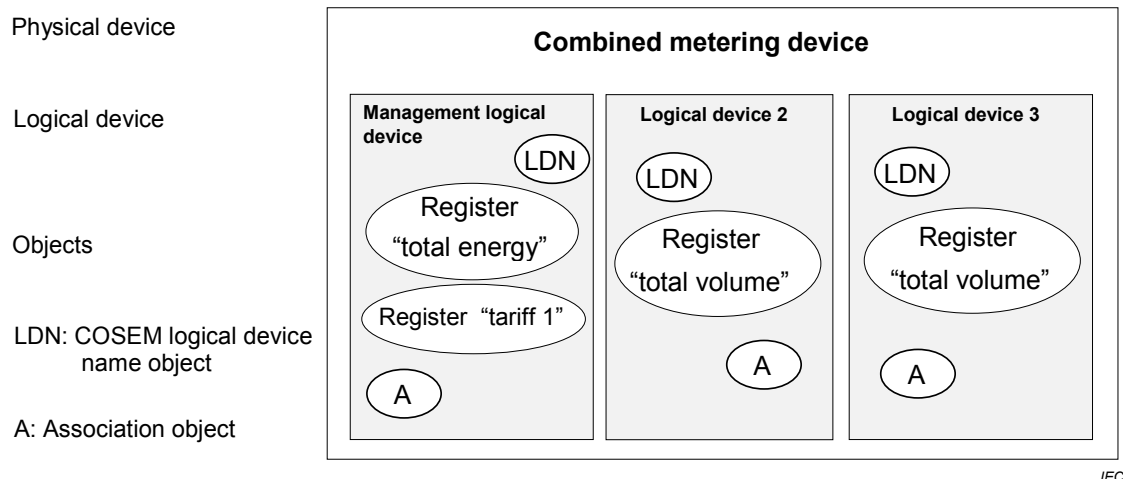


Figure 4 – Combined metering device

4.8 The COSEM logical device

4.8.1 General

The COSEM logical device contains a set of COSEM objects. Each physical device shall contain a "Management logical device".

The addressing of COSEM logical devices shall be provided by the addressing scheme of the lower layers of the protocol stack used.

4.8.2 COSEM logical device name (LDN)

The COSEM logical device can be identified by its unique COSEM LDN. This name can be retrieved from an instance of IC "SAP assignment" (see 5.3.5), or from a COSEM object "COSEM logical device name" (see 6.2.29).

The LDN is defined as an octet-string of up to 16 octets. The first three octets shall carry the manufacturer identifier ². The manufacturer shall ensure that the LDN, starting with the three octets identifying the manufacturer and followed by up to 13 octets, is unique.

4.8.3 The "association view" of the logical device

In order to access COSEM objects in the server, an application association (AA) shall first be established with a client. AAs identify the partners and characterize the context within which the associated applications will communicate. The major parts of this context are:

- the application context;
- the authentication mechanism;
- the xDLMS context.

AAs are modelled by special COSEM objects:

- instances of the IC "Association SN" – see 5.3.3 – are used with short name referencing;
- instances of the IC "Association LN" – see 5.3.4 – are used with logical name referencing;

² Administered by the DLMS User Association, in cooperation with the FLAG Association.

Depending on the AA established between the client and the server, different access rights may be granted by the server. Access rights concern a set of COSEM objects – the visible objects – that can be accessed ('seen') within the given AA. In addition, access to attributes and methods of these COSEM objects may also be restricted within the AA (for example a certain type of client can only read a particular attribute of a COSEM object, but cannot write it). Access right may also stipulate required cryptographic protection.

The list of the visible COSEM objects – the "association view" – can be obtained by the client by reading the *object_list* attribute of the appropriate association object.

4.8.4 Mandatory contents of a COSEM logical device

The following objects shall be present in each COSEM logical device. They shall be accessible for GET/Read in all AAs with this logical device:

- COSEM logical device name object;
- current "Association" (LN or SN) object.

If the "SAP Assignment" object is present, then the COSEM logical device name object does not have to be present.

4.8.5 Management logical device

As specified in 4.8.1, the management logical device is a mandatory element of any physical device. It has a reserved address. It shall support an AA to a public client with the lowest level security (no security) authentication. Its role is to support revealing the internal structure of the physical device and to support notification of events in the server.

In addition to the "Association" object modelling the AA with the public client, the management logical device shall contain a "SAP assignment" object, giving its SAP and the SAP of all other logical devices within the physical device. The SAP assignment object shall be readable at least by the public client.

If there is only one logical device within the physical device, the "SAP assignment" object may be omitted.

4.9 Information security

DLMS/COSEM provides several information security features for accessing and transporting data:

- data access security controls access to the data held by a DLMS/COSEM server;
- data transport security allows the sending party to apply cryptographic protection to the xDLMS APDUs sent. This requires ciphered APDUs. The receiving party can remove or check this protection

For a description of these security mechanisms, see IEC 62056-5-3:2016, Clause 5.

Information security is provided on the DLMS/COSEM Application layer level and on the COSEM object level and it is supported / managed by the following objects:

- "Association SN", see 5.3.3;
- "Association LN", see 5.3.4; and
- "Security setup", see 5.3.7.

5 The COSEM interface classes

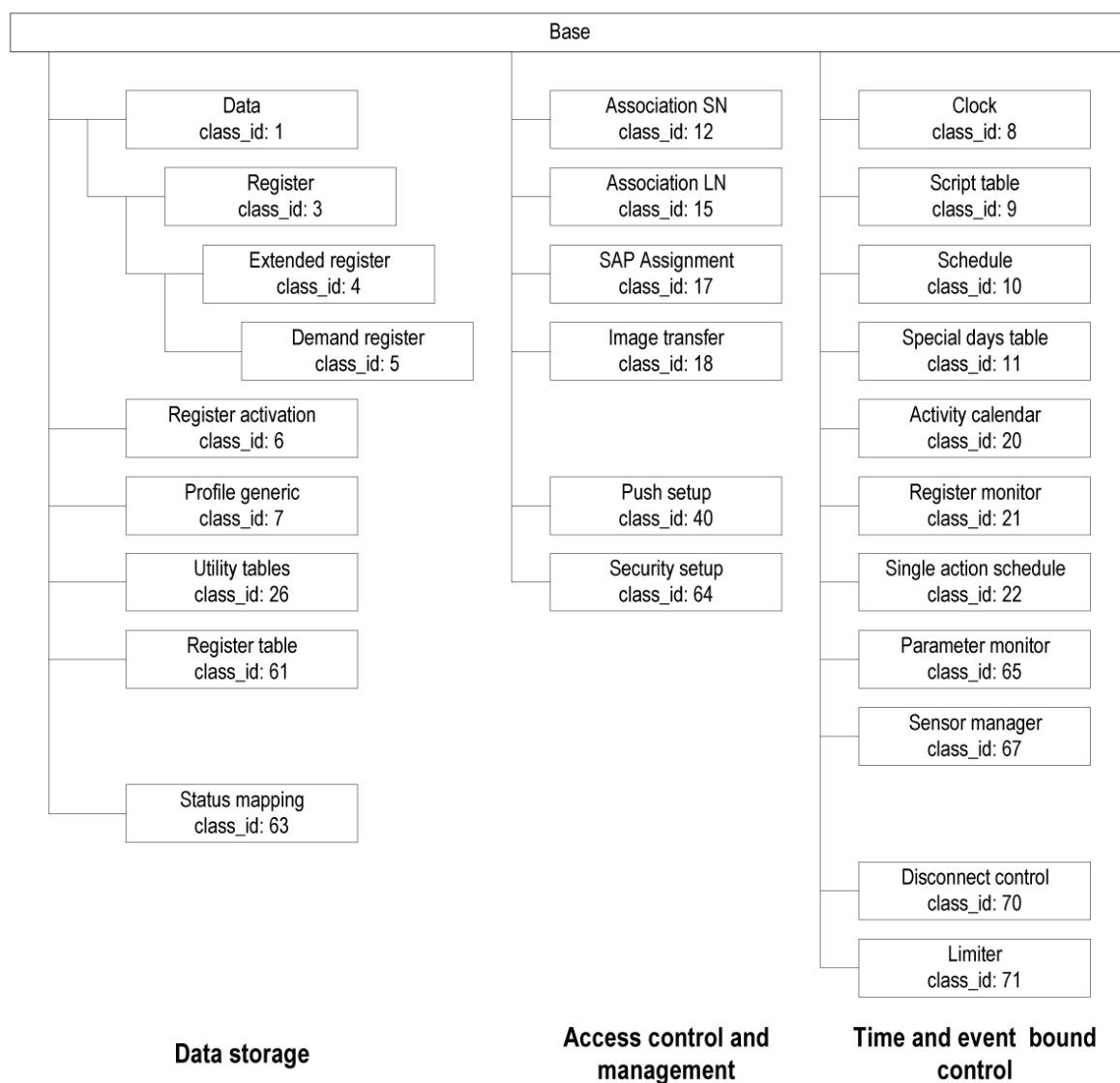
5.1 Overview

The ICs defined currently and the relations between them are shown in Figure 5 and Figure 6.

NOTE 1 The IC “base” itself is not specified explicitly. It contains only one attribute *logical_name*.

NOTE 2 In the description of the “Demand register”, “Clock” and “Profile generic” ICs, the 2nd attributes are labelled differently from that of the 2nd attribute of the “Data” IC, namely *current_average_value*, *time* and *buffer* vs. *value*. This is to emphasize the specific nature of the *value*.

NOTE 3 On these Figures the interface classes are presented in each group by increasing class_id. In the clauses specifying the various groups of interface classes, the new interface classes are put at the end of the relevant clause.



IEC

Figure 5 – Overview of the interface classes – Part 1