

INTERNATIONAL STANDARD

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2002-02

**Electricity metering –
Data exchange for meter reading,
tariff and load control –**

**Part 42:
Physical layer services and procedures
for connection-oriented asynchronous
data exchange**

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CONTENTS

FOREWORD	4
1 Scope	5
2 Normative references	5
3 Terms, definitions and abbreviations	6
4 Overview	7
5 Service specification	8
5.1 List of services	8
5.1.1 Connection establishment/release related services	8
5.1.2 Data communication services	8
5.1.3 Layer management services	8
5.2 Use of the physical layer services	9
5.3 Service definitions	9
5.3.1 PH-CONNECT.request	9
5.3.2 PH-CONNECT.indication	10
5.3.3 PH-CONNECT.confirm	10
5.3.4 PH-ABORT.request	11
5.3.5 PH-ABORT.confirm	11
5.3.6 PH-ABORT.indication	11
5.3.7 PH-DATA.request	12
5.3.8 PH-DATA.indication	12
6 Protocol specification	13
6.1 Physical layer protocol data unit	13
6.2 Transmission order and characteristics	13
6.3 Physical layer operation – description of the procedures	13
6.3.1 General	13
6.3.2 Setting up a physical connection	14
6.3.3 The identification service	15
6.3.4 Data communications	19
6.3.5 Disconnection of an existing physical connection	19
Annex A (informative) An example: PH service primitives and Hayes commands	20
Annex B (informative) Data model and protocol	25
Bibliography	26
Figure 1 – Typical PSTN configuration	7
Figure 2 – The location of the physical layer	8
Figure 3 – Protocol layer services of the COSEM 3-layer connection oriented profile	9
Figure 4 – MSC for physical connection establishment	15
Figure 5 – MSC for IDENTIFY.request/.response message exchange	17
Figure 6 – Handling the identification service at the COSEM server side	17
Figure 7 – Partial state machine for the client side physical layer	18
Figure A.1 – MSC for physical connection request	20
Figure A.2 – Physical connection establishment at the CALLING station	21
Figure A.3 – MSC for physical connection establishment	22
Figure A.4 – Data exchange between the calling and called stations	23
Figure A.5 – MSC for a physical disconnection	24
Figure B.1 – The three-step approach of COSEM	25

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICITY METERING – DATA EXCHANGE
FOR METER READING, TARIFF AND LOAD CONTROL –**
**Part 42: Physical layer services and procedures for
connection-oriented asynchronous data exchange**

FOREWORD

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The IEC takes no position concerning the evidence, validity and scope of this maintenance service.

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DLMS¹ User Association
Geneva / Switzerland
www.dlms.ch

International Standard IEC 62056-42 has been prepared by IEC technical committee 13: Equipment for electrical energy measurement and load control.

The text of this standard is based on the following documents:

FDIS	Report on voting
13/1266/FDIS	13/1272/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

¹ Device Language Message Specification.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annexes A and B are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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ELECTRICITY METERING – DATA EXCHANGE FOR METER READING, TARIFF AND LOAD CONTROL –

Part 42: Physical layer services and procedures for connection-oriented asynchronous data exchange

1 Scope

This part of IEC 62056 specifies the physical layer services and protocols within the Companion Specification for Energy Metering (COSEM) three-layer connection oriented profile for asynchronous data communication. The document does not specify physical layer signals and mechanical aspects. Local, implementation-specific issues are also not specified.

In annex A, an example of how this physical layer can be used for data exchange through the Public Switched Telephone Network (PSTN) using intelligent Hayes modems is given.

The use of the physical layer for the purposes of direct local data exchange using an optical port or a current loop physical interface is specified in IEC 62056-21.

Annex B gives an explanation of the role of data models and protocols in electricity meter data exchange.

2 Normative references

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

IEC 60050-300:2001, *International Electrotechnical Vocabulary –Electrical and electronic measurements and measuring instruments – Part 311: General terms relating to measurements – Part 312: General terms relating to electrical measurements – Part 313: Types of electrical measuring instruments – Part 314: Specific terms according to the type of instrument*

IEC/TR 62051:1999, *Electricity metering – Glossary of terms*

IEC 62056-21, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange*¹

IEC 62056-46, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol*¹

IEC 62056-53, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 53: COSEM application layer*¹

IEC 62056-61, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: OBIS Object identification system*¹

IEC 62056-62, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 62: Interface objects*¹

NEMA C12.21:1999, *Protocol Specification for Telephone Modem Communication*

¹ To be published.

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purpose of this part of IEC 62056, the definitions in IEC 60050-300 and IEC/TR 62051 as well as the following definitions apply:

3.1.1

client

a station asking for services, normally the master station

3.1.2

master

central station – station which takes the initiative and controls the data flow

3.1.3

server

a station delivering services. The tariff device (meter) is normally the server, delivering the requested values or executing the requested tasks

3.1.4

slave

station responding to requests of a master station. The tariff device (meter) is normally a slave station

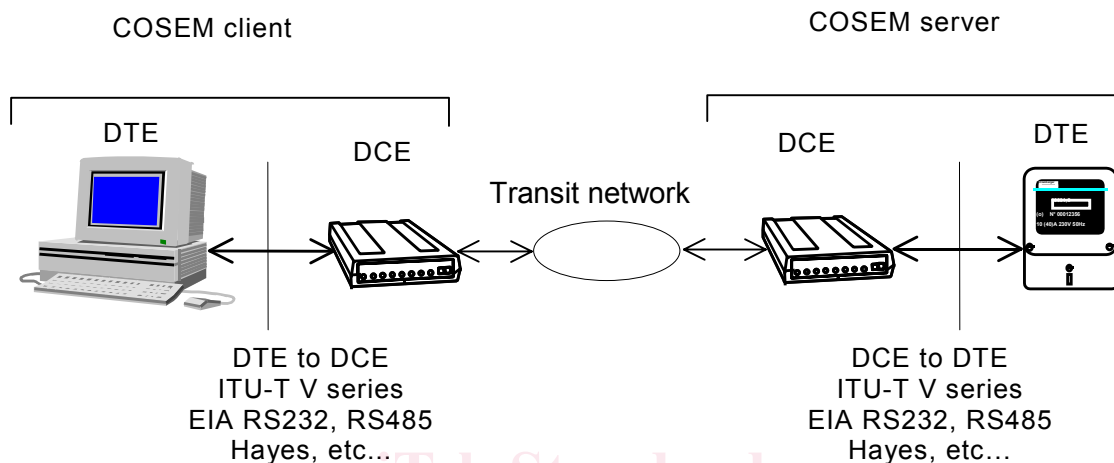
3.2 Abbreviations

COSEM	COmpanion Specification for Energy Metering
DCE	Data Communication Equipment (communications interface or modem)
DTE	Data Terminal Equipment (computers, terminals or printers)
MSC	Message Sequence Chart 62056-42:2002
PDU	Protocol Data Unit /iec/3679457f8806-4dea-a512-2eb07b160ffa/iec-62056-42-2002
PH	PHysical layer
PHPDU	PHysical layer Protocol Data Unit
PHSDU	PHysical layer Service Data Unit
SDU	Service Data Unit

4 Overview

From the external point of view, the physical layer provides the interface between the DTE and the DCE, see

Figure 2. Figure 1 shows a typical configuration for data exchange through a wide area network, for example the PSTN.



IEC 235/02

Figure 1 – Typical PSTN configuration

From the physical connection point of view, all communications involve two sets of equipment represented by the terms caller system and called system. The caller is the system that decides to initiate a communication with a remote system known as the called party; these denominations remain valid throughout the duration of the communication. A communication is broken down into a certain number of transactions. Each transaction is represented by a transmission from the transmitter to the receiver. During the sequence of transactions, the caller and called systems take turns to act as transmitter and receiver.

From the data link point of view the central station normally acts as a master, taking the initiative and controlling the data flow. The tariff device is the slave, responding to the master station.

From the application point of view the central station normally acts as a client asking for services, and the tariff device acts as a server delivering the requested services.

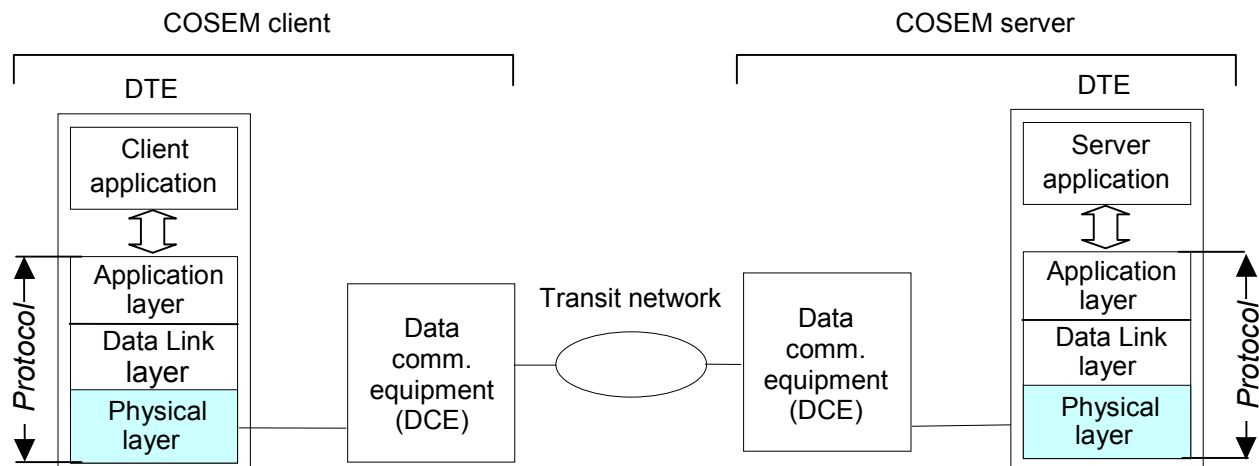
The situation involving a caller client and a called server is undoubtedly the most frequent case, but a communication based on a caller server and a called client is also possible, in particular to report the occurrence of an urgent alarm.

For the purpose of local data exchange, two DTEs can be directly connected using appropriate connections.

To allow using a wide variety of media, this standard does not specify the physical layer signals and their characteristics. However, the following assumptions are made:

- the communication is point to point or point to multipoint;
- both half-duplex and duplex connections are possible;
- asynchronous transmission with 1 start bit, 8 data bits, no parity and 1 stop bit (8N1).

From the internal point of view, the physical layer is the lowest layer in the protocol stack.



IEC 236/02

Figure 2 – The location of the physical layer

This standard defines the services of the physical layer towards its peer layer(s) and the upper layers, and the protocol of the physical layer.

5 Service specification

5.1 List of services

ITU-T X.211 defines a set of capabilities to be made available by the physical layer over the physical media. These capabilities are available via service primitives, as follows:

<https://standards.iteh.ai/iec-62056-42-2002>

5.1.1 Connection establishment/release related services

PH-CONNECT.request / PH-CONNECT.indication / PH-CONNECT.confirm

PH-ABORT.request / PH-ABORT.confirm / PH-ABORT.indication

5.1.2 Data communication services

PH-DATA.request / PH-DATA.indication

5.1.3 Layer management services

In addition to the services above, some additional physical layer services may be necessary, which are used by or provided for the layer management process, which is part of the application process. Some examples are given below:

PH-INITIALIZE.request / PH-INITIALIZE.confirm

PH-GET_VALUE.request / PH-GET_VALUE.confirm

PH-SET_VALUE.request / PH-SET_VALUE.confirm

PH-LM_EVENT.indication

As these services are of local importance only, their definition is not within the scope of this standard.

5.2 Use of the physical layer services

Figure 3 shows how different service users use the service primitives of the physical layer.

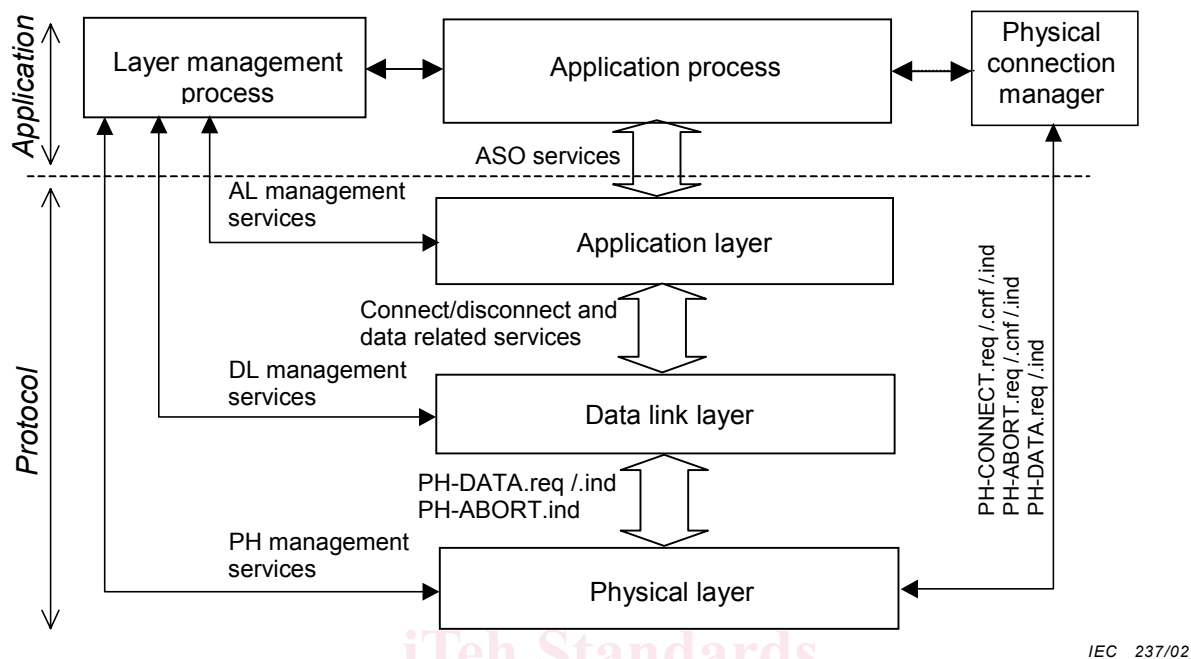


Figure 3 – Protocol layer services of the COSEM 3-layer connection oriented profile

As is shown in Figure 3, the connection establishment/release services are used by and provided for the physical connection manager application process, and not the data link layer. The reasons for this are explained in 6.3.1.

5.3 Service definitions

5.3.1 PH-CONNECT.request

Function

This primitive is invoked by the service user entity to request the setting up of a physical connection to a remote device.

NOTE In the COSEM environment, it is the physical connection manager application process.

Service parameters

The semantics of the primitive is as follows:

```
PH-CONNECT.request
(
    PhConnType,
    PhConnReqParams
)
```

The PhConnType parameter specifies the type of connection requested, for example direct connection, PSTN modem connection, etc. This standard does not specify data/type(s) and/or value(s) for this parameter, because this is a local issue only.