**.NET**

A software framework by Microsoft that includes a large library of coded solutions to common programming problems and a virtual machine that manages the execution of programs written specifically for the framework.

**A**

Active energy register

**ABT**

Availability Based Tariff. It is a performance-based tariff for the supply of electricity by state-owned generators. It is also a new system of scheduling and despatch, which requires both generators and consumers to commit to pre-defined schedules which are enforced with a system of rewards and penalties.

**Active Energy**

Active Energy

**Advanced Metering**

Technology which enables an automated bi-directional communication between the energy meter and the utility. The communication is not limited to meter data alone but also includes information about consumption, tariffs, alerts and complementary services.

**Advanced Metering Systems**

These systems enable an automated bi-directional communication between the energy meter and the utility. The communication is not limited to meter data, but can include information about consumption, tariffs, alerts and complementary services.

**AIM**

Active Information Management: The Landis+Gyr system software for residential advanced metering. It contains system applications for data collection, data management, load control and sharing metering information. It also provides a system integration platform as well as tools for deployment and maintenance work.

**AIMAS**

AIM Application Server, a server in Landis+Gyr's data collection system platform

**AIMCS**

AIM Communication Server, a server in Landis+Gyr's data collection system platform

**AIMDB**

AIM DataBase server, a database server in Landis+Gyr's data collection system platform

**AIMIA**

AIM Integration Application (AIMIA), a Landis+Gyr application that provides data exchange services for the integration of systems external to the Gridstream solution.

**AK14**

Arbeitskreis 14 = Workgroup 14, which has developed DIN 43863-4 (IP Telemetry)

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**AM**

(>) Advanced Metering

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**AMI**

Advanced Metering Infrastructure. System components to measure, collect and analyse energy usage.

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**AMM**

Advanced Metering Management, systems that measure, collect and analyse energy usage.

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**AMR**

Automated Meter Reading, systems responsible for handling tasks that require communication with metering devices, for example reading of metering values.

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**ANSI**

American National Standards Institute.

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**APN**

Access Point Name

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**Application Service Provider**

A third party business that manages and distributes software-based services and solutions to customers across a wide-area network from a central data centre.

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**AT command**

Attention command. AT commands are used to parameterise the modem correctly before making connection.

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**Auto-Crossover**

LAN components with Auto-Crossover recognise automatically whether the connected Ethernet cable is a normal patch cable or a crossover cable and adjust to this cable accordingly. This kind of connection is also called Auto-MDI/X.

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**Autodetect**

Mode of operation of communication module in which IEC 62056-21 as well as dlms is automatically recognised. It is even possible to change the mode during a session.

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**Automated Meter Reading**

Automated Meter Reading (AMR) collects utility meter data via radio or other networking technology. AMR is a form of (>) Advanced Metering that uses communication devices to communicate data from the meter to the utility or to a meter data management provider. AMR may be used to transmit simple energy usage data from the meter or to transmit more complex measures of energy recorded in the meter. Moreover, it can feature advanced functionality such as outage detection or remote programming of meters by an authorised party.

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**Baud rate**

(>) Transmission rate

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**Billing cycle**

Period of days in which a utility or supplier totals customer energy use and produces the customer bill.

**Billing data**

(>) TOU data

**bits/s or bps**

Bit rate, (>) transmission rate.

**BM**

Base module = the SyM² meter module

**CAD**

Current Average Demand

**Cal**

Calibration adjustment. A customer magnitude adjustment and/or a CT/VT correction has been made.

**CHAP**

Challenge-Handshake Authentication Protocol. CHAP is used by Point to Point Protocol (> PPP) servers to authenticate a user to an Internet access provider.

**CIM**

Common Information Model, a standard developed by the electric power industry which aims to allow application software to exchange information about the configuration and status of an electrical network.

**Class**

Usually used in the metering context to specify a meter's accuracy. IEC defines classes as 0.2%, 0.5%, 1.0% and 2.0% max. measurement deviation; the new MID (Metering instrument directive) specifies classes A, B, C. Class C represents the highest accuracy. The term is sometimes also used for environmental, mechanical and electromagnetic conditions.

**CLI**

Caller Line Identification. The telephone number of the caller can be recognised in this way before the receiver is picked up or the modem accepts the call. The telephone or modem must support CLI.

**Client / Server**

In a Client-Server-environment, a server is an application or a computer which receives and responds to requests from a client application or computer. If data communication is referred to, it is also possible to regard the computer as a client that establishes a connection to a server (or host). This means that the client is the computer issuing a call and the server (or host) the one receiving the call.

**CM**

Communication module (SyM²)

**COSEM**

Companion Specification for Energy Metering, specifications required in addition to DLMS, which describe the interface to the meter.

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**CP**

Capture Period

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**CPC**

iMEGA ComPortClient

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**CRC**

Cyclic Redundancy Check. A CRC is a function which produces a checksum to detect errors after data transmission or storage. A CRC is computed and appended before transmission or storage, and verified afterwards by the recipient to confirm that no changes occurred on transit.

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**CS**

Central System/Station. A software which offers a complete set of features and functions in connection with meter data acquisition, data segmentation, report generation, monitoring, tariffication, data plausibility checks and many more.

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**CS**

Current loop serial interface. A serial transmission method that uses a closed loop. Current loops provide a better signal-to-noise ratio (SNR) than voltage-based systems, i.e. they offer very good noise immunity.

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**CSD**

Circuit Switched Data (CSD) is the original form of data transmission developed for mobile phone systems like Global System for Mobile Communications (GSM). CSD uses a single radio time slot to deliver 9.6 kbit/s or 14.4 kbit/s data transmission to the GSM Network and Switching Subsystem where it could be connected through the equivalent of a normal modem to the Public Switched Telephone Network (PSTN) allowing direct calls to any dial-up service.

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**CSV**

Comma separated values. The CSV file format is a very simple data file format for the storage or exchange of tabular data that is supported by almost all spreadsheet software such as Excel, Calc, etc. Any programming language that has input/output and string processing functionality will be able to read and write CSV files.

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**CT**

Current transformer. An alternating current device which reduces actual current flow through meter with a fixed ratio.

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**CT Ratio**

The relationship of a current transformers' primary to secondary rating. This ratio defines the multiplication factor that has to be applied to the meter output in order to obtain the actual metered amount.

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**CTS**

Clear To Send. A signal employed in a procedure which intends to ensure that nodes within a network refrain from sending data for a given time if a particular destination node replies with a Clear To Send frame (CTS) upon reception of a Request to Send frame (RTS). This method solves the hidden node problem.

**CU**

Communication unit. A device which can be connected to a meter in order to enable automatic meter reading.

**Cumulative value**

Value cumulated since the beginning of the measurement.

**DA**

Data Acquisition

**Daily Consumption**

The amount of energy a consumer uses in a 24 hour day. It is captured at a specific time each day, usually at midnight, and refers to active energy.

**Datagram**

With the TCP/IP transmission protocol, data is transmitted in the form of data packets, the so-called IP-Datagrams. An IP-Datagram has the following structure:
1. IP-Header
2. TCP-/UDP-Header
3. Data (Payload)

**DC**

Data Concentrator

**DCE**

Data Communication Equipment. Designation of a unit which only passes on data, e.g. a modem.

**Delta value**

Value calculated over the billing or the capture period. After the end of the period the value is reset.

**Demand billing**

The demand upon which billing to a customer is based, as specified in the rate schedule or contract. The billing demand doesn't have to coincide with the actual measured demand for a billing period. Such a charge might be applied to an industrial customer who may have inconsistent supplies of raw materials, but who must have access to substantial amounts of energy when those materials are available, or to a seasonal customer who requires large amounts of energy at one time of the year for which a utility company must make extra facilities constantly available.

**Demand interval**

The interval of time over which a demand measurement is taken. Common intervals: 10, 15, 30, or 60 minutes.

**Demand response**

Commercial arrangements between utilities and their customers in which customers agree to reduce their loads when the electricity system – either the network or generation – is constrained.

**Deregulation**

The elimination of regulation from a previously regulated industry or sector of an industry.

**DFS**

Direct Field Sensor. A technology based on the Hall effect used in Landis+Gyr measuring elements in order to generate digital signals.

**DHCP**

Dynamic Host Configuration Protocol. This is a protocol used by networked devices (clients) to obtain the parameters necessary for operation in an Internet Protocol network. This protocol reduces system administration workload, allowing devices to be added to the network with little or no manual configuration.

**DIN**

Deutsche Industrienorm (German industrial standard)

**Disconnector**

A relay that can turn off power to a whole house or other metered electric service. In specific cases, it can be operated remotely.

**Distribution utility**

The regulated electric utility that constructs and maintains the distribution wires which connect the transmission grid to the final customer. This utility can also perform other services such as aggregating customers, purchasing power supply and transmission services for customers, billing customers and reimbursing suppliers, and offering other regulated or non-regulated energy services to retail customers.

**DLC**

Distribution Line Carrier. DLC utilizes the existing electrical distribution network in the Medium voltage (MV) – i.e., 11 kV, Low Voltage (LV) as well building voltages for data transmission. It is very similar to PLC.

**dlms**

Device Language Message Specification. This specification provides an environment for structured modelling and meter data exchange. Applications such as remote meter reading, remote control and value added services for metering any kind of energy (electricity, water, gas, and heat) are supported.

**dlms device identification**

Worldwide unique number in each dlms device to identify the device (in blue book it is named 'COSEM logical device name')

**dlms tree**

Tree in MAP120 showing all dlms objects of a device.

**dlms UA**

dlms User Association. Group of various companies interested in promoting, developing and enhancing the dlms standard.

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**DNS**

The addressing in IP-network is performed with the use of IP-addresses. Because it is more user-friendly, the addressing with a domain address is usually preferred (i.e. in the form www.abc.de). If the domain address is used, the sender sends the domain address first to a Domain Name Server (DNS) to obtain the corresponding IP-address. Then, the sender transmits its data to this particular IP-address.

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**DNV**

Data Not Valid (flag)

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**DSM**

Demand side management. This is a means to control energy consumption and to optimise network usage via tariff control and/or load control. Both can be controlled via ripple control signals (PLC) and radio signals. DSM encourages consumers to modify patterns of electricity usage, including the timing and level of electricity demand.

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**DSO**

Distribution System Operator = Verteilnetzbetreiber

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**DSR**

Data Set Ready, Signal of e.g. the RS-232-C Interface

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**DSW**

Device Software, (>) Firmware.

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**DTE**

Data Terminal Equipment. This is an end instrument - e.g. PC, terminal or laptop - that converts user information into signals for transmission, or reconverts the received signals into user information. A DTE device communicates with the Data Communication Equipment (DCE).

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**DTR**

Data Terminal Ready. An abbreviation used in RS232 serial communications. The DTR signal is sent via a dedicated wire from the transmitting computer to the transmission device to indicate that the computer is ready to receive data.

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**EAN**

The EAN is the International Article Number (formerly European Article Number) and is a product designation for commercial articles. Generally, the EAN is printed onto the product packaging in the form of a machine-readable bar code and can be decoded by bar code scanners.

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**EDI**

End of Interval. This bit indicates that the capture period was terminated and the profile entry was made due to an unsynchronised tariff switching.

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**EDIS**

Energy Data Identification System (energy industry standard)

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**EDM**

Energy Data Management covers the management and calculation of energy data in the liberalised electricity and gas market.

**EEPROM**

Electrically Erasable Programmable Read Only Memory. An EEPROM is a non-volatile storage chip used to store data safely even in case of a power cut.

**EFA**

Energy Flow Active. The energy flow signal EFA is derived from the measured quantities |+A|+|-A| and is solely used to drive the energy flow contacts.

**EFR**

Energy Flow Reactive. The energy flow signal EFR is derived from the measured quantities |+R|+|-R| and is solely used to drive the energy flow contacts.

**EIA**

Electronic Industries Alliance. The EIA publishes standards, e.g. for interfaces such as RS-232 (now EIA-232). The former designation RS stands for *Radio Sector*. Nowadays, it is interpreted as *Recommended Standard* because it encompasses standards that go beyond the actual radio sector.

**EMC**

Electromagnetic Compatibility is concerned with the unintentional generation, propagation and reception of electromagnetical energy and with the unwanted effects that such an energy may induce. In particular, the aim of EMC is the correct operation, in the same environment, of different equipments which involve electromagnetic phenomena in their operation.

**Energy Data Acquisition**

Acquisition/read-out of energy meter data via handheld-terminals, drive-by or communication technology (e.g. radio, mesh, plc, PSTN, GSM/GPRS).

**Energy Data Management**

Processing of energy data for billing, forecasting and other purposes, related to the operational and/or commercial processes of energy utilities.

**Energy Management**

Technologies or strategies that reduce, limit or shift peak loads to off-peak time periods. Examples include load limiting devices or programs that aggressively promote time-of-use (TOU) rates, real time pricing or other innovative rates intended to reduce consumer bills and shift hours of operation of equipment to off-peak periods.

**ER**

Energy Register

**ERP**

Enterprise Resource Planning. ERP systems aim at integrating all data and processes of an organisation into a unified system. In order to achieve this, multiple components of software and hardware are employed. A key component of most ERP systems is a central database to store data for the various system modules.

**ESD**

Electrostatic discharge

**ESU**

Energy Service Utility

**ESW**

Embedded Software

**ET**

Energy Total

**Ethernet**

Ethernet is a wired local data network (LAN) technology. It enables data exchange with data frames between all devices (e.g. computer, printer) connected to a local network (LAN). Usually, a LAN spans entire buildings. However, today applications which connect devices over wide distances via glass fibre or radio are also possible.

Ethernet entails definitions of cables and connector types, describes the signalisation for the bit transmission layer and defines packet formats and protocols. Generally, Ethernet is standardised in the IEEE-standard 802.3. From the 1990s it became the most widely used LAN technology.

**Ferraris meter**

The Ferraris meter, named after Galileo Ferraris, is an electromagnetic electricity meter used to display electric energy and to record transmitted energy in single and three phase alternating current networks.

**Firmware**

Static software that resides on a hardware device such as a meter. This software defines the meter's functionality.

**FPS**

The Landis+Gyr Load Management Control System

**FSK**

Frequency Shift Keying, a classical narrow band modulation method: the digital form of frequency modulation. A specific frequency corresponds to a digital level.

**Full-duplex**

Designation for an interface in which data can be transmitted mutually independently in both directions, e.g. RS232.

**Generation Company**

A regulated or non-regulated entity that operates and maintains existing generating plants. This company may own the generation plants or interact with the short term market on behalf of plant owners.

**GPRS**

General Packet Radio Service. GPRS is a mobile data service available to users of GSM mobile phones. It is often described as "2.5G", that is, a technology between the second (2G) and third (3G) generations of mobile telephony. It provides transmission rates of up to 115.2 kbps by using unused channels in the GSM network.

**Greenhouse Effect**

The increasing average global surface temperature caused by gases in the atmosphere (including carbon dioxide, methane, nitrous oxide, ozone, and chlorofluorocarbon). The greenhouse effect allows solar radiation to penetrate but absorbs the infrared radiation returning to space.

**Grid company**

A company that manages power lines and generators to ensure generators are dispatched as needed to meet the requirements of the customers connected to the grid at various points.

**Grid meters**

High precision electricity meters for the highest energy quantities with several communication interfaces for e.g. GPRS/GSM or TCP/IP. These meters provide flexible communication with several central stations, making all relevant data accessible to all partners.

**Gridstream**

The Landis+Gyr solution concept that packages our AMM offering, including the latest multi-energy metering and network management technology, and personal energy management tools

**GSM**

Global System for Mobile Communication. This is a worldwide standard for digital mobile networks. Apart from voice services (telephone), GSM also supports several data services such as Fax, SMS, CSD and GPRS. Depending on legal regulations in the various countries, the frequency bands 900 MHz, 1800 MHz or 850 MHz and 1900 MHz are used.

**GSS**

Gridstream Solution

**Half-duplex**

Designation for an interface in which data can only be transmitted in one direction at a time. The data direction can, however, be subsequently changed, e.g. RS485.

**HDLC**

High-Level Data Link Control (HDLC) is a bit-oriented synchronous data link layer protocol specified by the International Organisation for Standardisation (ISO). The current standard for HDLC in ISO 13239: Information Processing Systems – Data Communication High-Level Data Link Control Procedure – Frame Structure

**HES**

The Head End System is part of Advanced Metering Infrastructure (AMI). It typically manages the data communication between AMI meters and meter data management system (MDMS)

**HHT, HHU**

Handheld terminal/unit, used for automated meter readings

**HLS**

High Level Security. The client and the server are both mutually authenticated. The server transmits a "challenge" (typically a random number) to the client; the client processes the "challenge" in a secret way (typically by encrypting it with a secret key) and transmits the processed challenge back to the server. The server then checks if the "challenge" was processed correctly. The authentification of the server is done in reverse order.

**Hourly Metering**

A type of interval metering where the measurement or recording of customer usage is collected on an hourly basis.

**HTTP**

HyperText Transfer Protocol

**I&C meters**

Industrial and commercial meters: Multi-tariff meters, often featuring active and reactive energy registers, for industrial or commercial usage.

**IARP**

Inverse Address Resolution Protocol. IARP is used within an Ethernet-IP-network to determine the IP-address of someone whose MAC-address is known.
Subscriber A knows the MAC-address of subscriber B. In order to establish a TCP/IP-connection to subscriber B, subscriber A needs the IP-address of subscriber B. To find out the IP-address of subscriber B, subscriber A sends an IARP-request to the MAC-address of subscriber B. Subscriber B responds with its IP-address.

**ICC**

Integrated Circuit Card, also known as SIM card.

**IDIS**

Interoperable Device Interface Specification, an association established to maintain and promote publicly available technical interoperability specifications based on open standards.

**IEC**

International Electrotechnical Commission, an international standards organization dealing with electrical, electronic and related technologies.

**IEC readout**

Billing data readout according to IEC 62056-21.

**IHU**

IHU - In-Home display Unit, a unit which informs end-users about their energy consumption.

**IM**

Pulse emitting module (SyM²)

**iMEGA**

Internet Metering Gateway. iMEGA is the interface between the meter and the AMR system. It manages a list of the dynamic IP addresses of the Internet-connected meters. iMEGA is therefore a kind of telephone book for automatic meter reading. iMEGA is also an important security component in the overall system, since it does permit access to the meter without a valid code. The iMEGA software does not store any meter data.

**IMEI**

The International Mobile Equipment Identity is a number unique to every GSM and UMTS mobile phone as well as some satellite phones.

**IMSI**

An International Mobile Subscriber Identity is a unique number associated with all GSM and UMTS network mobile phone users. It is stored in the SIM.

**Industrial meter**

An electricity meter used in industrial and commercial settings. These meters have an extended functionality and communication possibilities and can be integrated into systems for high data availability.

**Interval meter**

Interval meters measure customer energy consumption by fixed time periods or intervals (typically every 15 minutes, but this can vary depending on utility requirements). Today, interval metering is provided to commercial and industrial customers and some residential customers. In the future, in an unbundled environment, the residential market may require more frequent interval measurements. These meters produce many hundreds of sets of data and are usually read remotely due to the large amounts of data collected.

**Intranet**

An intranet is a private IP-network whose size may vary. An IP-network of a company or several interconnected private computers might form an intranet.
In contrast, the internet is a public network. Intranet and internet should only be connected via security devices such as a firewall.

**IOU (investor owned utility)**

A company, owned by stockholders for profit, that provides utility services. A designation used to differentiate a utility owned and operated for the benefit of shareholders from municipally owned and operated utilities and rural electric cooperatives.

**IP**

Ingress Protection Level; 1st number: Solid Particle Protection, 2nd number: Liquid Ingress Protection

**IP-address**

Each host or router in the internet / intranet has a unique IP-address (IP = Internet Protocol). The IP-address consists of 32 bits (= 4 Byte) and is written as 4 numbers (ranging from 0 to 255) separated by a dot.
An IP-address has two parts: the network address and the host address.
All hosts of a network have the same network address but different host addresses. There are three size categories of networks: Class A, B and C.

**IP-packet**

See Datagram.

**IPT**

Internet Protocol Telemetry

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**IP-telemetry**

Protocol according to E DIN 43863-4 for the transmission of telemetry data via IP-networks. It is optimised in such a way that only few control data are added to the user data. It enables the use of dynamically assigned IP-addresses.

First, the IP-telemetry-client establishes a TCP/IP-connection with the IP-telemetry-master. Then the IP-telemetry-client logs on at the IP-telemetry-master with the help of user name and password. If the login is successful, data can be exchanged in coded form. Control data are distinguished from user data by an additional Escape sequence.

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**ISO**

International Standardization Organisation, an international-standard-setting body.

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**KEV**

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**L**

Live wire. L1, L2, L3 are the phases 1, 2 and 3 of a three-phase network.

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**LAD**

Last Average Demand

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**LC**

Local Communication mode.

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**LLC**

Logical Link Control. Conforms to ISO/IEC 8809-2.

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**LLS**

Low Level Security. The client authenticates itself with a "secret" known by the client and the server. The "secret" is typically a password. LLS is normally used on "secure" channels where no eavesdropper is expected.

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**LM**

Load management

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**LMP**

Line Manager Protocol, a Landis+Gyr module within AMR, responsible for handling communication lines towards the meters

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**Load (electric)**

The amount of electric power delivered or required at any specific point or points on a system, as demanded by an electricity-consuming system, or systems.

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**Load control**

Activities performed by the utility that can interrupt load at the time of peak by interrupting power supply on consumer premises. Load control is usually applied to residential consumers.

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**Load data**

Electric power consumption (kWh), measured in specific intervals.

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**Load management**

Utility activities designed to influence the timing and amount of electricity that customers may use.

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**Load profile**

Hourly or sub-hourly pattern of energy use. It is stored as a list of time stamped power data and is sometimes shown as a graph depicting the power consumption over a specific period.

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**Load profiling**

In a deregulated energy market, the public utility commission may require utilities to perform load profile reads on a certain number of customers in each customer class. This load profiling data is needed to determine rates and usage for other customers in the same customer class.

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**Load shedding**

The process of deliberately removing (either manually or automatically) preselected customer demand from a power system in response to an abnormal condition to maintain the integrity of the system and minimise overall customer outages.

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**Load shifting**

Demand-side management programs designed to encourage consumers to move their use of electricity from on-peak times to off-peak times.

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**Local bus with SyM²**

SyM² modules of a SyM² system communicate via the local bus. The local bus is an Ethernet-network in which TCP/IP and UDP/IP are used as communication protocols.
It is not necessary to switch off a SyM²-metering point to extend it with additional participants, e.g. further base modules. SyM²-modules do not need to be manually configured for a connection to the local bus.
The assignment of the IP-adresses, necessary for TCP/IP and UDP/IP, is performed automatically. After switching on, each SyM²-module first chooses an IP-adress freely and checks, if there is another bus participant with this address. If the IP-address is still free, the SyM²-module keeps this IP-address; if this IP-address is already taken, the SyM²-module chooses a new IP-address and checks again, if it is already in use. The procedure is repeated until a free IP-address is found. Additional SyM²-modules such as pulse emitting modules and communication modules are also powered via the local bus (Power-over-Ethernet).

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**Location Area Code**

A Location Area is a group of neigbouring interconnected GSM-base stations which facilitates the search for and the call signalling to a GSM device such as the CM-E1P01-GPRS module. The group can include between 10 and 100 GSM-base stations. Each of these groups has a unique identifier (Location Area Code = LAC).

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**LON**

Local Operating Network, a technology variant to implement PLC.

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**LP**

Load profile

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**LV**

Low Voltage, an electrical engineering term that broadly identifies safety considerations of an electricity supply system based on the voltage used. It is often defined as 50-1000 V AC and is the voltage used in the final distribution to users.

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**m2c**

meter2cash Ltd. A former Landis+Gyr subsidiary, now integrated into Landis+Gyr, which offers market-leading solutions for meter data acquisition, processing and management. m2c has created several generations of meter reading and meter data processing systems.

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**MAC**

Medium Access Control. MAC specifies the link layer address of the device for the communication. COSEM separates the address in a lower MAC address (addressing the physical device) and an upper MAC address (addressing the logical device within the physical device).

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**MAP110**

Meter Application Product 110. The Landis+Gyr MAP110 Service Tool is used for reading out billing data and profiles and for changing the most important device parameters. It is able to communicate with all modern electronic meters from Landis+Gyr, which comply with the standards under dlms or IEC 62056-21 (formerly IEC 1107). Its core functionality relates to meter testing/certification, installation and service.

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**MAP120**

Meter Application Product 120. The Landis+Gyr MAP120 Parameterisation Tool was developed for the reparameterisation of meters by the utility. It is able to communicate with all modern electronic meters from Landis+Gyr and also with many units from other manufacturers, which comply with the standards according to dlms or IEC 62056-21 (formerly IEC 1107). The Landis+Gyr MAP120 Parameterisation Tool is therefore an ideal aid for the service engineer.

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**Maximum demand**

The highest demand measured over a designated period of time, e.g. one year.

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**M-Bus**

The M-Bus, also called Meter Bus, was produced from the necessity to interlink a large number of consumption measuring units, such as electricity, water, gas or heat meters over a long section at low cost to permit communication with a central station, i.e. to read meter data or to perform service functions (setting starting values, time/date, etc.). The central station computer (PC) together with a repeater connected to its RS232 interface forms the M-Bus master. Up to 250 meters can be connected to the repeater as M-Bus slaves.

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**MC**

Master (remote) Communication mode

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**MCC/MNC**

The MCC (Mobile Country Code) and the MNC (Mobile Network Code) are worldwide unique identifiers for a mobile network. The MCC is triple-digit and the MNC double- or triple-digit. There are several websites on the internet that list the MCC/MNC of various countries and network providers.

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**MDE2**

Mobile data acquisition devices from Landis+Gyr.

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**MDM**

Meter Data Management, a single repository for hosting data from multiple and existing metering systems and then provide, make available this data to multiple in-house or hosted applications.

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**MDMS**

Meter Data Management System

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**MDR**

Maximum Demand Register

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**MDUS**

Meter Data Unifaction and Synchronization, a Landis+Gyr messaging interface and meter data management system that enables seamless end-to-end bidirectional communication between SAP IS-U and advanced meter management systems.

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**ME**

Multi Energy

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**Meter constant**

The meter constant is a factor applied to the output of a meter to obtain the desired units of measure. In Ferraris-meters, it represents the number of revolutions for 1 kWh. In electronic meters, it defines how many times the Test-LED flashes per 1 kWh.

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**Meter node**

The meter and the attached PLC-module

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**MID**

European Measuring Instruments Directive 2004/22/EU.

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**MK**

DLMS COSEM Master Key

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**MMI**

Monolithic Measuring System I (Index I). The Landis+Gyr measurement chip for residential meters.

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**MP**

Metering Point

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**MPF**

Minimum Power Factor

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**MTE**

Meter Test Equipment

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**MV**

Medium Voltage, an electrical engineering term that broadly identifies safety considerations of an electricity supply system based on the voltage used. It is often defined as 1-72 kV AC and is the voltage used in the local power lines.

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**N**

Neutral

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**NC**

Network Control

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**Net capacity resource**

The total owned capacity, plus capacity available from independent power producers, plus the net of total capacity purchases and sales, less the sum of inoperable capacity, and less planned outages.

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**NICT**

Non Conventional Instruments Transformer (NCIT) according IEC 61850

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**NIS**

Network Information System

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**NLA**

No Load Active: active energy losses of transformer

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**NLR**

No Load Reactive: reactive energy losses of transformer

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**NTP**

Network Time Protocol. NTP is an IP-Protocol for the acquisition of accurate time from a time server via an IP-network. Time servers are usually coupled to a time standard and provide the coordinated universal time (UTC) with a very high accuracy. The Network Time Protocol uses special algorithms to determine the network delay time by sending a sequence of several requests.

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**OBIS**

OBject Identification System, defines identification codes for all data in DLMS/COSEM compliant metering equipment

**ODEP**

Outside Data Exchange Protocol, a Landis+Gyr proprietary protocol for exchanging meter information

**OLA**

On Load Active: active energy line losses

**OLR**

On Load Reactive: reactive energy line losses

**OMV**

Original meter values

**Open architecture**

Standardisation, documentation, and publication of meter system parameters that allow data to be exchanged among authorised parties from an access point to the point at which data are of billing quality. Generally used in discussions of meter standards that allow any supplier of power to accept data from any meter that follows an "open architecture" specification, thus avoiding proprietary meter standards that could obsolete a customer's metering should he wish to switch to a provider using a different meter spec.

**OSI**

Open System Interconnection

**OSI layer model of ISO**

The OSI layer model describes all components required for communication. A total of seven mutually structured layers are defined:

**P**

Active power

**P running**

Current Average Demand

**P2M and P2MP**

Point to multi-point, based on a data concentrator. Today, we consider PLC as P2M technology.

**P2P**

Uses point to point communication. Today, this is usually GPRS and Ethernet.

**PAP**

Password Authentication Protocol

**Parity**

Test sum for detecting transmission errors which can e.g. be used with the RS232 interface. A difference is drawn between even, odd and no parity, whereby no parity means that this function is not used. Since this function only offers low security and is also not even supported by many modems, no form of parity is used for the communication modules. If IEC is used, a parity is indeed used, but this bit is considered as an eighth data bit over the entire transmission path and only evaluated in the central station. Modern protocols (e.g. HDLC/dlms) are provided with their own, significantly securer test sum.

**Peaking Capacity**

Capacity of generators normally reserved for operation during the hours of maximum loads.

**PF**

Power Factor (PF = cos φ; φ = phase angle between voltage and current)

**PLAN**

Power Line Automation Network, a technology variant to implement PLC.

**PLC**

Power Line Communication, a system for carrying data on a conductor also used for electric power transmission.

**PLC-module**

Functional box and communication interface connecting the meter to a DC over power line

**PM**

Network node module with auxiliary voltage (SyM²)

**Point to Point**

Type of connection in which exactly two units are interconnected.

**Port number**

The field "Port number" is a field in UDP- and TCP-headers with 2 Bytes. The assignment of port numbers enables the identification of various data streams processed simultaneously by UDP/TCP. The complete data exchange between UDP/TCP and the applications is performed via these port numbers. The assignment of port numbers to applications is dynamic and optional. For specific, often used applications, fix port numbers are assigned.

**Power Factor**

The power factor of an AC electric power system is defined as the ratio of the real power to the apparent power.

**Power Line Carrier**

Power Line Communication, also called Mains Communication or Power Line Telecoms (PLT), is a term describing several different systems which use power distribution wires for a simultaneous distribution of data. The carrier can communicate voice and data by superimposing an analogue signal over the standard 50 or 60 Hz alternating current (AC).

**Power-over-Ethernet**

Power-over-Ethernet is a technology to supply LAN components with power via wires of the Ethernet cable which are not needed for data transmission.

**PPP**

Point-to-Point Protocol. PPP is used to establish a direct connection between two nodes. It can connect computers using serial cable, phone line, mobile phone, radio links, or fiber optic links.

**PPPoE**

Point-to-Point Protocol over Ethernet. Based on the standards PPP and Ethernet. PPPoE is a specification with which users can be connected to the internet via Ethernet by using a common broadband medium such as DSL, Wireless LAN or cable-modem.

**PQI**

Power Quality Information

**Prepayment meters**

Prepayment meters are electric meters that allow the customer to pay a specified amount of money in advance of service to guarantee some level of minimum service while allowing low-income customers to keep within their budget.

**PRIME**

A narrowband PLC communications technique which uses Orthogonal Frequency-Division Multiplexing as the technology at physical layer to provide data rates of up to 128 kbit/s.

**Protocol, transmission protocol**

Devices which communicate with each other have to use the same rules. They have to speak the "same language". These rules and standards are called protocols or transmission protocols. Common protocols are IP, TCP, PPP, HTTP, SMTP. TCP/IP is the generic term for all IP based protocols.

**PSTN**

Public Switched Telephone Network. This network can be used for data transmission. A modem (modulator/demodulator) must be inserted between computer and telephone network and also between the telephone network and the remote meter.

**Publicly Owned Utilities (POU)**

Municipal utilities (utilities owned by branches of local government) and/or co-ops (utilities owned cooperatively by customers).

**Pulse**

In metering, an electric or optical signal that communicates a defined amount of energy consumption.

**PV**

Photovoltaic

**Q**

Reactive power

**R**

Reactive energy

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**Rates**

Generally, we distinguish between Time-of-Use rates and Real-time pricing. The difference between these is that TOU rates are based on forecasted prices and Real-time pricing is based on actual prices which may fluctuate many times a day rather than varying with a fixed schedule.

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**RCR**

Ripple Control Receiver

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**Real Time Metering**

Metering that records consumer use in the same time frame as pricing changes in the market, typically hourly or more frequently.

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**Real Time Pricing**

The pricing of electricity based on the cost of the electricity available for use at the time the electricity is demanded by the customer. As distinguished from TOU pricing, RTP is usually applied to that power demand above a defined base usage for a given customer, and not to all power consumed by that customer. RTP may also encompass charges for transmission and distribution whereas market-based rates cover only the energy (and possibly capacity) portion of an electric bill.

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**Remote parameterisation**

Possibility for parameterising certain meter parameters (all parameters contained in the service tree) from a central station.

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**Renewable resources**

Renewable energy resources are naturally replenishable resources such as solar, wind, biomass, geothermal and hydro. Usually, renewable energy is more environmental friendly than alternative energy source, especially with regard to air emissions.

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**Residential**

The residential sector is defined as private household establishments which consume energy primarily for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and clothes drying. The classification of an individual consumer's account, where the use is both residential and commercial, is based on principal use.

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**Retail customer**

Any customer receiving power for end usage on his side of the meter, and not for redistribution/resale to others.

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**Retail service company**

A company that provides the ultimate consumer of electricity with end-use services such as power, energy efficiency services, metering and billing, on-site generation, and other unbundled services.

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**Reverse energy**

Energy that flows from the consumer back to the utility supplier, e.g. generated by solar panels on the consumer's premises.

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**RJ**

Registered Jack. Jacks for telephone and network connections standardised by the US-american Federal Communications Commission (FCC). Example: RJ-45.

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**RM**

Remote Metering

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**RMA-Form**

Return Material Application which can be obtained in the Landis+Gyr Service&Repair dept.

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**RMS**

Root mean square (abbreviated RMS or rms), also known as the quadratic mean, is a statistical measure of the magnitude of a varying quantity and is normally used to calculate the power dissipated by an electrical conductor or load.

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**Rolling demand**

A method of measuring power that uses an interval with subintervals, in which the oldest subinterval is replaced by the newest subinterval number and the demand calculated. With this method, the demand is recalculated for the interval at the end of each new subinterval.

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**RP**

Registration period

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**RS 485**

EIA-485 (formerly RS-485 or RS485) is an OSI Model physical layer electrical specification of a two-wire, half-duplex, multipoint serial connection. The standard specifies a differential form of signalling. The difference between the wires' voltages is what conveys the data. One polarity of voltage indicates a logic 1 level, the reverse polarity indicates logic 0.

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**RS232**

In telecommunications, EIA-232 (formerly RS232) is a standard for serial binary data interconnection. It is commonly used in serial ports of PCs. In RS232, data is sent as a time-series of bits. Both synchronous and asynchronous transmissions are supported by the standard. Since transmit data and receive data are separate circuits, the interface can operate in a full duplex manner, supporting concurrent data flow in both directions. The RS232 standard defines the voltage levels that correspond to logical one (negative voltage) and logical zero (positive voltage) levels. Signals are plus or minus 3 to 15 volts.

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**RTC**

Real Time Clock. Time/date is invalid

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**RTP**

Real Time Pricing

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**RTU**

Remote Terminal Unit (e.g. FAG, METCOM)

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**S (VA)**

Apparent power

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**S0**

The S0 interface (transistor pulse output r53) serves to transmit fixed valency pulses to external devices. The pulse length and the pulse constant are parameterisable.

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**SAP**

Service Access Point. The SAP is a device address defined in the link layer (see HDLC). Only a correctly addressed device reacts to the communication data received.

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**SCADA**

Supervisory Control And Data Acquisition. A large-scale, distributed measurement (and control) system. SCADA systems are e.g. used to monitor or to control electric power generation, transmission and distribution.

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**SCTM**

Serial Coded TeleMetering, this is a former FAG telegram protocol.

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**Server-ID**

The Server-ID is the unique address of each SyM²-module. The Server-ID corresponds to the MAC-adress of a SyM²-module on the local bus.
The Server-ID is determined in various ways for components without local bus connection (e.g. MDE or central station). It is, however, always unique.

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**Service Provider**

Provider, company, institution, which offers users access to the internet or to an online service.

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**Service tool**

Landis+Gyr MAP110 und MAP120 software

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**Settlement Price**

The official closing price of the day for each future contract, established by the exchange as a benchmark for settling margin accounts and determining invoice price for delivery on that day.

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**S-FSK**

Spread frequency shift keying. A modulation scheme which is a combination of narrow band FSK and spread-spectrum technology. The signal is transmitted on a bandwidth considerably larger than the frequency content of the original information, this increases the signal-to-noise ratio.

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**SIM card**

Subscriber Identity Module. A chip card that is inserted in a mobile device and is used for the identification of the user in the network.

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**Smart Metering Systems**

These systems collect and deliver the information needed to optimise energy consumption.

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**Smart meters**

Devices with a range of extra functions. A smart meter will be able to record not only how much energy was used, but also when it was used. This enables different electricity rates for different times of the day to encourage customers to regulate their own usage of electricity during peak times. There are basically two types of smart meters: "Time Of Use" meters and interval meters.

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**SML**

SML (Smart Message Language) is a communication protocol for applications in the area of data acquisition and parametrisation of devices. User data are packed into SML-messages, which are again combined to SML files for transmission. SML-files are independent of the transmission method. They can be sent via e-mail, modem-connection or IP-Telemetry.

The following SML-files can occur: SML-request file, SML-response file or SML-combined file.

An SML-message is either a request message or a response message. Depending on the task, SML defines different message types.
The SML-Transport-Protocol (SML-T) is used for the transmission of SML messages via unsecured connections. This protocol is used on all SyM² interfaces.

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**SNR**

Signal-to-Noise Ratio

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**SOI**

Start of Interval. This bit indicates the start of the capture period.

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**Solid state meter**

Digital/electronic metering device.

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**Solid state recorder**

Device that saves data pulses in solid state memory for later analysis.

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**SPI**

Serial Process Interface.

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**SPI**

Service Provider Interface

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**Starting bit rate**

It is specified by IEC to permit change to a higher bit rate (the maximum bit rate or communication speed) after an opening. 300 bps is normally selected for starting and 9600 bps for the maximum rate via the optical interface. As soon as communication takes place e.g. via a modem connection, however, the bit rate can no longer be changed. In this case therefore the starting bit rate is selected to be the same as the communication speed.

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**Start-Stop bit**

Characters used with asynchronous interfaces (e.g. RS232) to find the beginning and end of the transmission frame. One start and one stop bit and 8 data bits are normally used per transmission frame.

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**STOM**

Serial Transmission of Original Meter Values. Acquisition of meter values with subset from IEC 870-5-102 and transmission via IEC 870 or SCTM to the central station.

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**Substation**

A facility for switching electrical elements, transforming voltage, regulating power, or metering.

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**Supervisory control**

A form of remote control comprising an arrangement for the selective control of remotely located facilities by an electrical means over one or more communications media.

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**Supply-Side**

Activities conducted on the utility's side of the customer meter.

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**TCP/IP**

Transmission Control Protocol/Internet Protocol, the suite of communication protocols used to connect hosts on the internet.

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**Telemetering**

The instantaneous transmission of metering data.

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**THD**

Total Harmonic Distortion

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**Time window**

In the communication module, a time interval can be parameterised during which the communication module can receive a call. This interval can also be repeated periodically (daily, weekly, monthly).

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**Time-of-Use meters**

A type of meter that measures and stores consumption and specific times of the day. These meters have lower costs to purchase and to read, and low-end versions cannot be remotely reprogrammed and cannot communicate in real time. Any changes to rate "buckets" requires the meter to be returned to the manufacturer and a new verification seal has to be applied.

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**TLA**

Total Losses of Active energy

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**TLR**

Total Losses of Reactive energy

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**Total Harmonic Distortion**

The Total Harmonic Distortion of a signal is a measurement of the harmonic distortion present and is defined as the ratio of the sum of the powers of all harmonic components to the power of the fundamental.

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**TOU**

Time-of-Use tables facilitate load control and planning on the part of utilities. This involves dividing the day, month and year into tariff slots and with higher rates at peak load periods and low tariff rates at off-peak load periods. The TOU table can also be used for load control, signal generation, etc.

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**TOU data**

The data collected in a TOU meter, which can be programmed differently for each meter, includes energy readings. This is referred to as billing data. Additional information, such as date and time of the highest meter readings, the continuous demand readings, and cumulative demand readings are referred to as non-billing data. This data is also stored in the TOU meter.

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**TOU rates**

The pricing of electricity based on the estimated cost of electricity during a particular time block. Time-of-use rates are usually divided into three or four time blocks per twenty-four hour period (on-peak, mid-peak, off-peak and sometimes super off-peak) and by seasons of the year (summer and winter).

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**Transmission Company**

A privately owned firm whose primary asset and focus is the high-voltage transmission of power.

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**Transmission rate**

The transmission rate, sometimes also called bit rate, represents the digital data quantity transmitted within a specific time. Unit: bit/s or bps. The term "baud rate" is often used for transmission rate, although it signifies the symbol changes per time unit at the interface (unit: baud = symbols/second). Depending on coding, a symbol can consist of several bits of a data stream. The transmission rate can, therefore, be several times higher than the baud rate.

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**UCTE**

Union for the Coordination of Transmission of Energy

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**UCTE**

The Union for the Co-ordination of Transmission of Electricity (UCTE) operates the European synchronous grid and is an association of electricity distribution network operators in Continental Europe. Its interconnected network is a single phase-locked 50 Hz mains frequency electricity grid that supplies over 400 million customers in 22 countries, including most European Union members.

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**UDP**

See TCP/IP.

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**UI**

User Interface

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**UMTS**

Universal Mobile Telecommunications System

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**Unbundling**

Disaggregating the electric utility service into its basic components and offering each component separately for sale with separate rates for each component. For example, generation, transmission and distribution could be unbundled and offered as discrete services or metering and billing could be offered as discrete services.

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**UPS**

Uninterruptible power supply. This is a device which maintains a continuous supply of electric power to connected equipment by supplying power from a separate source, e.g. batteries, when utility power is not available.

**US**

Additional power supply US

**V.250 command set**

New standard for the modem command format.

**V.32**

Communication standard for PSTN modems, 4800 to 9600 bps full-duplex. Return to a slower mode is possible depending on the opposite station, e.g. to V.22bis.

**V.32bis**

Communication standard for PSTN modems, 4800 to 14'400 bps full-duplex. Return to a slower mode is possible depending on the opposite station, e.g. to V.22bis.

**V.34, V.Fast**

Communication standard for PSTN modems, 2400 to 28'800 bps full-duplex. Return to a slower mode is possible depending on the opposite station, e.g. to V.22bis.

**V.34bis**

Communication standard for PSTN modems, 2400 to 33'600 bps full-duplex. Return to a slower mode is possible depending on the opposite station, e.g. to V.22bis.

**V.42**

Protocol for modem error correction.

**V.42bis**

Protocol for data compression for modems by a maximum factor 4 (exact value depends on the data transmitted). Based on V.42.

**VAA**

Virtual Application Association. Defines the relationship (on application level) between a server (meter) and the client (central unit, hand held unit). The VAA specifies how the client "sees" the meter, i.e. it defines which of the meter objects are actually available for the specific client. In connection with the ZxD, ZxG and ZxQ meters, a VAA corresponds to a security level which is defined by parameters.

**VDE**

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**VDEW**

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**VPN**

Virtual Private Network, a network that uses a public telecommunication infrastructure, such as the Internet, to provide remote offices or individual users with secure access to their organization's network

**xDLMS**

eXtended Device Language Message Specification, the application layer service element providing access to the COSEM objects

**XML**

The Extensible Markup Language (XML) is a general-purpose markup language for creating special-purpose markup languages, capable of describing many different kinds of data. Its primary purpose is to facilitate the sharing of data across different systems, particularly systems connected via the Internet.

**ZFA**

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**ZVEI**

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