CEN-CENELEC-ETSI Smart Meters Coordination Group

December 2012

Introduction and Guide to the work undertaken under the M/441 mandate

A report by the CEN-CENELEC-ETSI Smart Meters Coordination Group at end 2012

Contents

1. Foreword

This report documents the work as at the end of 2012 undertaken by the European Standards Organisations (ESOs) CEN, CENELEC and ETSI in response to mandate M/441, which was issued in March 2009. It is intended as a guidance note to the work over the period 2009-2012, introducing the various reports and other deliverables over this period of the mandate, guiding the reader on how they are intended to be used and explaining how subsequent on-going standardisation work in the area of smart metering may be taken forward.

2. Background and overview

Smart metering within the European Union had a very varied status at the beginning of the mandated work. While in some Member States (MS) full roll-out of smart meters had been fully implemented in the market, others had not even thought about trials or pilots. From a potential of about 350 million meters for the different energy sources (electricity, gas, water and heat), about 45 million smart meters had already been deployed, mainly electricity meters in Italy and Sweden.

An initial review of existing technologies revealed some 110 different applicable standards for smart meters and their communication infrastructure. It was obvious that focusing on a single technology or communication type would inhibit technological development. Also that there is a distinction to be made between battery and mains-powered meters, and that the differences between architectures that are linked to the specificities of distribution in MS has to be borne in mind.

Fulfilment of the M/441 was thus focused on two main aspects:

- identifying standards to facilitate interoperability across different technical requirements and
- providing a route for MS implementations

Considering data models for smart metering, there are various data models in use in MS who have already implemented smart metering.

Individual discussions with standardisation bodies from those MSs which have implemented or planning to implement smart metering have shown a broad consensus on using the IEC / EN 62056 COSEM model for future implementations of electricity smart meters.

To assist the standardisation of new developments and standards under M/441, a work programme was produced and activities co-ordinated by four standardisation committees – CENELEC/TC13 and TC 205, CEN/TC 294 and ETSI/TC M2M.

A suite of well documented standards is now available (see Annex 3) and in the course of development (see Annex 4) to guide MS in the implementation of their national smart metering programmes, minimising the risk of local islands of technology and helping to ensure a wide spectrum of potential suppliers for smart meter deployments.

3. Introduction to the M/441 mandate

The general objective of work under the M/441 mandate has been to ensure European standards that will enable interoperability of utility meters (water, gas, electricity, heat), which can then improve the means by which customers' awareness of actual consumption can be raised in order to allow timely adaptation to their demands.

The M/441 work when completed should permit fully integrated solutions, modular and multi-part solutions and should allow secure data exchange. In addition the architecture has to be scalable and adaptable to future communications media.

SM-CG has thus understood the mandate to cover the entire Advanced Metering Infrastructure (AMI) and not just the meters. The reference architecture diagram included as Annex 2 indicates the scope and functional components of the AMI system and communications interfaces considered by SM-CG.

3.1 Organisation of work around M/441

At the outset of the work, the ESOs established the Smart Meter Co-ordination Group (SM-CG). The SM-CG is an advisory and co-ordination group of ESOs and European stakeholder representatives, who act to ensure that the results of the work will meet the needs of interested parties. The SM-CG thus has wide representation of all relevant stakeholders: regulators, utilities, consumer organisations, IT industry, etc.

The work has been steered by a Chairman's Advisory Group (CAG), but with all developments and reports subject to endorsement by the plenary SM-CG, and adoption by the ESOs (through their respective Technical Boards).

The SM-CG established relevant sub-groups (e.g. 'Report Group', 'Task Force on Use Cases' and the 'Privacy & Security Task Force') to help manage the various deliverables.

3.2 TCs involved (Co-ordinating TCs)

The standardisation work under M/441 necessarily involves a large number of different Technical Committees within CEN, CENELEC and ETSI and needs to benefit from existing and on-going standardisation activities and deliverables within CEN, CENELEC and ETSI.

To ensure this and to create a common focus on the mandate, four Co-ordinating TCs were identified to provide co-ordination of standardisation activities as regards smart metering systems:

- CEN/TC 294: Communications systems for meters and remote reading of meters
    - Liaison with CEN/TC 237 (Gas meters) and CEN/TC 234 (Gas infrastructure); also with CEN/TC 92 (Water meters) and CEN/TC 176 (Heat meters)
- CENELEC/TC 13: Equipment for electrical energy measurement and load control
    - Liaison with CENELEC/TC 57 (Power systems management and associated information exchange) and IEC SC77A (EMC - Low frequency phenomena)
- CENELEC/TC 205: Home and Building Electronic Systems (HBES)

- Liaison with CEN/TC 247 (Building automation, controls and building management) and CENELEC/TC 57 (Power systems management and associated information exchange)

- ETSI M2M: Machine to Machine Communications
  - Liaison with ETSI/SCP (Smart Card Platform), ETSI/TISPAN (Telecom and Internet converged Services and Protocols for Advanced Networking), ETSI/MSG (3GPP) (Mobile Standards Group), ETSI/ERM TG28 (EMC and radio spectrum matters on SRD), ETSI/ATTM (Access Terminal Transmission and Multiplexing) and ETST/PLT (Power Line Telecommunications)

In addition to their own workload, these four TCs have taken the lead within their broader areas of responsibility as outlined above, ensuring liaison between the various TCs involved.

Together the Co-ordinating TCs have developed an overall work programme, bringing all the M/441 work together to enable SM-CG to have an overview of activities and to co-ordinate as necessary (see section 3.4).

3.3 Methodology

The intention of the work undertaken in response to M/441 has been to ensure that what a MS may want to do in smart metering is covered by suitable standards.

The approach has been to build on existing standards already available and maintained by CEN, CENELEC and ETSI, with the possibility of adding new work items for the creation of additional standards. Standards are voluntary, and permit innovation e.g. in remote reading protocols. Standards are also designed to be neutral as regards market structures and outcomes. They should promote competition by avoiding the foreclosure of markets (e.g. through bundling of services).

M/441 standards do not impose identical solutions on all smart metering projects in Member States, nor are they a best practice solution or recommendations. The standards which have been developed should be seen as a common standards “suitcase” or “toolbox” to facilitate smart metering deployments.

This approach recognises that Member States will have their own priorities and will undertake their own cost benefit analyses. Also there are differences between electricity, gas, water and heat. This leads to different national solutions.

Given the plethora of communication media - wired and wireless using different modulations - the strategy of SM-CG is to ensure semantic interoperability in the first place, i.e. interoperability on the data model level. Using this media-independent data model over a range of communication media will not constrain adopting results of the fast technology developments in media specific communication technologies. To provide a migration path, mapping between the COSEM data model and other data models, in particular M-Bus, used with power and resource constrained devices, may be necessary.

Furthermore the standardisation bodies should provide protocol stacks (eg profiles) that cover various technologies such as PLC, in order to provide interoperable solutions within one Local/Wide Area Network.

Note: The standards do not cover 'back office' or other industry IT systems impacted by smart meters although the standards used in smart metering will clearly have implications for both company and national systems.

4. Overall process

4.1 M/441 Deliverables

M/441, issued in March 2009 and accepted in July 2009, required the ESOs to produce:

- a European standard comprising a scalable architecture that supports secure two-way communication
- communication standards comprising standardised interfaces and data exchange formats, which permit secure interfacing and data exchange
- harmonised standards for additional functionalities within an interoperable framework.

After calling for a work programme within 3 months of acceptance (July 2009), together with a list of standards for additional functionalities, the M/441 mandate specified the following two deliverables:

- the European standard for communications within 9 months of acceptance
- the harmonised solutions for additional functions (European Standards) within 30 months of the acceptance.

Annex 1 details these requirements as they are shown in the original mandate**.**

Against this mandate, the SM-CG has produced:

- a SM-CG report (see 4.2 below)
- the CEN-CENELEC-ETSI Technical Report TR 50572:2011 'Functional reference architecture for communications in smart metering systems' (see 4.3 below)
- a consolidated work programme for standardisation by the ESOs (see 4.4 below)
- a set of smart metering use cases (see 4.5 below)
- a report on privacy and security (see section 6 below)

4.2 SM-CG report

This initial report, produced by the SM-CG in December 2009, was in response to the request for a list of standards for additional functionalities. It comprised an extensive survey of the current standardisation landscape as regards smart metering, identified a list of additional functionalities for smart metering systems as basis for understanding standardisation requirements and proposed a responsibility allocation for the organisation of the standardisation work.

The six functionalities developed by SM-CG and which underpin the work are as follows:

- **F1 – Remote reading of metrological register(s) and provision to designated market organisations**
- **F2 – Two-way communication between the metering system and designated market organisation(s)**
- **F3 – To support advanced tariffing and payment systems**

- **F4 – To allow remote disablement and enablement of supply and flow / power limitation**
- **F5 – To provide secure communication enabling the smart meter to export metrological data for display and potential analysis to the end consumer or a third party designated by the end consumer**
- **F6 – To provide information via web portal/gateway to an in-home/building display or auxiliary equipment**

The smart metering system may also be used for a further important functionality:

- To enable communication of AMI components with devices or gateways within the home / building used in the provision of energy efficiency and demand-side management services.

Note: the functionalities listed are not a minimum, so will not all be present in every meter or in every MS deployment. Also the functionalities can be provided in other ways**.**

4.3 CEN-CENELEC-ETSI Technical Report TR 50572:2011

Building on this initial work, this Technical Report, entitled 'Functional reference architecture for communications in smart metering systems' (CEN/CLC/ETSI TR 50572), was produced in September 2011, to meet the first deliverable specified in the mandate, related to the European standard for communications. Finalisation of the report was delayed because of the need to resolve issues raised by the Commission in December 2010, especially regarding the link with home/building automation systems. The Technical Report was finally able to be sent for voting in July 2011, agreed in October and was formally published by the ESOs in December 2011.

The Technical Report provides a **functional reference architecture** for smart metering communications, which was constructed at a generic level in order to be applicable across the variety of smart metering deployments in Europe and able to be implemented in electricity, gas, water and heat applications. The architecture identifies the communication interfaces relevant to this architecture. Annex 2 shows this functional architecture and communications interfaces.

The Technical Report also identifies the communications standards which are currently the most relevant for smart metering and lists in a table both existing communications standards and the standards to be developed in the course of the mandate. Standards are considered in relation to each of the communications interfaces.

The Technical Report focuses exclusively on communications involving the smart metering system. Thus it does not cover metrological aspects (which are addressed in the Measuring Instruments Directive M/347) or utility back-office systems. Nor does the Technical Report cover displays/home/building automation, just communications to these where such communications are routed via the smart metering system. The reference architecture ranges from the metering Head End System to the Smart Meter and interface to an external display.

Similarly the Technical Report does not cover smart grid applications or electric vehicles, except to the extent that they involve communications routed via the smart metering system - see also section 7 below. The interfaces to Home Automation equipment for the purpose of

demand side management and demand response are considered to fall under the Smart Grid mandate (M/490).

The Technical Report can be found on the SM-CG electronic platform, hosted by the IEC/CENELEC Collaboration Tool, and is freely available on the ESOs' websites.

4.4 Work programmes

A series of consolidated work programmes were prepared, the most recent of which is dated November 2012. These brought together the latest work plans of the TCs involved in standardisation in response to the mandate, monitored progress and ensured that activities were co-ordinated across TCs.

The work programme also helped where there was parallel work being undertaken under separate mandates, notably the M/490 smart grid mandate, which is overseen by the Smart Grid Co-ordination Group – see section 7. In its work programme the SM-CG has also accepted work items delegated by the SG-CG as being more appropriately managed under M/441.

Successive M/441 work programmes have been shared with the European Commission.

The relevant standards being developed in support of the smart grid mandate are also included in Annex 4.

4.5 Use Cases

In response to the need to determine functionalities in more detail, a repository of use cases for smart metering was developed to clarify standardisation requirements. These provide insight in the functionality and technical requirements of the data communication that standards should support, help identify where new standards might be required and facilitate interoperability and consistency in the smart meter data flows. The Technical Report shows how these use cases relate to each functionality as mentioned in 4.2.

A series of more detailed documents on smart meter use cases and use case requirements were considered at the June 2012 SM-CG meeting and issued for comment, following which a number of use case documents are about to be finalised.

The relevant use case documents are:

- a final report introducing the Use Cases, listing the Use Cases, explaining how they should be designed and by whom (The guidelines for developing Smart Metering Use Cases)
- a report listing the final Use Cases and explaining how they have been designed and their relationship with the reference architecture
- a repository of Primary Use Cases
- a repository of Secondary Use Cases
- a first set of technical requirements identified by the Task Force while working on the definition of use cases.

5. Standards

As at the end of 2012, an extensive list of standards has either been completed or sent for voting. These are listed in Annex 3 and fulfil the second deliverable under the mandate related to European Standards.

However there are a number of other standards which are nearing completion and are expected to be sent for voting in 2013. Standardisation work on a number of other standards will continue beyond the end of 2012, this requiring continuous co-ordination by SM-CG. Annex 4 lists standards the development of which goes beyond December 2012. For most of these standards NWIPs have already been approved; the list will be added to as proposals for new work items are accepted.

6. Security and privacy issues

In addition to the above reports and standards, in order to address the issue of security, privacy and data protection noted at several points in the mandate, a separate report has been produced on this topic, explaining how it should be addressed in the smart meter standardisation process, setting out the principles which have been followed by the TCs in this area and emphasising how the approaches of the four co-ordinating TCs are converging.

MS will decide their individual security solutions adapted to their national specificities and what is technically and economically efficient, taking account of EU recommendations in the interests of promoting interoperability. Solution(s) proposed in the standard should be compatible with any of the architectures and solutions deployed by MS and must be in conformity with MS national regulations. Also security solutions must be considered holistically, taking account of e.g. the infrastructure required for key management.

The report will be made available on the SM-CG electronic platform, hosted by the IEC/CENELEC Collaboration Tool.

The development of this report has been undertaken in close co-ordination with those considering this subject in the context of smart grid standardisation – see also the following section – and work in this area continues.

7. Link with other mandates, in particular M/490 (Smart Grids)

The M/441 focus is on provision of improved information and services to consumers and enabling consumers to better manage their consumption. In relation to electricity metering, there is the important additional objective of facilitating smart grid applications, notably through incorporation of distributed generation.

Smart grids are outside M/441 scope but smart metering is a key enabler for smart grids, providing two-way information flows between meter and designated market organisation(s).
The use of the AMI for demand side management purposes is covered by the M/490 mandate, as is the approach to defining security requirements for smart grids. The latter is largely applicable also to smart metering and this is reflected in the privacy and security report referred to in section 6 above.

Close co-ordination between the M/441 smart metering mandate and the M/490 smart grid mandate has been ensured at all levels by designated 'rapporteurs', who were responsible for resolution of any interface issues between the SM-CG and the Smart Grid Co-ordination Group (SG-CG).

8. Summary and next steps

Completion of the above work and this report address the work required under the mandate issued in 2009.

8.1 Completed deliverables

The completed deliverables, which are or will shortly be available on the SM-CG electronic platform, are:

- the **initial report** produced by the SM-CG in December 2009
- the **Technical Report TR 50572** formally issued by the ESOs in December 2011- see ftp://ftp.cen.eu/cen/Sectors/List/Measurement/Smartmeters/CENCLCETSI_TR50572.pdf & http://www.cenelec.eu/aboutcenelec/whatwedo/technologysectors/smartmetering.html
- a consolidated **standardisation work programme** for the relevant TCs
- a comprehensive list of **new and updated standards** for smart metering (see Annex 3 of this report)
- a final report with guidelines for the design of Smart Metering Use Cases
- a final report on **Smart Metering Use Cases**
- a **repository of Primary Use Cases**
- a **repository of Secondary Use Cases**
- **Technical requirements for use cases**
- a **report on Privacy and Security**

8.2 Next steps in standardisation

Electricity smart meter implementations in Europe are required to be undertaken between 2013 and 2020 and new technologies and standards will be created during that time. Even though the deliverables requested by the mandate are completed, on-going support of standardisation is therefore required until 2020 and beyond.

A continuation of the SM-CG work programme is therefore proposed together with maintenance and frequent updates of the SM-CG work, with SM-CG reviewing and agreeing the need for the work programme to continue on an annual basis. The programme should be aligned with the parallel work being done for smart grids under the M/490 mandate and e-mobility under the M/468 mandate and will include further work on standards and on privacy and security requirements for smart metering.

Regarding the main list of standards developed under the M/441 mandate, Annex 3 represents the status at the end of 2012. This list will be continuously updated by CEN, CENELEC and ETSI as necessary, in line with their established procedures.

The maintenance of Use Cases will be passed to horizontal TCs such as TC8X.

It is proposed that the SM-CG will continue as a co-ordinating body within CEN/CENELEC/ETSI, in order to

- oversee the continuing work programme in smart metering
- follow the recommendations of the SM-CG Task Force on privacy and security aspects of smart metering standards. The objectives of the SM-CG will be to provide input for further work on standards and on privacy and security requirements for smart metering.
- act as an occasional point of liaison and co-ordination when new work items in smart metering standardisation are put forward,
- serve as plenary body of all stakeholders involved in smart meter standardisation, including stakeholders (e.g. consumer representatives) who are not able to be actively involved in the work of the various technical committees,
- provide a smart metering perspective in smart grid standardisation as it further develops, and
- assign on-going ownership for any SM-CG responsibilities which may continue after its role is concluded.

It should be noted that the standards for interfaces to home/building automation, which are being developed in co-operation with the SM-CG, will not be finished before the end of 2012. In addition the definition of security requirements can only be finished after the SG-CG has delivered its final results, and there will be on-going issues concerning privacy, data protection and security, which will be addressed by SM-CG Privacy & Security Task Force and co-ordinated with the continuing work of the SG-CG in the area.

Annex 1: The M/441 mandate

Description of the mandated work

CEN, CENELEC and ETSI are requested to develop:

1. A European standard comprising a software and hardware open architecture for utility meters that supports secure bidirectional communication upstream and downstream through standardised interfaces and data exchange formats and allows advanced information and management and control systems for consumers and service suppliers. The architecture must be scalable to support from the simplest to the most complex applications. Furthermore, the architecture must consider current relevant communication media and be adaptable for future communication media. The communication standard of the open architecture must allow the secure interfacing for data exchanges with the protected metrological block.

2. European standards containing harmonised solutions for additional functionalities within an interoperable framework using where needed the above-mentioned open architecture for communication protocols. These solutions must be standardised to achieve full interoperability. Solutions meant to be installed in living quarters should be silent, non-intrusive and safe.

3. The standards to be developed must be performance-based and permit innovation in the protocols that enable remote reading of utility meters and advanced information and management services for consumers and suppliers. In particular, the standards shall permit fully integrated instruments, modular and multi-part solutions. Standards developed under this mandate and M/374 should not conflict with each other and other standards and any overlaps should be indicated.

Execution of the mandate

CEN, CENELEC and ETSI shall present a work programme to the European Commission within 3 months of the acceptance of the mandate. This work programme shall include the precise time schedules for the work as well as a full list of the European standards to be developed for additional functionalities. After notifying the Standing Committee under Directive 98/34/EC, the European Commission will without delay inform CEN, CENELEC and ETSI of the proposed standards it accepts as being covered by this mandate.

The deliverables shall nevertheless be presented to the European Commission as follows:

a. The European standard for communication shall be presented within 9 months of the acceptance of the mandate.
b. The harmonised solutions for additional functions (European standards) shall be completed within 30 months of the acceptance of the mandate.

CEN, CENELEC and ETSI shall provide a combined progress report on the mandated work by the end of October 2010.

It is requested that deliverables indicate where they cover requirements which are necessary to comply with Directive 2004/22/EC (notably Annex I points 7.6, 8.1-8.5 and 10.5). Also deliverables should take into account applicable legal requirements concerning the confidentiality of personal data protected under Directive 95/46/EC[4] and Directive 2002/58/EC[5].

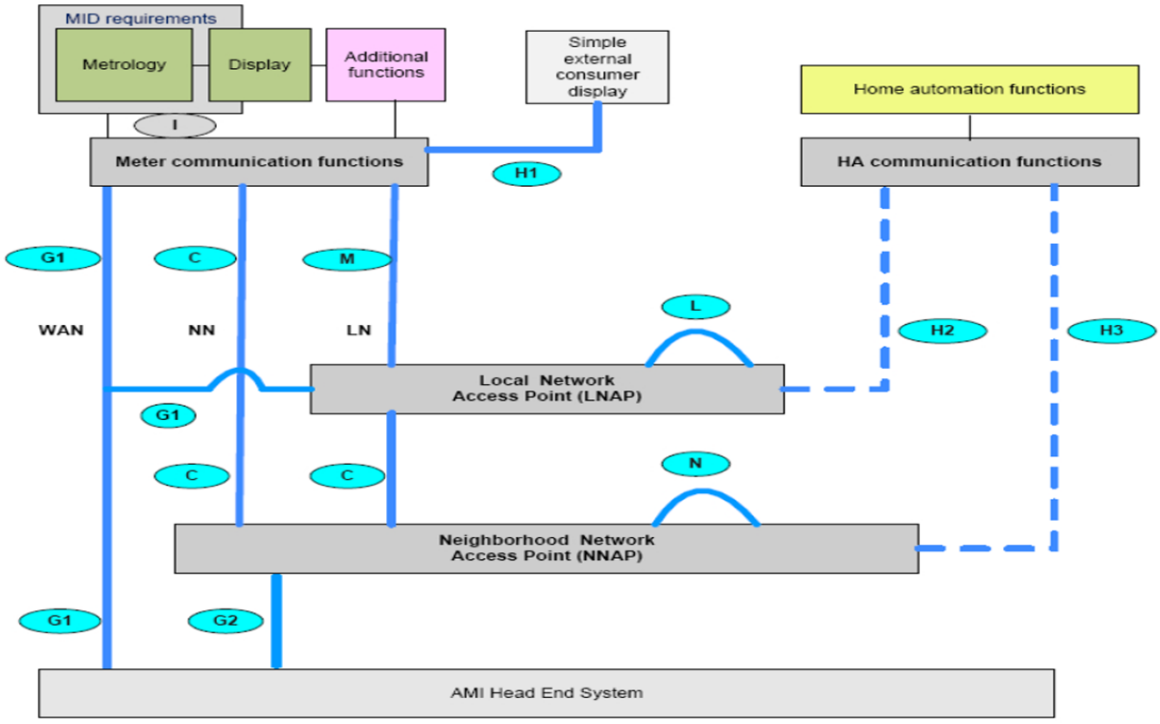
Footnote:

Directive 2004/22/EC = Measuring Instruments Directive
Annex 1 point 7.6 = meter associated software not to be inadmissibly influenced
Annex 1 point 8.1-8.5 = protection of metrology from accidental or intentional corruption
Annex 1 point 10.5 = customer accessibility of display

Directive 95/46/EC = Data Protection Directive

Directive 2002/58/EC = Directive on Privacy and Electronic Communications

Annex 2: Functional Reference Architecture for communications in smart metering systems



The diagram above is taken from TR 50572 and gives a simplified overview of functional entities and interfaces in a smart metering communications network; the boxes correspond to functions that in physical terms can be implemented in a number of different ways. TR 50572 is concerned solely with the communications interfaces depicted in blue.

The M interface is between the communications function of the meter and the LNAP or between metering end devices.

The G1 / G2 interfaces are used to connect the meters / LNAPs /NNAPs directly with an AMI HES.

The C interface is used to connect LNAPs and / or metering end devices to an NNAP.

L is an optional interface which allows an LNAP to be connected to zero or more peer LNAPs. Similarly, N is an optional interface which allows an NNAP to be connected to zero or more NNAPs.

The H1 interface connects a metering end device to a simple external consumer display.

The dotted H2 interface connects a LNAP and the H3 interface connects an NNAP with auxiliary devices e.g. a home automation or advanced display functionality and support the provision of energy efficiency and demand-side management services, including via web portal/gateway to an in-home/building display or auxiliary equipment.

Building and home automation are outside the scope of the M/441 mandate; however their interfaces with the smart meter are treated in co-operation with the SM-CG.

Annex 3: Standards completed / sent for voting by December 2012

CLC/TC 13

- prTS 50568-2 Electricity metering data exchange - The Smart Metering Information and Telecommunication Protocols (SMITP) suite - Part 2: Local data exchange via optical interface
- prTS 50568-4 Electricity metering data exchange - The Smart Metering Information and Telecommunication Protocols (SMITP) suite - Part 4: Physical layer based on B-PSK modulation + Data Link Layer
- prTS 52056-8-4 Electricity metering data exchange – The DLMS/COSEM suite – Part 8-4: The Type 1 OFDM PLC profile
- prTS 52056-8-5 Electricity metering data exchange - The DLMS/COSEM suite -- Part 8-5: The Type 2 OFDM PLC profile
- FprEN 62056-3-1 Electricity metering data exchange – The DLMS/COSEM suite – Part 3-1: Use of local area networks on twisted pair with carrier signalling
- FprEN 62056-5-3 Electricity metering data exchange - The DLMS/COSEM suite -- Part 5-3: DLMS/COSEM application layer
- FprEN 62056-6-1 Electricity metering data exchange - The DLMS/COSEM suite -- Part 6-1: Object Identification System (OBIS)
- FprEN 62056-6-2 Electricity metering data exchange - The DLMS/COSEM suite -- Part 6-2: COSEM interface classes
- FprEN62056-7-6 Electricity metering data exchange - the DLMS/COSEM suite -- Part 7-6: The 3-layer, connection-oriented HDLC based communication profile
- FprEN 62056-8-3 Electricity metering data exchange - The DLMS/COSEM suite -- Part 8-3: Communication profile for power line carrier for neighborhood networks
- IEC 62056-8-6 Electricity metering data exchange – The DLMS/COSEM suite – Part 8-6: DMT PLC profile for neighborhood networks
- FprEN 62056-9-7 Electricity metering data exchange - The DLMS/COSEM suite -- Part 9-7: Communication profile for TCP-UDP/IP networks

Available standards not mentioned in TR 50572

- EN 50470-1 Electricity metering equipment (a.c.) Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)
- EN 50470-3 Electricity metering equipment (a.c.) Part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)

  The above two standards are harmonized under the MID.
- EN 62052-11 Electricity metering equipment (a.c.) - General requirements, tests and test conditions - Part 11: Metering equipment
- IEC 62052-21 Electricity metering equipment (a.c.) – General requirements, tests and test conditions – Part 21: Tariff and load control equipment
- EN 62053-21 Electricity metering equipment (a.c.) – Particular requirements – Part 21: Static meters for active energy (classes 1 and 2)
- EN 62053-23 Electricity metering equipment (a.c.) - Particular requirements - Part 23: Static meters for reactive energy (classes 2 and 3)
- IEC/EN 62053-24 Electricity metering equipment (a.c.) - Particular requirements - Part 24: Static meters for reactive energy (classes 0,5 S, 1 S and 1)

- EN 62054-21 Electricity metering (a.c.) – Tariff and load control – Part 21: Particular requirements for time switches
- EN 62055-21 Electricity metering – Payment systems – Part 21: Framework for standardization
- EN 62055-31 Electricity metering – Payment systems Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2)

CEN/TC 294

- prEN 13757-3 Communication system for and remote reading of meters – Part 3: Dedicated application layer

CEN/TC 237

- prEN 16314 Gas meters - Additional functionalities

ETSI/TC M2M

- TR 102 691 (Release 1 & Release 2) Technical Report on Smart Metering Use Cases
- TS 102 689 (Release 1 & Release 2) M2M Service Requirements (stage 1)
- TS 102 690 (Release 1 & Release 2) M2M functional architecture (stage 2)
- TS 102 921 (Release 1& Release 2) Mia, mid, and dia interfaces
- TR 102 935 Applicability of M2M architecture to Smart Grid Networks Impact of Smart Grids on M2M platform
- TR 101 531 (Release 1) Re-use of 3GPP nodes by M2MSC layer
- TR 103 167 (Release 1) Threat analysis and counter measure to M2M service layer
- TR 102 966 (Release 1) Interworking between M2M architecture and M2M area network technologies
- TS103 092 (Release 1 & Release 2) OMA compatible management objects for M2M
- TS103 093 (Release 1 & Release 2) BBR TR 069 compatible management objects for M2M
- TE 103 118 (Release 2) Smart Energy Infrastructures security; Review of existing security measures and convergence investigations
- TS101 584 (Release 2) Semantic support for M2M
- TS103 104 (Release 2) M2M Testing of CoAP bindings
- TS103 603 (Release 2) Service layer interworking with 3GPP
- TS103 107 (Release 2) Service layer interworking with 3GPP2

> *Note: Many of TC M2M specifications will be transferred to the new Partnership project oneM2M in Q2 2013. However TC M2M will continue to exist and will re-focus on M2M standards from an EU perspective. Also the specifications made in oneM2M will be published via ETSI (as the EU ESO) and this will be done via TC M2M.*

ETSI/TC ERM

- TR 102 886 Performance Requirements for Smart Metering Wireless Access Protocol
- TR 103 055 Spectrum Requirements for Short Range Device, Metropolitan Mesh Machine Networks (M3N) and Smart Metering (SM) applications

ETSI/TC PLT

- TS 103 908 BPSK Narrow Band Power Line Channel for Smart Metering Applications (Ref: DTS/PLT-00032)

ETSI/TC SCP

- TS 102 412 Smart Cards; Smart Card Platform Requirements Stage 1
- TS 102 671 Smart Cards; Machine to Machine UICC; Physical and logical characteristics
- TS 102 221 Smart Cards; UICC-Terminal interface; Physical and logical characteristics
- TS 102 671 Smart Cards; Machine to Machine UICC; Physical and logical characteristics
- TS 102 569 UICC Security Service Module (USSM); Stage 2

ETSI/TC MSG

- ETSI TS 122 368 Service requirements for Machine-Type Communications (MTC); Stage 1
- ETSI TS 136 300 Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2
- ETSI TS 136 201 Evolved Universal Terrestrial Radio Access (E-UTRA); LTE physical layer; General description
- ETSI TS 136 211 Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation
- ETSI TS 136 212 Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding
- ETSI TS 136 213 Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures
- ETSI TS 136 214 Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer; Measurements
- ETSI TS 136 216 Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer for relaying operation
- ETSI TS 123 401 General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access

IETF

Generic IP protocols related to smart metering are listed in the IETF RFC 6272 (IPv4, IPv6, DNS, TCP, UDP…).

Specific IP related RFC standards are:

- IETF RFC 4919: 6LoWPAN
- IETF RFC 6282: IPv6 Header compression
- IETF RFC 6550: RPL IPv6 Routing protocol
- IETF RFC 6551: ROLL routing metrics
- IETF RFC 6552: ROLL objective function Zero
- IETF RFC 6206: ROLL Trickle

Annex 4: Deliverables under development

CLC/TC 13

- prTS 62056-1-0 Electricity metering data exchange - Part 1-0: Smart metering Standardization framework
- prTS 50586 OSGP (Open Smart Grid Protocol) for utility metering, tariff, load control and other applications - Communication protocols, data structures and procedures
- prEN 50xxx Electricity metering data exchange - CX 1 Lower layer specification - Part X: Physical layer, data link layer and network layer
  Note: 'CX1' will be replaced by a technical name
- prTS 52056-8-7 Electricity metering data exchange – The DLMS/COSEM suite – Part 8-7: Communication profile for PLC neighborhood networks using CX1
  Note: 'CX1' will be replaced by a technical name
- prTS 50568-5 Electricity metering data exchange - The Smart Metering Information and Telecommunication Protocols (SMITP) suite - Part 5: Application layer messages exchange on PLC and IP networks
- prTS 50568-8 Electricity metering data exchange - The Smart Metering Information and Telecommunication Protocols (SMITP) suite - Part 8: PLC profile based on B-PSK modulation
- prTS 50568-9 Electricity metering data exchange - The Smart Metering Information and Telecommunication Protocols (SMITP) suite - Part 9: IP profile on public telecommunication network
- FprEN 62056-4-7 Electricity metering data exchange – The DLMS/COSEM Suite Part 4-7: COSEM transport layers for IPv4 and IPv6 networks
- prEN 62056-5-3-8 Electricity metering data exchange – Part 5-3-8: Smart message language SML standard
- prEN 62056-7-2 Electricity metering data exchange - The DLMS/COSEM suite - Part 7-2: Local interface using twisted pair with carrier signalling
  IEC/TS 62056-6-9 Mapping between the Common Information Model CIM (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and message profiles
- prTS 50567-1 Meter data exchange over power lines - Part 1: Lower layer profile using Orthogonal Frequency Division Multiplexing (OFDM) Type 1
- prTS 50567-2 Meter data exchange over power lines - Part 2: Lower layer profile using Orthogonal Frequency Division Multiplexing (OFDM) Type 2
  Note: prTS 50567-1 and prTS 50567-2 will be withdrawn as soon as the BT approves new ITU-T referencing

CLC/TC 205

- prEN 50491-11 Smart metering –Application specification-Home display
- prEN 50491-12 Smart grid – Application specification- Interface and framework for customer energy management

CEN/TC 176

- prEN 1434-1 Heat meters - Part 1: General requirements
- prEN 1434-2 Heat meters - Part 2: Constructional requirements
- prEN 1434-4 Heat meters - Part 4: Pattern approval tests
- prEN 1434-5 Heat meters - Part 5: Initial verification tests
- prEN 1434-6 Heat meters - Part 6: Installation, commissioning, operational monitoring and maintenance

CEN/TC 234

- prEN 1776 - Gas infrastructure - Gas measuring systems - Functional requirements

CEN/TC 247

- prEN 13321-2 Open Data Communication in Building Automation, Controls and Building Management - Home and Building Electronic System Part 2: KNXnet/IP Communication

CEN/TC 294

- prEN 13757-1 Communication system for and remote reading of meters Part 1: Data exchange
- prEN 13757-4 Communication systems for meters and remote reading of meters Part 4: Wireless meter readout (Radio meter reading for operation in SRD bands)
- prEN 13757-5 Communication systems for meters and remote reading of meters - Part 5: Wireless relaying

ETSI/TC ERM

- TS 102 887-1 Smart Metering Wireless Access Protocol; PHY layer-1
- TS 102 887-2 Smart Metering Wireless Access Protocol; Data Link Layer (MAC sub-layer)
- ES 202 630 ETSI Standard for SRDs in parts of the frequency range 870-876 MHz and 915-921 MHz, with Transmitter Duty Cycle(TDC) restriction and power levels up to 25 mW

ETSI/TC PLT

- TS DTS/PLT-00031 Powerline communication requirements for smart meters

ETSI/TC SCP

- TS 103 383 Smart Cards; Embedded UICC Requirements Stage 1
- TS 102 240 Smart cards; UICC Application Programming Interface and Loader Requirements; Service description
- TS 102 241 Smart cards; UICC Application Programming Interface (UICC API) for Java Card (TM)

IETF

- IETF draft Constrained Application Protocol (CoAP) (mesh network for energy constraints sensors and nodes)

IEEE

- IEEE P1901,2