

TECHNICAL REPORT



Smart grid user interface – Part 1: Interface overview and country perspectives

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CONTENTS

FOREWORD.....	8
0 Introduction	10
0.1 High-level definition of Smart Grid user interface (SGUI).....	10
0.2 PC 118 history	10
0.3 Relation of IEC PC 118 to other IEC technical committees.....	10
0.4 Report overview.....	11
0.5 Key recommendations and findings.....	11
1 Scope.....	12
2 Smart Grid user interface overview	12
2.1 SGUI – Consensus perspective.....	12
2.2 Inter-domain interoperability	14
2.2.1 General	14
2.2.2 Agreement at the interface – a contract	14
2.2.3 Boundary of authority	14
2.2.4 Decision making in very large networks	14
2.2.5 The role of standards.....	15
2.3 Smart Grid user applications	15
2.3.1 General	15
2.3.2 Demand response.....	15
2.3.3 Other SGUI applications	20
2.4 SGUI functional requirements	20
2.5 Architecture	22
2.6 Actors	24
2.6.1 Overview	24
2.6.2 Customer domain characteristics	24
2.6.3 Grid-side, customer-side, and SGUI actors	24
2.7 Quality requirements.....	26
2.7.1 General	26
2.7.2 Security and privacy	27
2.7.3 Scalability and performance.....	27
2.7.4 Maintainability	28
3 Country actions and perspective on Smart Grid user interface	28
3.1 General.....	28
3.2 Overview of country experiences	28
3.2.1 China perspective.....	28
3.2.2 U.S. perspective	29
3.2.3 European perspective.....	31
3.2.4 France perspective	32
3.2.5 Korea perspective.....	36
3.2.6 Japan perspective	37
3.2.7 India perspective	37
3.3 Use cases from PC 118 member countries.....	38
3.3.1 General	38
3.3.2 China use cases	38
3.3.3 Korea use cases.....	39
3.3.4 Japan use cases.....	39

3.3.5	France use cases	39
3.3.6	India use cases	40
3.3.7	U.S. use cases	40
3.4	Use case analysis	41
3.4.1	General	41
3.4.2	Service and control interactions	41
3.4.3	Use case taxonomy	42
3.4.4	Analysis and classification of use cases	42
3.4.5	Summary of use case analysis.....	44
3.5	Special considerations	44
3.5.1	General	44
3.5.2	Meter interactions	44
3.5.3	Electric vehicles and other storage	45
4	Smart grid user interface standards	45
4.1	General.....	45
4.2	Overview of existing standards	45
4.3	Standards gap context	50
4.3.1	General	50
4.3.2	Standards gap analysis procedure	50
4.3.3	Use case classification system	51
4.4	Use case classes and relevant standards	52
4.4.1	General	52
4.4.2	UCC 1—Interact with markets.....	52
4.4.3	UCC 2—Convey price information.....	55
4.4.4	UCC 3—Ancillary services	58
4.4.5	UCC 4—DR & DER requests and supporting services.....	61
4.4.6	UCC 5—Impending power failure or instability	64
4.4.7	UCC 6—Directed interaction and direct load control	66
4.4.8	UCC 7—Historical, present and future projection information.....	69
4.4.9	UCC 8—Monitoring and energy efficiency analysis	71
4.5	Smart Grid user interface standards gap analysis conclusions	73
5	Recommendations for IEC SGUI standards development.....	74
5.1	General.....	74
5.2	OpenADR 2.0.....	74
5.3	OASIS Energy Interoperation	75
5.4	Smart Energy SEP 2.0	75
Annex A (informative)	IEC establishment and history of PC 118.....	76
Annex B (informative)	SGUI perspective – More details	81
B.1	General.....	81
B.2	European standardization for Smart Grid realization in buildings.....	81
B.3	DR through smart meter infrastructure (France)	84
Annex C (informative)	Use cases	87
C.1	General.....	87
C.2	China use cases	87
C.2.1	CN01 – Use case of generic use cases.....	87
C.2.2	CN02 – Use case of demand response	87
C.2.3	CN03 – Use case of energy efficiency	87
C.2.4	CN04 – Use case of distributed energy resource	88

C.2.5	CN05 – Use case of electric vehicle charging	88
C.2.6	CN06 – Use case of load management	88
C.3	Korea use cases	88
C.4	Japan use cases	90
C.4.1	General	90
C.4.2	JP01 – Control battery via home energy management system (HEMS)	90
C.4.3	JP02 – Control distributed energy resources (DER) via home energy management system (HEMS).....	91
C.4.4	JP03 – Control energy consumption with smart appliances by building energy management system (BEMS)	91
C.4.5	JP04 – Control energy consumption with smart appliances by community EMS.....	91
C.4.6	JP05 – Control energy consumption with smart appliances by energy provider	92
C.4.7	JP06 – Control energy consumption via home energy management system (HEMS) with smart appliances	92
C.4.8	JP07 – Peak shift contribution by battery aggregation (virtual energy storage).....	92
C.4.9	JP08 – Control of smart home appliances based on price information by time slot.....	92
C.4.10	JP09 – Control of smart home appliances in response to power saving request from electric power supplier	93
C.4.11	JP10 – Control of smart home appliance before power cut.....	93
C.4.12	JP11 – Control of smart home appliances in case of natural disaster	94
C.5	France use cases.....	94
C.5.1	General	94
C.5.2	FR01 – Load control for electrical water heating tank coupled with on/off peak tariff	94
C.5.3	FR02 – Dynamic pricing of electricity and energy management.....	95
C.5.4	FR03 – Managing a superseding tariff schedule (peak demand) UC_PC_14	96
C.5.5	FR04 Handle a tariff event through managed equipment UC_PC_16	98
C.5.6	FR05 – Handling a tariff event by local intelligence UC_PC_17	99
C.6	India use cases.....	100
C.6.1	IN01 – Energy efficiency	100
C.6.2	IN02 – Demand response for peak load reduction.....	101
C.6.3	IN03 – Home energy management.....	101
C.6.4	IN04 – Building energy management	101
C.6.5	IN05 – Local markets to enable consumer-prosumer open access transactions.....	102
C.6.6	IN06 – Deliver output reports of demand side equipment in standardized data formats to users	103
Annex D (informative)	Standards	104
D.1	Short summary of Clause 4 relevant standards	104
D.1.1	General	104
D.1.2	ISO/IEC 15067-3	104
D.1.3	ISO/IEC 15045 series	104
D.1.4	ISO/IEC 18012 series	104
D.1.5	ISO/IEC 14543 series	104
D.1.6	ISO/IEC 14543-3 (EN 50090) KNX.....	104
D.1.7	ISO/IEC 14908-1	105

- D.1.8 ISO 16484-5 (ASHRAE/ANSI 135) 105
- D.1.9 ISO 17800 (ASHRAE/NEMA 201P) 105
- D.1.10 ISO/IEC 14762 106
- D.1.11 ISO/IEC 29145 106
- D.1.12 ISO/IEC 30100 106
- D.1.13 IEC 61158-6 106
- D.1.14 IEC 61400-25 series 106
- D.1.15 IEC 61588 107
- D.1.16 IEC TR 61850-90-7 107
- D.1.17 IEC TR 61850-90-8 108
- D.1.18 IEC 61968 series 108
- D.1.19 IEC 61970 series 109
- D.1.20 IEC 62056 series 109
- D.1.21 IEC 62325 series 109
- D.1.22 IEC 62351 series 110
- D.1.23 IEC 62394 110
- D.1.24 IEC 62480 110
- D.1.25 IEC 62488 series 110
- D.1.26 IEC 62746 series 111
- D.1.27 IEC TS 62872 111
- D.1.28 OASIS Energy Interoperation 1.0 111
- D.1.29 OpenADR 2.0 (IEC PAS 62746-10-1) 111
- D.1.30 OASIS Energy Market Information Exchange 111
- D.1.31 OASIS WS-Calendar 112
- D.1.32 CENELEC EN 50491-12 112
- D.1.33 IEEE P2030.5 Smart Energy Profile 2.0 112
- D.1.34 ECHONET 112
- D.1.35 ANSI/CEA-2045, Modular Communication Interface 113
- D.1.36 AS/NZS 4755 113
- D.1.37 IEEE 1547 113
- D.2 Additional standards information 114
 - D.2.1 General 114
 - D.2.2 Standard: OASIS Energy Interoperation (EI) 114
 - D.2.3 Standard: OpenADR 2.0 Profile Specification (OpenADR 2.0) 116
 - D.2.4 Standard: Smart Energy Profile (SEP) 2.0 116
 - D.2.5 Standard: NAESB REQ.21: Energy Services Provider Interface (ESPI) 119
 - D.2.6 Standard: ASHRAE/NEMA 201P Facility Smart Grid Information Model (FSGIM) 122
 - D.2.7 Standard: ANSI/CEA-2045: Modular Communication Interface 123
- Bibliography 127

- Figure 1 – High-level view of the SGUI architecture as interface (blue line) between different domains 13
- Figure 2 – Levels of demand response interactions 16
- Figure 3 – Interactive demand response versus DLC 18
- Figure 4 – Information exchange through the SGUI between the grid (external service providers) and users in the Customer Facility domain 22
- Figure 5 – High-level generic Smart Grid user interface architecture 23
- Figure 6 – NIST smart grid conceptual model (from NIST Framework 2.0) 30

Figure 7 – Architectural details of the EN 50491-12 CEM framework.....	32
Figure 8 – Example COSEI architecture diagrams.....	33
Figure 9 – Summary classification of submitted use cases with three interaction styles	43
Figure 10 – Cross-tabulations of use cases by category with three interaction styles	43
Figure 11 – Classification of standards in the following tables based on SGUI (Table 11), grid-side domains (Table 12) and facility-side domain (Table 13)	46
Figure 12 – Smart Grid architecture model.....	51
Figure A.1 – Consensus reference drawing for PC 118 work relative to other TCs	77
Figure A.2 – Top-down approach to identify industry expectations	79
Figure A.3 – Questions to be addressed by PC 118 working groups leading to work plan	79
Figure A.4 – Conceptual work plan for PC 118.....	80
Figure B.1 – Reference architecture for smart metering communications [19]	81
Figure B.2 – Expanded smart metering reference architecture	82
Figure B.3 – European functional architecture.....	83
Figure B.4 – Reality of multiple HBES in market	83
Figure B.5 – Common framework with one standard interface for mapping to any HBES.....	84
Figure B.6 – DR through smart meter infrastructure, without (Internet) e-Box.....	85
Figure B.7 – DR through smart meter infrastructure, with (Internet) e-Box.....	85
Figure D.1 – Energy Interoperation directed interaction graph.....	115
Figure D.2 – ESPI automated exchange use cases	120
Figure D.3 – Overview of ESPI actors	121
Figure D.4 – Modular interface concept.....	125
Figure D.5 – CEA-2045 modular interface layers.....	126
Table 1 – Correspondence between hardware components in smart homes and their potential integrated functional components	35
Table 2 – Korean framework domains and relation to SGUI	37
Table 3 – Four regional demonstration tests in Japan	37
Table 4 – China use case classification and use case summary.....	38
Table 5 – Korea use case category table summary	39
Table 6 – Japan use case category table summary	39
Table 7 – France use case category table summary.....	39
Table 8 – India use case category table summary.....	40
Table 9 – U.S. use case category table summary.....	41
Table 10 – SGUI functional use case classes (UCC) and descriptions	42
Table 11 – Standards relevant to the SGUI	46
Table 12 – Standards relevant to the grid-side of the SGUI.....	47
Table 13 – Standards relevant to the facility-side of the SGUI.....	49
Table 14 – Use case classes and relevant use cases.....	52
Table 15 – Functional systems and relevant use cases.....	52
Table 16 – Relevant standards for use case class 1.....	54
Table 17 – Relevant standards for use case class 2.....	56
Table 18 – Relevant standards for use case class 3.....	59
Table 19 – Relevant standards for use case class 4.....	62

Table 20 – Relevant standards for use case class 5..... 65

Table 21 – Relevant standards for use case class 6..... 67

Table 22 – Relevant standards for use case class 7..... 70

Table 23 – Relevant standards for use case class 8..... 72

Table A.1 – Chart used for capturing existing solutions during PC 118 meetings..... 78

Table B.1 – DR infrastructure comparison – Services and roles 86

Table C.1 – Summary of Japanese use cases..... 90

Table C.2 – Summary of French use cases 94

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SMART GRID USER INTERFACE –**Part 1: Interface overview and country perspectives**

FOREWORD

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IEC TR 62939-1, which is a technical report, has been prepared by IEC project committee 118: Smart grid user interface.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
118/40/DTR	118/42/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62939 series, published under the general title *Smart grid user interface*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

0 Introduction

0.1 High-level definition of Smart Grid user interface (SGUI)

The Smart Grid user interface (SGUI) is a logical, abstract cross-domain interface that supports appropriately secure communications of information between an entity within the customer domain (e.g., home or building energy management system, electrical load, energy storage system or generation source) and an external service provider (e.g., utility, aggregator, market or customer energy service provider). Devices and applications will implement the SGUI between grid-side entities and customers for the purpose of facilitating machine-to-machine communications. The SGUI needs to meet the needs of today's grid interactions (e.g., demand response, grid-aware energy management, electric vehicle (EV) charging equipment interactions) and those of the future (e.g., retail market transactions).

In practice, the SGUI will potentially be one interface between multiple aggregation points, both inside and outside of the customer facility. Implementations will have variations arising from complex system inter-relationships: diverse customer business and usage models with different types of equipment in different types of customer facilities controlled by a range of energy management systems.

0.2 PC 118 history

In 2010, China proposed three new work proposals for IEC standards for Smart Grid user interface. There was a long process (refer to Annex A for details of the history of the establishment of Project Committee 118) of SMB and Strategy Group 3 (SG3) discussions and interaction with different TCs who each were working on some standards efforts related to the customer interface. Because many TCs have some connection to the SGUI, the Project Committee approach was chosen with the goal of coordinating between TCs to move forward toward effective standards. China was appointed secretary of PC 118 and the two Chinese work proposals became two working groups within PC 118, each tasked to produce a standard that would become deliverables of this temporary PC.

PC 118 members first met in Tianjin, China, in February 2012. At that meeting, representatives from different TCs and NCs each presented standards work related to the SGUI. Also at this meeting PC 118 members agreed to prepare a technical report covering the definition of the SGUI, the national requirements for SGUI communications (use cases), and an analysis of standards gaps between requirements and available standards. The end result would be acknowledgement of available international standards, recommendations for advancement of national standards and/or development of new standards to fill gaps.

PC 118 members recognized that standards exist for interactions between the traditional grid domain and the customer domain. There are international and national standards covering different parts of the interface. IEC TC 57 had just established a new working group (WG 21, Interfaces and protocol profiles relevant to systems connected to the electrical grid) and other TCs and WGs address meter interactions, industrial plant interactions, EV communications, market information models, etc. PC 118 adopted the approach of preparing this technical report, welcoming member countries and other IEC TCs to participate.

One may ask where Smart Grid stakeholders derive value. The industry will be best served by rapid progress which in turn is enabled by use of established technologies which meet Smart Grid user interface functional and quality requirements. This technical report presents the work of PC 118 members to gather and report the requirements for the customer interface, available standards, and identified standards gaps. Some national standards are recommended for advancement in IEC.

0.3 Relation of IEC PC 118 to other IEC technical committees

According to the PC 118 Strategic Business Plan (SBP) (SMB/4823/R, June 2012), the scope of PC 118 is to look at information exchange between the customer and the power grid from the user's point of view. PC 118 draws on the input of other IEC TCs to have a coherent IEC

perspective on the customer interface, developing a set of standards (or mapping to existing standards) to ensure that IEC standards meet the needs of customer Smart Grid interactions. In order to do this, PC 118 works with IEC TCs developing standards for the power grid and within the customer domain.

IEC TC 57 is the manager of the IEC Common Information Model (CIM) and 61850 standards that serve as the information models for power grid domain communications. TC 57/WG 21 is specifically focused on the customer interface from the power grid point of view. IEC TC 13 developed the standards of the IEC 62056 Device Language Message Specification (DLMS)/Companion Specification for Energy Metering (COSEM) suite [1]¹ for the purposes of electricity metering.² The PC 118 SBP scope is, “Standardization in the field of information exchange for demand response and in connecting demand side equipment and/or systems into the Smart Grid.” Also, “PC 118 will develop a harmonized and consistent suite of standards for the users.” PC 118 will work with existing IEC, ISO standards and examine existing national standards in order to identify the collection of standards that together meet the needs of the Customer Smart Grid interface.

The PC 118 SBP specifically states, “Smart Grid user interface related standards prepared by other technical committees of the IEC (including IEC/ISO JTC1) shall be used where applicable. PC 118 shall apply analytical approach and Use Cases developed by IEC TC 8 for Smart Grid requirements. PC 118 shall use IEC CIM and IEC 61850, and will develop new information models in view of demand side needs and characteristics. PC 118 shall consider IEC TC 57, TC 13, TC 59, TC 69, TC 72, TC 100, IEC/ISO JTC1 SC 25, TC 56, TC 65, etc., related architectures and standards. PC 118 should also consider Smart Grid user interface related standards prepared by other organizations such as ISO and ITU.”

0.4 Report overview

Clause 2 introduces the customer (the Smart Grid user) interface—an interface between separate and historically independent domains. Subclause 2.3 presents a high-level conceptual model for demand response interactions from loosely coupled market interactions down to direct load control interactions. Subclause 2.4 organizes the functional requirements that have been discussed in PC 118. The remainder of Clause 2 examines the SGUI architecture, actors, and quality requirements.

Clause 3 begins with an overview of PC 118 member country perspectives on SGUI and an overview of contributed use cases (details in Annex C). Subclause 3.4 presents an analysis of use cases organized according to the functional requirements in 2.4. Subclause 3.5 looks at the relationship of SGUI to advanced metering infrastructure (AMI) and electric vehicles.

Clause 4 examines existing standards relevant to the use case classes to identify standards that meet the needs of the SGUI, or alternatively to identify gaps in IEC standards. This in turn informs Clause 5 recommendations for IEC SGUI standards development work.

0.5 Key recommendations and findings

PC 118 has identified some gaps in international standards for each of the use case classes presented in 4.4. Several existing national standards are recommended for advancement in IEC. Discussion of recommendations can be found in 4.5 and Clause 5.

¹ Numbers in square brackets refer to the Bibliography.

² The COSEM data model is also used by other Technical Committees responsible for non-electricity metering.

SMART GRID USER INTERFACE –

Part 1: Interface overview and country perspectives

1 Scope

This part of IEC 62939, which is a technical report, presents an international consensus perspective on the vision for a Smart Grid user interface (SGUI) including: SGUI requirements distilled from use cases for communications across the customer interface (the SGUI); an analysis of existing IEC and other international standards that relate to the SGUI; and an identification of standards gaps that need to be filled and might become potential work items for IEC Project Committee 118.

The PC 118 scope is, “Standardization in the field of information exchange for demand response and in connecting demand side equipment and/or systems into the Smart Grid”. This report presents the information exchange and interface requirements leading to standards to support effective integration of consumer systems and devices into the Smart Grid.