IEC SRD 63268

Edition 1.0 2020-10

SYSTEMS REFERENCE DELIVERABLE

colour inside

Energy and data interfaces of users connected to the smart grid with other smart grid stakeholders – Standardization landscape

IEC SRD 63268:2020-10(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.020, 29.240

ISBN 978-2-8322-8995-2

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ENERGY AND DATA INTERFACES OF USERS CONNECTED TO THE SMART GRID WITH OTHER SMART GRID STAKEHOLDERS – STANDARDIZATION LANDSCAPE

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The text of this Systems Reference Deliverable is based on the following documents:

Draft SRD	Report on voting
SyCSmartEnergy/136/DTS	SyCSmartEnergy/144/RVDTS

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

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

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

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- withdrawn,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

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INTRODUCTION

One of the main impacts of the smart grid and/or the smart energy grid is the increasing interactions between the grid users and the other energy-related stakeholders.

The main driver remains the introduction of renewables to the grid which makes the grid operation much more complex, but other drivers are also the consequences of the digitalization trend and the coupling with energy efficiency and greener energy trends.

All these new interactions and trends make the interface between grid users and the other stakeholders more complex, and it is the ambition of this document is to build this new landscape.

It is in some way very close to the objective of the IEC TR 63097 [1] smart grid standardization roadmap, with however a clear focus on the area related to interfacing the grid users, and also the objective to map the roles of the different IEC entities coping with this objective.

This document aims as well at providing an entry point for solving the situation 7. S-HBES/BACS-1 of the IEC SRD 63199 SyC Smart Energy development plan established by the IEC SyC Smart Energy WG 2.

As decided in the Worcester joint IEC SyC SE WG 2/WG 3 meeting, in June 2018, addressing this point will need to get a global landscape of the grid user interface, and restricted neither to demand-response type of interface (which is just one type of interface) nor to home and buildings (except for the internal implementation of DER unit hosted within this grid user, all interfaces seem common to all types of grid user).

It will serve as well the IEC TR 63097 roadmap update but will also be a source for the SGAM (IEC SRD 63200 [2]) currently under development by the IEC SyC SE WG 6.

ENERGY AND DATA INTERFACES OF USERS CONNECTED TO THE SMART GRID WITH OTHER SMART GRID STAKEHOLDERS – STANDARDIZATION LANDSCAPE

1 Scope

This document depicts a comprehensive standardization landscape of the interfaces between the main grid stakeholders and the grid users, grid users comprising DERs and Customer Premises.

This document considers the main "physical" and "logical" interactions (i.e. through wires/functions – power and/or communication) between grid users and grid stakeholders, both from an electrical standpoint and from a data standpoint. Then for each interaction type, the document presents the standardization landscape.

This document depicts, as well, the interactions between the grid stakeholders manipulating grid user related data, themselves. Effectively it appears that considering the sole landscape of the interfaces between the grid users and the grid would be very limited without considering the way the data attached to grid users are manipulated/managed within and between the different stakeholders holding these data. Providing a seamless vision of the management of these data is becoming of highest priority.

The document focuses exclusively on Distribution grid users, excluding as such "bulk generation" grid users and "transmission connected grid users", the main reason being that the main breakthrough resulting from the introduction of distributed energy resources affects mostly the Distribution grid users.

This document mostly focuses on establishing the standardization landscape for the considered domain, including the IEC entities involved in producing reports, technical specifications and standards related to it. From this assessment a first set of recommendations is issued related to the way IEC addresses this scope.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
grid user
entity physically connected to the distribution or transmission grid (in SGAM sense, i.e. connected to an actor attached to the Distribution domain or Transmission domain) to consume, produce or store energy, either as a primary goal to interact with the grid stakeholders or as a means to run a process

Note 1 to entry: This document only considers Distribution grid users.

EXAMPLE 1 Typical grid user having as primary goal to interact with the grid stakeholders: entity of the DER SGAM domain such as a DER plant.

EXAMPLE 2 Typical grid user not having as primary goal to interact with the grid stakeholders and running its own process: entity of the Customer Premises SGAM domain such as homes, buildings, industries and infrastructures.

3.2 Abbreviated terms

AMI	automatic metering infrastructure
BRP	balance responsible party
CEM	customer energy manager
CHP	combined heat and power
CSMS	charging stations management system
CSO	charging stations operator
DER	distributed energy resource
DERMS	distributed energy resource management system
DMS	distribution management system
DR	demand-response
DSO	distribution system operator
EMC	electro-magnetic compatibility
EMS	energy management system
EMSP	e-mobility service provider
ERP	enterprise resource planning
EV	electric vehicle
EVSE	electric vehicle supply equipment
H&B	home and building
HVAC	heating, ventilation and air-conditioning
JTC	joint technical committee
LAN	local area network
LNAP	local network access point
MDM	meter data management
NNAP	neighbourhood network access point
PV	photovoltaic
SC	subcommittee
SCADA	supervisory, control and data acquisition
SDO	standards development organization
SGAM	smart energy grid architecture model
SBP	strategic business plan
SRD	systems reference deliverable
SyC SE	systems committee Smart Energy

TC	technical committee
TF	task force
TSO	transmission system operator
VPP	virtual power plant
V2G	vehicle-to-grid
WAN	wide area network

4 Executive summary

4.1 General

Interfacing the grid users requires consideration of many kinds of interfaces, with many links linking them together, and where consistency is key.

This document concludes with many needed improvements on how IEC addresses the situation, unfortunately with a too much siloed approach. It lists a series of recommendations for better supporting the domain, and especially by better bridging some IEC activities. This appears to be a prerequisite for reaching the needed consistency between all IEC productions and limiting overlaps and different ways for treating the same subjects.

4.2 IEC entities involvement summary

4.2.1 General

Table 1 below summarizes the main IEC entities involved in managing grid user related interfaces, sorted by type of interface (refers to the interactions breakdown exposed in 5.4).

Cybersecurity is fully part of the considered interfaces, however this aspect is not treated in this document but fully addressed in IEC Technology Report "Cyber security and resilience guidelines for the smart energy operational environment" [9][1]. All references to cybersecurity standardization activities or standards are thus voluntarily omitted.

NOTE The standards related to non-specific cross-cutting technologies such as EMC, quality, safety, security, low layers communication protocols, are not considered in this approach. They can be found in the IEC TR 63097 [1] roadmap document.

[1] Numbers in square brackets refer to the Bibliography.

Table 1 – Summary of IEC entities involved in supporting interfaces of smart grid users

IEC entities	Utility interfaces (Annex A)	DER grid users for operation purpose (B.3.2)	H&B grid users for operation purpose (B.3.3)	Industry grid users for operation purpose (B.3.4)	Multi-owner microgrid for operation purpose (B.3.5)	Market places interfaces (Annex D)	Service providers and energy metering interfaces (Annex C)
IEC TC 8/SC 8A	X				X		
IEC SC 8B	X				X		
IEC TC 13							X
IEC TC 23, SC 23K			X		X		
IEC TC 57 WG 13/ WG 14	X					X	X
IEC TC 57 WG 16						X	X
IEC TC 57 WG 17	X	X	X	X	X		
IEC TC 57 WG 21		X	X	X	X		X
Ex – IEC PC 118 [a]		X	X	X	X		X
IEC TC 64	X		X		X		
IEC TC 65				X			X [b]
IEC TC 69	X						
IEC TC 69/TC 57 JWG 11		X	X	X	X		
IEC TC 82	X						
IEC TC 88	X				X		
IEC TC 120	X				X		
IEC TC 88/TC 57 JWG 25		X			X		
IEC TC 100			X				
ISO/IEC JTC 1/SC 25			X		X		
ISO/IEC JTC 1/SC 41							X [b]

[a] IEC PC 118 was disbanded end of 2018.

[b] Especially when considering the coming delivery of the IEC TC 65–ISO/IEC JTC 1/SC 41 JWG 17 work.

4.2.2 Main gaps

This list of gaps and their ranking will be developed in a future edition of IEC SRD 63268, logically worked after the publication of this document.

4.2.3 Standardization entity coordination improvement

The detailed assessment provided in Annex A to Annex E helps identifying some needed coordination between entities working on the same areas or having de facto common interfaces.

The list below sums up the results of this assessment but also suggests recommendations for a more consistent standardization approach of the domain. A few of them are marked with a "high importance" statement, for these cases these interactions are considered as essential for the production of a consistent set of standards.

1) Coordination between TC 57 WG 13/WG 14 and TC 57 WG 17 mostly around a common modelling approach of DER from both IEC CIM and IEC 61850 [22] sides. A joint TF is effectively already in place under IEC TC 57 WG 19 aiming at reaching that goal (results should be formalized in IEC 62361-102).
2) Coordination between TC 8/SC 8A/SC 8B and TC 95 on grid codes related functions, especially in frequency measurements. Already in place through the IEC TC 8/TC 85 JWG 12 (joint as well with TC 85 and SC 77A).