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BSI Standards Publication

Information technology — Home electronic system (HES) application model

Part 3-7: GridWise transactive energy systems research, development and deployment roadmap

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National foreword

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FOREWORD

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ISO/IEC TR 15067-3-7, which is a Technical Report, has been prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
JTC1-SC25/2900/DTR	JTC1-SC25/2966/RVDTR

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

A list of all parts in the ISO/IEC 15067 series, published under the general title *Information technology – Home electronic system (HES) application model*, can be found on the IEC and ISO websites.

In this document, the following print type is used:

- ***Bolded italics*** represent condensed encapsulations of the transactive energy (TE) principles described in ISO/IEC TR 15067-3-8:2020, 6.4.

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.

INTRODUCTION

It has been said that if Thomas Edison could see the electricity industry today, he would recognize it as being much the same as 100 years ago, but that may not be the case for much longer. The century-old paradigm of large-scale generation and distribution is starting to change as renewable resources make more of an impact. New distributed devices, both consumer and utility-owned, affect the grid directly and also interact with each other. Preparations are already underway to integrate these new resources and technologies by considering operational and policy changes based on measured and effective choices. For example, the industry is undergoing a fundamental shift from a "load following" paradigm, where central generation adjusts to varying demand, to a "supply following" paradigm, where responsive demand absorbs variable generation such as solar and wind. During the transition to a more distributed system, the industry cannot afford to design purely for either extreme. A key to success is to use technologies that support flexible coordination of both centralized and distributed elements. One such approach is provided by transactive energy (TE) systems.

Transactive energy systems are systems of economic and control mechanisms that allow the dynamic balance of supply and demand across the entire electrical infrastructure using value as a key operational parameter. This definition is from ISO/IEC 15067-3-8:2020, 3.20 [1][1].

This broad definition allows us to recognize the existing use of transactive techniques in bulk energy markets and to consider how to enable new techniques for possible use in distribution systems, at the interface between transmission and distribution, and perhaps even more broadly.

The need for transactive energy systems is being driven by economic, technological, and customer preference opportunities that were just beginning to exist five years ago. Better performance and declining costs for many renewable energy sources and storage technologies now being deployed suggest use of distributed energy resources will continue growing. Distribution systems were not designed for large-scale deployment of distributed energy resources with potential power flows in multiple directions. Ad hoc arrangements have worked so far, but as the combined effects of changes that are often outside of regulatory and utility observation and control become significant, a more robust response to maintaining and enhancing safety, reliability, and resilience of distribution energy systems and markets is required.

ISO/IEC TR 15067-3-7 is adapted from the GridWise®[2] Architecture Council document, *Transactive Energy Systems Research, Development and Deployment Roadmap* [2], which provides a broad perspective of how transactive energy systems and their use will evolve over time. It has been edited to align with the format of IEC documents.

1 Numbers in square brackets refer to the Bibliography.

2 GridWise is a registered trademark of Gridwise, Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC or ISO.

INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) APPLICATION MODEL –

Part 3-7: GridWise transactive energy systems research, development and deployment roadmap

1 Scope

This part of ISO/IEC 15067, which is a Technical Report, explains the organization and structure of the transactive energy systems research, development, and deployment roadmap.

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
congestion
characteristic of the transmission system produced by a constraint on the optimum economic operation of the power system, such that the marginal price of energy to serve the next increment of load, exclusive of losses, at different locations on the transmission system is unequal

3.1.2
cyber-physical system
smart system that includes engineered interacting networks of physical and computational components

3.1.3
deterministic
<model> always producing the same output when given a particular input (no randomness)

3.1.4
distribution system operator
DSO
entity responsible for planning and operational functions associated with a distribution system that is modernized for high levels of distributed energy resources (DERs) and handles the interface to the bulk system transmission system operator (TSO) at a locational marginal price (LMP) node or transmission-distribution substation

Note 1 to entry: A range of other DSO models are under consideration in the industry.