IEC/TS 62654

Edition 1.0 2012-08

TECHNICAL SPECIFICATION

Network-based energy consumption measurement – Energy saving system – Conceptual model

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1126-4314-8221-510ba998a42a/iec-ts-62654-2012

IEC/TS 62654:2012(E)

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2012 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.
If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

Useful links:

IEC publications search - www.iec.ch/searchpub

The advanced search enables you to find IEC publications by a variety of criteria (reference number, text, technical committee,…).
It also gives information on projects, replaced and withdrawn publications.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available on-line and also once a month by email.

Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1126-4314-8221-510ba998a42a/iec-ts-62654-2012

IEC/TS 62654

Edition 1.0 2012-08

TECHNICAL SPECIFICATION

Network-based energy consumption measurement – Energy saving system – Conceptual model

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1126-4314-8221-510ba998a42a/iec-ts-62654-2012

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE T

ICS 29.240.30; 33.040.40; 35.110

ISBN 978-2-83220-306-4

Warning! Make sure that you obtained this publication from an authorized distributor.

® Registered trademark of the International Electrotechnical Commission

CONTENTS

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1104-4314-8221-510ba998a42a/iec-ts-62654-2012

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1126-4314-
8221-5168a998a42d/iec-ts-62654-2012

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

NETWORK-BASED ENERGY CONSUMPTION MEASUREMENT – ENERGY SAVING SYSTEM – CONCEPTUAL MODEL

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abdb575-1128-4514-8221-510ba998a42a/iec-ts-62654-2012

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62654, which is a technical specification, has been prepared by technical area 12: AV energy efficiency and smart grid applications, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

Enquiry draft	Report on voting
100/1928/DTS	100/1987/RVC

Full information on the voting for the approval of this technical specification 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.

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

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1126-4314-8221-510ba998a42a/iec-ts-62654-2012

INTRODUCTION

Due to unusual climate change such as global warming, the need for technologies regarding energy efficiency and reduction of carbon dioxide emission through energy saving and efficient energy usage is growing. Especially in the IT industry, although its energy consumption is low compared to other business areas, an increase in energy efficiency for whole business areas is expected by using IT technologies. For example, a substantial reduction in energy consumption can be achieved in homes, where most of electrical energy is consumed.

As technologies evolve, the number of electric appliances in homes increases. Accordingly, the consumers tend to check the amount of energy consumption of each appliance and its rate. In addition, for users' convenience, many appliances including multi-media equipment are provided with remote controls, and become network-enabled. Thus, their standby power is increasing considerably.

If the energy consumption of home appliances can be monitored or shown in real time, energy consumption can be reduced by 10 % to 20 % according to statistics. Furthermore, by decreasing the standby mode power for the appliances that are not in use, additional power can be saved. Besides, the use of renewable energies like solar energy or wind energy is spreading in homes. Furthermore, smart grid, an intelligent power network, is expected to be introduced soon. So a system that manages production, consumption, and sales of energy is indispensable.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This specification defines an energy saving system (ESS) providing functions and architecture for a network-based energy consumption measurement model of AV multimedia equipment and systems, efficient usage of electric energy, intelligent energy saving, and a basic possible platform in homes for future power network systems. Specifically, it provides the following:

IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1126-4314-8271-510bc998a42a/iec-ts-62654-2012

- basic architecture of ESS;
- functional requirements of an ESS client;
- functional requirements of an ESS server;
- classification of ESS clients;
- classification of ESS servers;
- energy consumption measurement of home electronic devices;
- energy consumption measurement of an ESS client.

NETWORK-BASED ENERGY CONSUMPTION MEASUREMENT – ENERGY SAVING SYSTEM – CONCEPTUAL MODEL

1 Scope

This Technical Specification defines the architecture and functional requirements of an energy saving system (ESS) that measures energy consumption of each home appliance, including AV multimedia equipment and systems, and shows how to reduce its standby power. With respect to energy consumption measurements, this specification extends only to AC power environments in premises.

2 Terms, definitions and abbreviations

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

2.1 Terms and definitions

2.1.1
ESS server
energy saving system server
component of an energy saving system which gathers power consumption data of home electric devices, measured by ESS clients through communication between an ESS server and clients

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1126-4314-8221-510ba998a42a/iec-ts-62654-2012

2.1.2
ESS client
energy saving system client
component of an energy saving system, which is physically located between an AC power source and a home electric device so as to supply or to block AC power

Note 1 to entry: An ESS client is operated by AC/DC power and it measures the power consumed by a home electric device connected to the ESS client. The result of the measurement is sent to an ESS server through communication with the ESS server.

2.1.3
ESS network
energy saving system network
network that consists of an ESS server and one or more ESS client(s) which communicate(s) with the ESS server

2.1.4
EPCM protocol
electric power control and monitoring protocol
application layer protocol between an ESS server and ESS clients

Note 1 to entry: This protocol controls power of the devices connected between the ESS server and an ESS client and gathers the power consumption data from the ESS client.

2.1.5
low-power communication module
communication module that supports low-power data transmission between the ESS server and ESS clients and that has the dedicated power that processes the EPCM protocol

Note 1 to entry: A low-power communication module is a hardware module in an ESS client and is responsible for low-power communication with an ESS server. It physically transmits data generated from a processing unit in an ESS client and receives data from the ESS server. Low-power communication is essential to ESS clients so as to minimize self-power consumption caused by frequent communication with an ESS server.

2.1.6
home electronic device
device group that includes home appliances

EXAMPLE Home electronic devices are multimedia equipment and systems, information appliances, home network devices, etc.

2.2 Abbreviations

EEC Energy Efficiency Class
EPCM Electric Power Control and Monitoring
ESS Energy Saving System
GUI Graphic User Interface
HED Home Electronic Device
LPCM Low-Power Communication Module
PLC Power Line Communication
PnP Plug and Play

3 Specification of operating modes

Operating modes of ESS server and clients are specified in Table 1.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1136-4314-8221-310ba998a42a/iec-ts-62654-2012

Table 1 – Operating mode of ESS server and client

Mode	ESS server	ESS client
Disconnected	The ESS server is disconnected from all external power sources.	The ESS client is disconnected from all external power sources.
Off	The ESS server is connected to a power source, does not perform any functions specified in 5.1, and cannot be switched into any other mode with the remote control unit, an external or internal signal.	The ESS client is connected to a power source, does not perform any functions specified in 5.2, and cannot be switched into any other mode with the remote control unit, an external or internal signal.
Standby-passive	The ESS server is connected to a power source, does not perform any functions specified in 5.1, but can be switched into any other mode with the remote control unit or an internal signal.	The ESS client is connected to a power source, does not perform any functions specified in 5.2, but can be switched into any other mode with the remote control unit or an internal signal.
Standby-active	The ESS server is connected to a power source, does not perform any functions specified in 5.1 except a basic communication function for receiving a mode-change command from an external source, and can additionally be switched into another mode with that external command.	The ESS client is connected to a power source, does not perform any functions specified in 5.2 except a basic communication function for either receiving a mode-change command from an ESS server or waiting until an initial registration process finishes, and can additionally be switched into another mode with that external command.
On (measure)		The ESS client is connected to a power source and perfoms an energy consumption measurement.
On (communicate)	The ESS server is connected to a power source, performs functions specified in 5.1, and communicates with one or more ESS clients or an external source.	The ESS client is connected to a power source, performs functions specified in 5.2, and communicates with an ESS server.

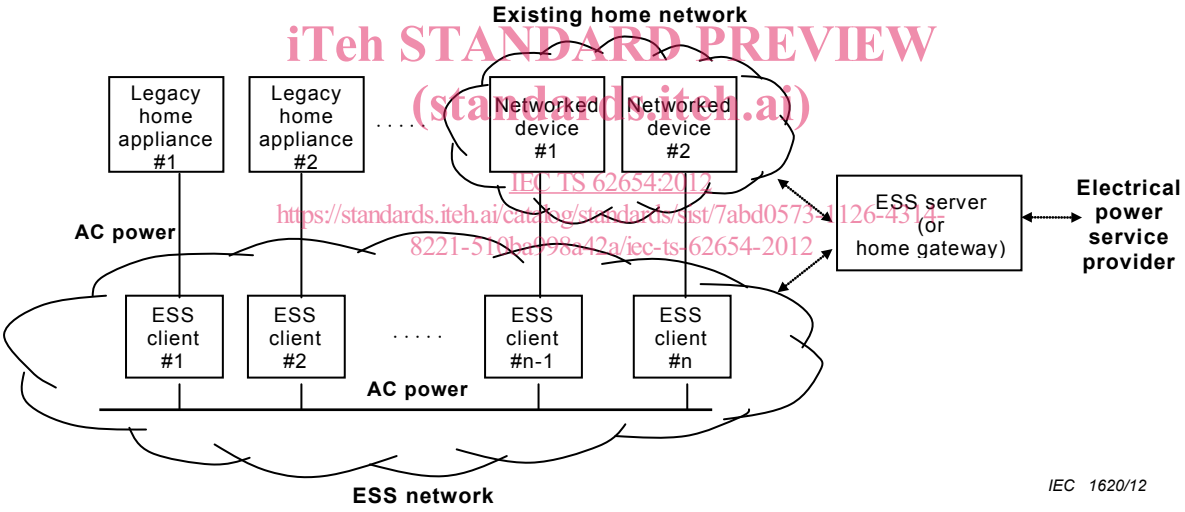
4 Architecture and basic functions of ESS

4.1 ESS network

An ESS network consists of an ESS server and one or more ESS clients, as shown in Figure 1. Each ESS client does not communicate with other ESS clients but the ESS server. The communication is enabled by the no-new-wire communication method such as wireless communication and PLC. Accordingly, it does not require extra wiring for configuring the home ESS network. Note that the ESS server can provide various network interfaces according to the network types that ESS clients can support. This specification does not specify the network interface types between the ESS server and ESS clients.

Each home electronic device (HED) can use the AC power provided from an ESS client regardless of its type and networking feature. The user can utilize the power consumption monitoring and power control functions for only the HEDs powered from ESS clients. This means that the user can connect only the desired devices to ESS clients and can use the ESS network services for the connected HEDs.

The ESS network can be configured separately from the existing home network and provides functions for energy consumption measurement, monitoring, and intelligent energy saving that are different from device control services, data services, and multimedia services provided by the existing home network.



iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC TS 62654:2012
https://standards.iteh.ai/catalog/standards/sist/7abd0573-1126-4514-8221-51dba998a42a/iec-ts-62654-2012

Figure 1 – Architecture of energy saving system

4.2 ESS server

As shown in Figure 2, the ESS server basically provides the physical link and upper layer network protocol that enable network interfaces to ESS clients. Based on this communication channel, the ESS server sends power control commands and gathers energy consumption data in real time by using an EPCM protocol. Among EPCM applications in the application layer, the basic application program processes the gathered data to display the consumed power-related information in the form of text or GUI in real time.

The ESS server can be implemented to additionally support the existing home network services. On the other hand, the existing home gateway or home server may include the functions of the ESS server. In this case, the EPCM functions may be integrated into the existing home network protocol or home network middleware. The ESS application program can also be implemented considering the scalability and compatibility toward the home network applications.