

IEEE Standard for Smart Energy Profile Application Protocol

IEEE Communications Society

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Power Line Communications Committee

IEEE
3 Park Avenue
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USA

IEEE Std 2030.5™-2018
(Revision of
IEEE Std 2030.5-2013)

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Approved 7 May 2018

IEEE-SA Standards Board

Abstract: The application layer with TCP/IP providing functions in the transport and Internet layers to enable utility management of the end user energy environment, including demand response, load control, time of day pricing, management of distributed generation, electric vehicles, etc. is defined in this standard. Depending on the physical layer in use (e.g., IEEE 802.15.4™, IEEE 802.11™, IEEE 1901™, IEEE 1901.2™), a variety of lower layer protocols may be involved in providing a complete solution. Generally, lower layer protocols are not discussed in this standard except where there is direct interaction with the application protocol. The mechanisms for exchanging application messages, the exact messages exchanged including error messages, and the security features used to protect the application messages are defined in this standard. With respect to the Open Systems Interconnection (OSI) network model, this standard is built using the four layer Internet stack model. The defined application profile sources elements from many existing standards, including IEC 61968 and IEC 61850, and follows a RESTful architecture (Fielding [B3]) using IETF protocols such as HTTP.

Keywords: adoption, application, application protocol, demand response, distributed energy resources, energy usage information, IEEE 2030.5™, load control, metering, plugin electric vehicles, prepayment, pricing communication, RESTful, SEP 2, smart energy, smart energy profile, Smart Energy Profile 2

The Institute of Electrical and Electronics Engineers, Inc.
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PDF: ISBN 978-1-5044-4907-6 STD23130
Print: ISBN 978-1-5044-4908-3 STDPD23130

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Robby Simpson, *Vice Chair*

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General Electric	Sensus
Itron, Inc.	SunSpec Alliance
KITU Systems	Wi-SUN Alliance

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Introduction

This introduction is not part of IEEE Std 2030.5-2018™, IEEE Standard for Smart Energy Profile Application Protocol.

The empowerment of consumers to manage their usage and generation of energy is a critical feature of the Smart Grid and is a basis of innovation for new products and services in energy management. To enable this capability, information flow between devices such as meters, smart appliances, plug-in electric vehicles, energy management systems, and distributed energy resources (including renewable energy and storage elements) must occur in an open, standardized, secure, and interoperable fashion. The following standard is intended to fulfill those needs.

The first publication of this standard (IEEE Std 2030.5-2013) was driven by, and sought to address the requirements of, many activities across the globe. Of note were the efforts within the United States by the National Institute of Standards and Technology (NIST) and the Smart Grid Interoperability Panel (SGIP) (in particular, Priority Action Plans 3, 9, 10, 11, and 18, with influence from many of the others) in fulfillment of the EISA 2007 legislation, the European Mandate on Smart Metering (M/441) (in particular, efforts within CEN/CENELEC and ETSI, and the Smart Meter Working Group), as well as similar efforts in Australia, the United Kingdom, Japan, and China, and electric vehicle standardization efforts (in particular, ISO/IEC JWG automotive EV standards and SAE EV standards), to name only a few.

This revision of IEEE Std 2030.5 was made with particular attention to the activities underway in California as part of the Rule 21 revision and the associated Smart Inverter Working Group as well as the revision of IEEE Std 1547™. This revision also seeks to address any errors and ambiguities discovered in the testing and deployment of the first publication.

This standard is also intended to enable communications that are link-layer agnostic and run over the Internet Protocol. Careful consideration was given to premises networks with various architectures, numbers of devices, and constraints, while maintaining flexibility, extensibility, and security.

Contents

1. Overview	11
1.1 Scope	11
1.2 Purpose	11
1.3 Document organization.....	11
1.4 Requirement language	12
1.5 Typography conventions used	12
1.6 Design principles	12
2. Normative references.....	12
3. Definitions, acronyms, and abbreviations	14
3.1 Definitions	14
3.2 Acronyms and abbreviations	16
4. Design pattern.....	18
4.1 Protocol flexibility	18
4.2 General rules/best practices	18
4.3 WADL	19
4.4 Schema	19
4.5 Uniform resource identifiers.....	20
4.6 List resources	20
4.7 Resource design rules	24
5. Application support	24
5.1 Overview	24
5.2 Use of TCP	24
5.3 URI encoding.....	25
5.4 HTTP headers	25
5.5 HTTP response codes	27
5.6 Application payload syntax	30
5.7 Content negotiation.....	31
6. Security.....	32
6.1 Introduction	32
6.2 Security attributes	32
6.3 Device credentials.....	39
6.4 Resource access authentication and authorization context	40
6.5 Resource access authentication.....	42
6.6 Resource access authorization	42
6.7 Cipher suites	42
6.8 Default security policy.....	43
6.9 Registration.....	44
6.10 Security LogEvents.....	46
6.11 Certificate management.....	46
7. Discovery.....	59
7.1 Introduction	59
7.2 Service instance	60
7.3 Service name.....	61
7.4 TXT record	61
7.5 Subtype queries.....	62

7.6 Discovery procedure.....	64
8. Support resources	64
8.1 Introduction	64
8.2 Resource section outlines	65
8.3 Device Capabilities function set	66
8.4 Self Device function set.....	67
8.5 End Device function set.....	67
8.6 Function Set Assignments function set.....	69
8.7 Subscription/Notification function set	70
8.8 Response function set	73
9. Common resources	77
9.1 Introduction	77
9.2 Time function set.....	77
9.3 Device Information function set	79
9.4 Power Status function set.....	79
9.5 Network Status function set.....	80
9.6 Log Event function set.....	81
9.7 Configuration function set	83
9.8 File Download function set.....	83
10. Smart energy resources.....	88
10.1 Introduction	88
10.2 Common application functionality	88
10.3 Demand Response and Load Control function set.....	95
10.4 Metering function set.....	99
10.5 Pricing function set.....	105
10.6 Messaging function set	109
10.7 Billing function set	111
10.8 Prepayment function set	114
10.9 Flow Reservation function set	116
10.10 Distributed Energy Resources function set.....	117
10.11 Metering Mirror function set	128
11. Manufacturer-specific proprietary extensions	130
11.1 Overview	130
11.2 xmDNS/DNS-SD.....	130
11.3 URIs.....	130
11.4 Resources.....	130
11.5 DeviceCapabilities resource	131
Annex A (informative) Web-application description language (WADL)	132
A.1 Introduction	132
A.2 Support resources section	132
A.3 Common resources section	136
A.4 Smart energy resources section.....	139
Annex B (informative) IEEE 2030.5 model.....	153
B.1 Introduction.....	153
B.2 IEEE 2030.5 package.....	153
Annex C (informative) Examples and guideline	267
C.1 Introduction.....	267
C.2 Registration: Remote	267
C.3 Registration: Local.....	270

C.4 Discovery: Function Set Assignment.....	272
C.5 Discovery: Without Function Set Assignment.....	274
C.6 Discovery: Undirected without Function Set Assignment.....	276
C.7 Subscription/Notification.....	277
C.8 Demand response: General.....	280
C.9 Demand response: Cancel.....	284
C.10 Distributed energy resource: General.....	286
C.11 Metering: Reading.....	290
C.12 Metering: Interval.....	295
C.13 Metering: Instantaneous.....	302
C.14 Metering: Mirroring.....	305
C.15 Pricing: Time of use.....	317
C.16 Billing: Billing period.....	322
C.17 Billing: Historical.....	324
C.18 Billing: Projection.....	328
C.19 File loading.....	330
C.20 Flow Reservation: General.....	334
C.21 Flow Reservation: Cancel.....	339
C.22 Event randomization.....	343
Annex D (informative) Guidelines.....	348
D.1 Pricing implementation guidelines.....	348
D.2 PEV implementation guidelines (subject to work with SAE and ISO/IEC).....	353
Annex E (informative) Mapping to IEEE Std 1547-2018.....	354
Annex F (informative) Bibliography.....	359

IEEE Standard for Smart Energy Profile Application Protocol

1. Overview

1.1 Scope

This standard defines the application layer with TCP/IP providing functions in the transport and Internet layers to enable utility management of the end user energy environment, including demand response, load control, time of day pricing, management of distributed generation, electric vehicles, etc. Depending on the physical layer in use (e.g., IEEE 802.15.4™, IEEE 802.11™, IEEE 1901™, IEEE 1901.2™), a variety of lower layer protocols may be involved in providing a complete solution. Generally, lower layer protocols are not discussed in this standard except where there is direct interaction with the application protocol. This standard defines the mechanisms for exchanging application messages, the exact messages exchanged including error messages, and the security features used to protect the application messages. With respect to the Open Systems Interconnection (OSI) network model, this standard is built using the four layer Internet stack model. The defined application profile sources elements from many existing standards, including IEC 61968 and IEC 61850, and follows a RESTful architecture (Fielding [B3]) using IETF protocols such as HTTP.

1.2 Purpose

The purpose of this document is to define the application protocol to enable utility management of the end user energy environment, including demand response, load control, time of day pricing, management of distributed generation, electric vehicles, etc. The defined application profile sources elements from many existing standards, including IEC 61968 and IEC 61850, and follows a RESTful architecture (Fielding [B3]) using IETF protocols such as HTTP.

1.3 Document organization

The following documents comprise the definition of IEEE 2030.5 and all IEEE 2030.5 devices will be required to maintain compliance to these documents:

- IEEE Std 2030.5 (this document)
- IEEE 2030.5 XML Schema Definition (XSD) (sep.xsd in the supplemental material of IEEE Std 2030.5)
- IEEE 2030.5 WADL (sep_wadl.xml in the supplemental material of IEEE Std 2030.5)