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SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Access networks – In premises networks

Generic architecture of home networks for energy management

Recommendation ITU-T G.9958

ITU-T

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Recommendation ITU-T G.9958

Generic architecture of home networks for energy management

Summary

Recommendation ITU-T G.9958 specifies functional definitions of components and networks to provide energy management services in the home. It also specifies home network configurations and requirements for these services.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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Introduction

Standardization of IoT (Internet of Things) has been promoted actively in ITU-T. Q15/15 in ITU-T has discussed the standardization of communication networks for power grids. One of the activities in Q15/15 has been specifications of smart meter networks as one of the promising applications in IoT. This Recommendation specifies generic architecture for home energy management services using smart meter networks and provides an example of real deployment for such services. In these services data protection is an important requirement. This Recommendation mentions security features used to provide secure communication such as isolation of traffic flows. However, the specification of these security features is out of the scope of this Recommendation.

Recommendation ITU-T G.9958

Generic architecture of home networks for energy management

1 Scope

This Recommendation specifies home network configurations and requirements for the provision of energy management services in the home. The proposed set of network configurations is also expected to result in a communication framework suitable for a broader set of other IoT applications.

The relationship between this Recommendation and other Recommendations on IoT and home networks is described as follows. IoT generic architecture and requirements have been specified in [ITU-T Y.4000] and [ITU-T Y.4113]. Architecture and requirements in IP home networks connected to broadband wide area networks have been specified in [ITU-T G.9970] and [ITU-T G.9971]. Home energy management has been described in [ITU-T Y.4409]. This Recommendation is based on the Recommendations mentioned above and does not introduce any conflicts.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T G.9970] Recommendation ITU-T G.9970 (2009), *Generic home network transport architecture*.
- [ITU-T G.9971] Recommendation ITU-T G.9971 (2010), *Requirements of transport functions in IP home networks*.
- [ITU-T Y.4000] Recommendation ITU-T Y.4000/Y.2600 (2012), *Overview of the Internet of things*.
- [ITU-T Y.4113] Recommendation ITU-T Y.4113 (2016), *Requirements of the network for the Internet of things*.
- [ITU-T Y.4409] Recommendation ITU-T Y.4409 (2015), *Requirements and architecture of the home energy management system and home network services*.

3 Definitions

The following definitions specify the functionality of various components and networks with regard to home energy management services and do not include implementation details.

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 Components

3.2.1.1 HEMS controller: A home energy management system (HEMS) controller is a networking device used to connect home appliances to the home network through a variety of IP and/or non-IP network interfaces. It provides intelligent functions, such as the monitoring of real-time and/or cumulative power consumption, feedback to users for ecology, etc., for energy management services in conjunction with a home gateway and/or smart meter.

3.2.1.2 HEMS-managed home appliances: HEMS-managed home appliances are devices associated with a HEMS controller by IP or non-IP interface. They are managed and controlled by the HEMS controller. Examples of such managed appliances include energy management facilities in the home, such as power conditioners for a photovoltaic (PV) power system, fuel cells, storage batteries, electric vehicles (EV) / plug-in hybrid vehicles (PHV), air conditioners, lighting equipment, water heaters etc.

3.2.1.3 home gateway: A home gateway is a networking device designated for use in a home which associates a general-purpose network and one or more general-purpose home networks and is responsible for the transfer of information between these networks. A home gateway may provide other user-oriented services such as video-on-demand, in addition to generic communication functionality.

3.2.1.4 non-HEMS appliance: A non-HEMS appliance is a device connected to the home network which is not managed by a HEMS controller.

3.2.1.5 smart meter: A smart meter is an electronic device that records consumption of electric energy in periodic intervals of an hour (or less) and reports this information to the electric utility for monitoring and billing. A smart meter enables two-way communication between the meter and the utility company. In addition to the function of automated meter reading it also can receive and handle control information regarding energy management from the utility, and report power quality monitoring information. The smart meter does not provide open access to its functionality to the users, regardless of its physical installation location (outdoor plant, in-building, in-home etc.).

3.2.2 Networks

3.2.2.1 dedicated home network: A dedicated home network is a local area network deployed in a home in order to connect specific managed home appliances. It is deployed as either a physical network or a logical network and it is independent of the general purpose home network.

3.2.2.2 general purpose home network: A general purpose home network is a local area network deployed in a home. This network provides wired and/or wireless connectivity to any device in the home, utilizing mainly IP technologies. This network is positioned as a backbone network in a home for general purpose use.

3.2.2.3 general purpose network: A general purpose network is a wide area network (WAN) which can be used for any legitimate purpose and does not impose any restrictions regarding its usage. A general purpose network must provide Internet access and may provide additional services such as telephony and video distribution services.

3.2.2.4 utility network: In this Recommendation, a utility network is deployed and managed by an electric utility company for the purposes of electric energy management, monitoring and billing.