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Information technology – Home network resource management – Part 1: Requirements

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FOREWORD

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International Standard ISO/IEC 30100-1 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

A list of all parts in the ISO/IEC 30100 series, published under the general title *Information technology – Home network resource management*, can be found on the IEC website.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

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

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INTRODUCTION

Products and services based on a variety of technologies are being installed and connected to existing home networks. Figure 1 illustrates the range of products being adapted to home networks: broadband, low power and high computing processors, reliable networking technology, high quality content services, e-health care, sensing technology, smart grid and robotics technology. These devices, providing a diversity of services and functions, may co-exist on a home network. Such a home network may need to support a multi-protocol environment. Some of these network protocols are based on standards and others use industry-developed specifications. In spite of this complex technology, users want simple, uniform and transparent services from all home network entities.

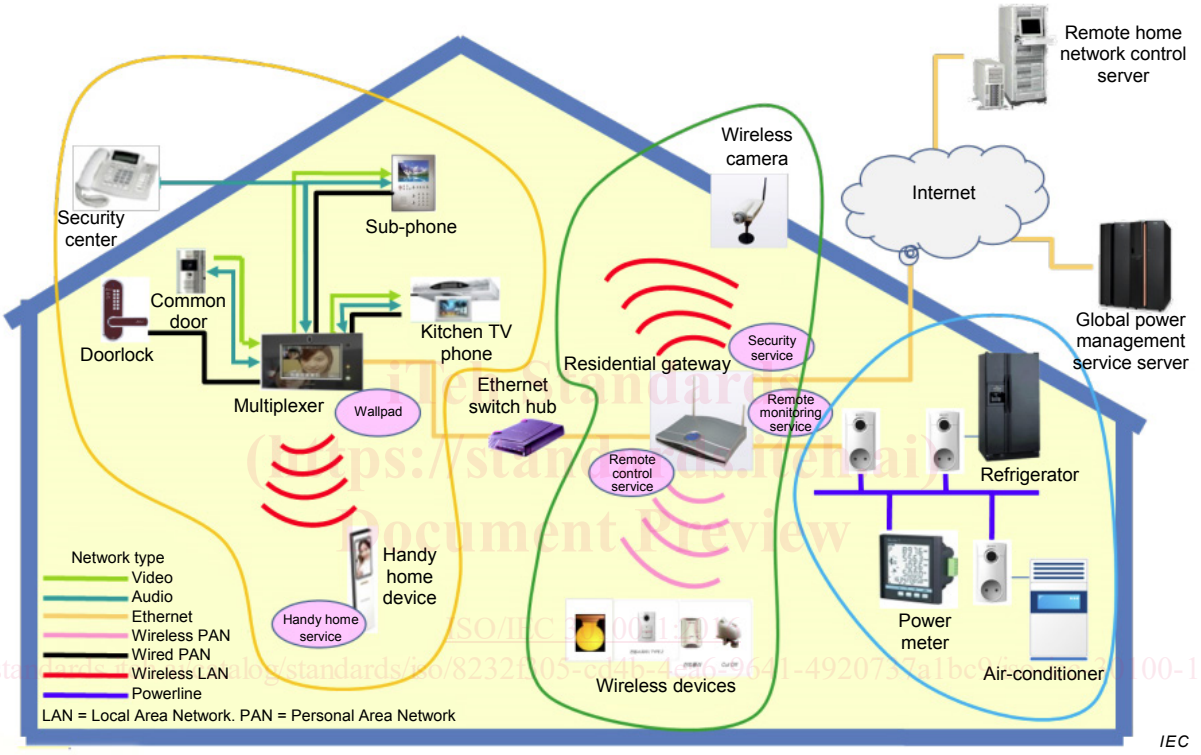

Figure 1 – Some examples of home networking devices and services

Interoperability among devices complying with these protocols is essential. The ISO/IEC 18012 series addresses product interoperability. The ISO/IEC 30100 series extends interoperability to the management of network resources. These management services may support fault diagnosis and remote management, and thus require that all available information be integrated. For example, when an audio/video (AV) streaming service has a problem, a diagnostic program should check all related information for the service plus the usage status of physical devices, network connectivity and traffic condition. The collection of this information may involve multiple information types and multiple protocols within each information type. Since home network information is collected and maintained independently for each data type and each protocol, it is very difficult to get access to all required data and to determine the relationship among various data types and protocols. This standard specifies a method for automatically maintaining information about HES entities poly-synthetically. This information provides the precise status of all available home network entities enabling the delivery of intelligent management services.

The ISO/IEC 30100 series of standards specifies an abstract model that accesses and manages home network information for various home network services including remote management and fault diagnosis. To handle different types of information, HES abstracts all HES elements as logical resources and provides a uniform architectural management method for them. Basic resource information for HES is defined as a collection of physical space,

devices, network and service, with optional extensions. The ISO/IEC 30100 series defines an interface to collect this information from all data types and protocols, and to abstract it as logical resource information. The series defines a relationship among the elements of this information. It also provides a uniform interface for representing this information and the relationship among all HES entities. This enables the development of various home network services including remote maintenance and fault diagnosis in multi-domain and multi-protocol home network environments.

This standard specifies the requirements for home resource management to support applications that may span multiple different HESs. Home resource management allows uniform fault processing, diagnostics and configuration management of HES elements in a home environment. This standard

- defines home resources to key elements of a home network such as device, network, service and so on,
- specifies an information model of the relationship among home resources,
- specifies management application procedures based on an information resource model with home resources, and
- specifies privacy methods for network management data to avoid releasing personal user data to external networks.

This standard specifies requirements for a home network resource management model. This standard defines new terminology for home resources (abstraction of device, network, service and location) on a home area network. It also specifies the general information model and relationship among home resources.

There are some standards that include management functions. However, it is impossible to discover, monitor, detect, diagnose, recover and configure all functions across a variety of protocols that may be used with a home network. Even if a service administrator could access a home network remotely, it would be difficult to manage problems. The ISO/IEC 30100 series enables the management of an entire home network without an administrator or technician.

Security and privacy protection should be considered when a user applies this standard. Countermeasures are needed to protect the security and privacy of information from home devices. The management of use cases corresponding to application categories is specified. Therefore, when implementing this standard, security standards and regulations should be applied. Also, some applications such as health data require higher levels of security and/or privacy than others (i.e. control systems). The ISO/IEC 30100 series of standards provides XML schemas as “generic data” that require some methods for security and privacy.

NOTE Some examples of security/privacy requirements are provided in NIST Interagency Report 7628 (smart grids), HIPAA law (health), PCI-DSS (Credit card) and the OECD Guidelines on the protection of privacy and transborder flows of personal data.

INFORMATION TECHNOLOGY – HOME NETWORK RESOURCE MANAGEMENT –

Part 1: Requirements

1 Scope

This part of ISO/IEC 30100 specifies the minimum requirements of a home network resource management architecture to deliver applications in a safe and future-proof way without being prescriptive. The purpose of this standard is to collect all available home network information from different types of home network elements and protocols, and to provide the inter-relationships among the elements of this information. This standard also describes user requirements and functional requirements for the management of home network entities as a resource.

This part of ISO/IEC 30100 specifies management requirements with respect to

- device management
- network topology
- auto-configuration
- device diagnosis and
- software management
- defines resources of a home network such as devices, networks and services,
- specifies an information model of the relationship among home network resources and
- specifies management application procedures based on a home resource model.

This standard defines new terminology and specifies a general information model and relationships for resources (abstraction of device, network, service and location) in the home area network.

This standard specifies how a home resource management system defines, organises, diagnoses, manages and combines these resources. This standard does not specify what kind of resources will be defined.

The architecture of this standard is targeted for generic usage. Countermeasures are needed to protect the security and privacy of information from home devices. For example, there are laws and regulations for smart grids, health care, credit card solutions, etc. Corresponding security and privacy policies are needed for each application. A suitable data structure (XML schema) for security policies is needed in each usage category.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 30100-2:2016, *Information technology – Home network resource management – Part 2: Architecture*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
application
field of use of home resource management process

3.1.2
device
distinct physical unit on a network that performs a (set of) specific function(s) in a particular context

Note 1 to entry: A device can either be an end node on the network or an intermediate node (as in the case of a network gateway device connecting two distinct physical networks).

3.1.3
HES entity
logical component that has a defined functionality in the HES architecture

Note 1 to entry: The HES architecture is specified in ISO/IEC 14543-2-1.

3.1.4
home resource
managed object that can be used for home network services

3.1.5
home resource management process
element that performs information processing for a particular management application

3.1.6
home resource model
abstract, formal representation of resource objects in a home environment

Note 1 to entry: Resource objects include resource properties, relationships and the operations that can be performed on them.

3.1.7
network
distinct interconnection of devices that share a single physical layer implementation in terms of the OSI layered network model

3.1.8
object
abstract element representing device functions and data stored within the device

Note 1 to entry: The functions and data contained within an object (referred to as "properties") can be executed, read or modified as appropriate for the property by "messages" sent from other objects. A message causes a "method" within the object to be invoked. This may result in access to an internal data structure or the execution of a subroutine or both. A value may be returned by the recipient object.

3.1.9
service
field of use of an HES