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Information technology — Home network resource management

Part 3: Management application

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National foreword

This British Standard is the UK implementation of ISO/IEC 30100-3:2016.

The UK participation in its preparation was entrusted by Technical Committee IST/6, Data communications, to Panel IST/6/-/12, Home Electronic Systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INFORMATION TECHNOLOGY – HOME NETWORK RESOURCE MANAGEMENT –

Part 3: Management application

FOREWORD

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International Standard ISO/IEC 30100-3 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

The list of all currently available parts of the ISO/IEC 30100 series, 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

The ISO/IEC 30100 series of standards specifies an abstract model for remote management of home networks conforming to the Home Electronic System (HES) architecture specified in ISO/IEC 14543-2-1. An HES consists of a collection of devices that are able to interwork via a common internal network. In a home environment several HES networks may operate concurrently each with separate control and management methods. This part of ISO/IEC 30100 specifies the architecture and the base methodology to support applications that may span multiple different HES networks. Home resource management allows uniform fault processing, diagnostics and configuration management of HES elements in home environment.

This standard specifies an architecture for the home network resource management, a home resource model for transparent system configuration and a diagnostic processing in the home network.

Currently, ISO/IEC 30100, *Information technology – Interconnection of information technology equipment – Home Network Resource Management*, consists of the following parts:

Part 1: Requirements

Part 2: Architecture

Part 3: Management application

ISO/IEC 30100 is applicable to

- a management server located at a home network service provider,
- an apartment complex server, located in an office at the of apartment complex office,
- a home residential gateway or set top box (STB).

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INFORMATION TECHNOLOGY – HOME NETWORK RESOURCE MANAGEMENT –

Part 3: Management application

1 Scope

This part of ISO/IEC 30100 specifies a control and management interface for the integrated home network resources at the top of the interoperability framework specified by ISO/IEC 18012-1. Methods are specified for controlling and managing home network resources through a consistent interface regardless of the underlying home network middleware technologies. Based on the home resource management interface, a management application specifies HES device control services and fault management services. This part of ISO/IEC 30100 specifies the communications data formats and functions for messages sent between the objects of a resource management process and the objects of one or more management applications.

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 14543-2-1, *Information technology – Home electronic system (HES) architecture – Part 2-1: Introduction and device modularity*

ISO/IEC 18012-1:2004, *Information technology – Home electronic system – Guidelines for product interoperability – Part 1:Introduction*

ISO/IEC 30100-2, *Information technology – Home network resource management – Part 2: Architecture*[1]

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
apartment complex server
computer remotely managing services for residents in a multiunit dwelling

apartment complex office
management facility that provides services for residents in a multiunit dwelling

3.1.2
application
field of use of home resource management process

[1] To be published.

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3.1.3
class
set of instances of home resource

3.1.4
device
distinct physical unit on a network that performs a specific function (a set of functions) 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).

3.1.5
domain
range of validity of a resource object

3.1.6
HES entity
logical component that has a specified functionality in the HES architecture

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

3.1.7
HES interoperability framework
collection of standards defining device and network interoperability for homes as specified in the ISO/IEC 14543 series

3.1.8
home residential gateway
interface between external networks and home networks

3.1.9
home resource
managed object that can be used for home network services

3.1.10
home resource management interface
logical connection point between management application and home resource management process

3.1.11
home resource management process
element that performs information processing for a particular management application

3.1.12
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.

3.1.13
home resource provider interface
data transfer between resource information provider and home resource management process

3.1.14
instance
example

Note 1 to entry: This term is used in object-oriented programming.

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3.1.15
management information
set of components used either in a management application or in a resource management process

3.1.16
network
interconnected devices sharing a common communications protocol

3.1.17
network middleware
software that links an operating system to a communications protocol

3.1.18
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.

3.1.19
physical space
some arbitrary set of reference co-ordinates of a home resource in the real world

3.1.20
resource information provider
functions for home resource management process to control HES entities

Note 1 to entry: Collects data from HES entities and transfers the collected data to a home resource management process.

3.1.21
resource object
managed unit located within the resource management process specified by the home resource model

Note 1 to entry: The resource object includes methods for accessing the properties of the management process and/or interacting with other objects. A resource object can contain one or more HES entities.

3.1.22
resource relation object
managing unit located within the resource management process by the home resource model

3.1.23
service
field of use of an HES

3.1.24
set top box
interface between the external service and home equipment

3.2 Abbreviations

AFM Automatic Fault Management

BNF Backus-Naur Form

DM Device Management

HAN Home Area Network

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HES	Home Electronic System
HNRM	Home Network Resource Management
HRMI	Home Resource Management Interface
HRPI	Home Resource Provider Interface
FMA	Fault Management Application
HMAI	Home Management Application Interface
RM	Remote Management
OSI	Open System Interconnection

4 Conformance

In order to claim conformance to this International Standard, the network application and management software written for managing the home network resources specified in Clause 4 of ISO/IEC 14543-2-1:2006 shall be implemented as follows.

- A home network management application shall be implemented according to the model specified in Clause 5.
- A home network management application shall implement the interface specified in Clause 6.
- A home network management process shall implement the interface specified in Clause 6.

5 Management application

5.1 Overview

The home resource management architecture consists of three parts as described in ISO/IEC 30100-2.

- Resource information provider
- Resource management process
- Management application

A management application is a user process that communicates with a resource management process via an HRMI. The HRMI provides an interface not only for information retrieval for the resources and relationships among resources, but also for the control and management of the resources regardless of the underlying home network middleware technologies.

This standard specifies basic interfaces for the essential home applications such as home resource auto-configuration, fault management and HES device control service.

5.2 Management application model

Figure 1 illustrates a reference model for the HNRM (home network resource management) application model with an HRMI.

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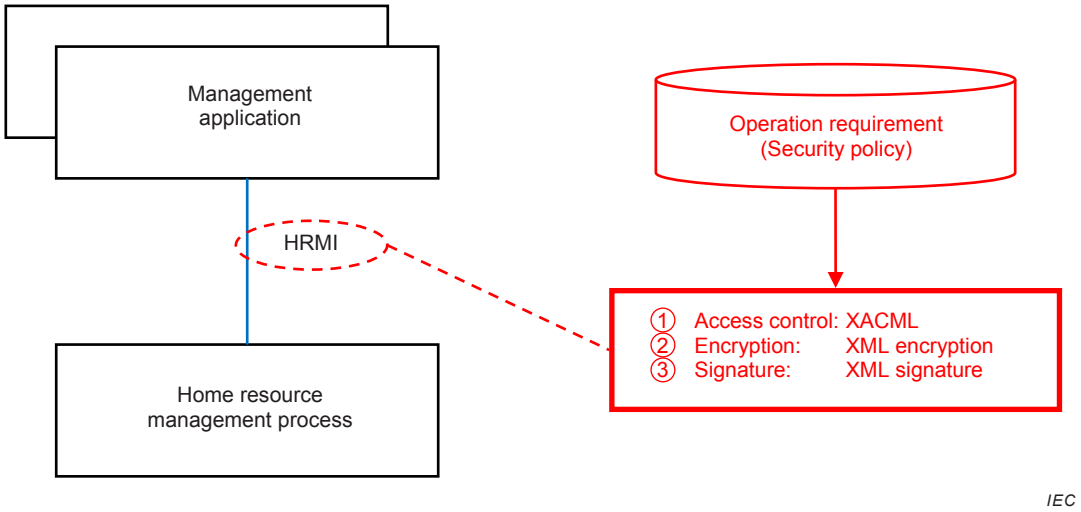

Figure 1 – Management application model

As shown in Figure 1, the HRMI provides a common interface for all home network resource management applications. Therefore, the home network resource management application can be developed to fulfil a requirement to be a stand-alone application or a client-server application. When the home network management application is designed with a client-server model, an interface for the server and client shall be specified. The interface is not specified in this standard. The HRMI interface shall include a resource management process for access control, encryption and signature as a means for security and privacy protection, as specified in 5.5 of ISO/IEC 30100-2[2].

5.3 Home resource management process

The home resource management process collects all information about a resource entity from at least one resource information provider through pre-defined interfaces. When two or more dissimilar home area networks are installed and interoperate, the network devices providing this information shall comply with Clause 6 of ISO/IEC 18012-1:2004. The interface example for other resources such as network, service and physical space is explained in Annex A. An implementation example is presented in Annex B.

5.4 Simple interaction flow using HRMI

Figure 2 shows the simple interaction flow between a management application and a resource management process using the HRMI function. In Figure 2 messages in brackets “[]” are optional messages. For example, event registration messages are used for registration in order to receive events of interest. However, when there are no events of interest, this message is not used.

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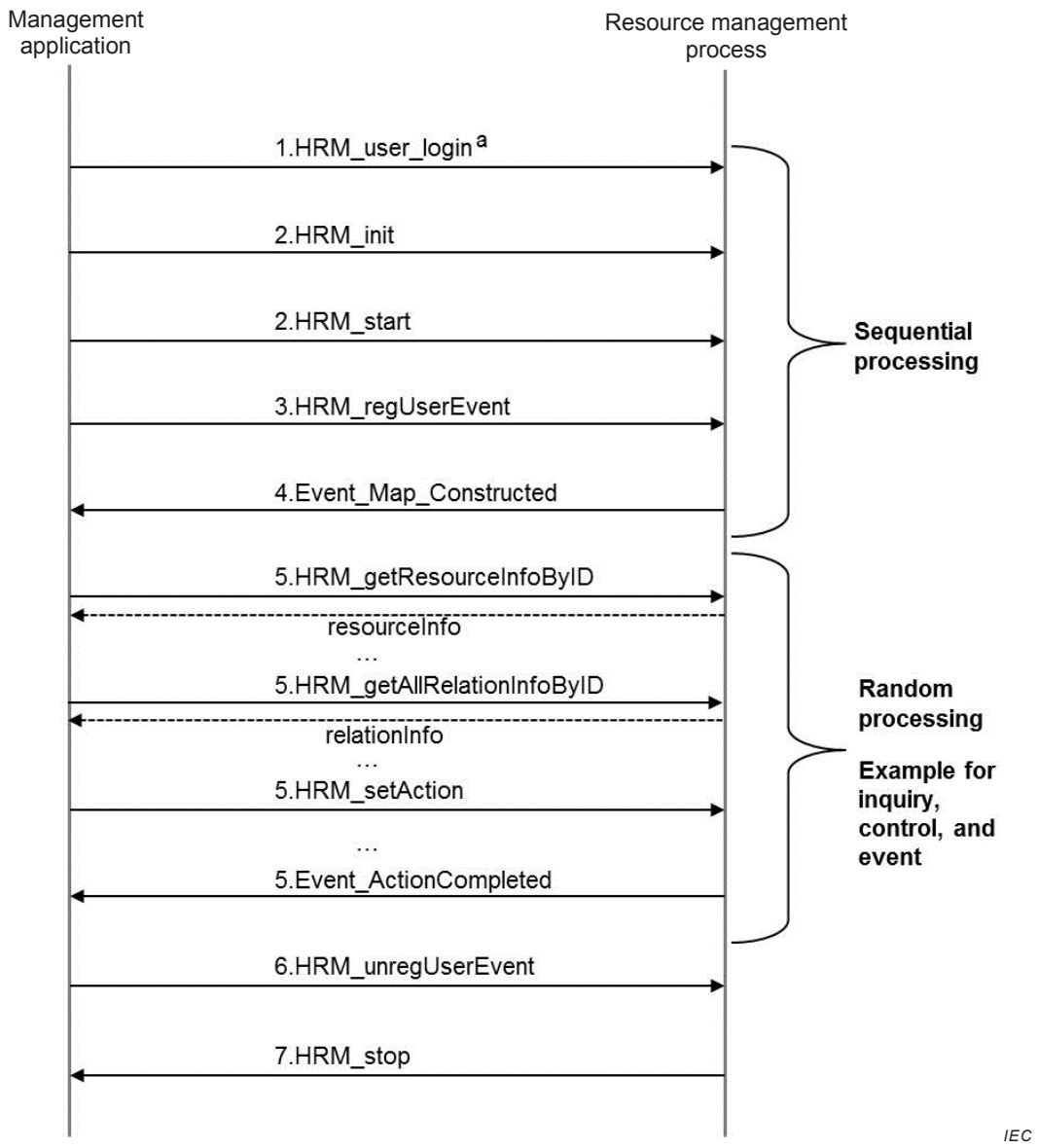

[a] Authentication is required.

Figure 2 – Example of simple interaction flow

While Figure 2 is not suitable for describing all use cases, it illustrates an example of a procedure for a home network resource management application to handle home network resources. In Figure 2, the solid line signifies a message for resource management interface service, and the dashed line signifies output parameters of the requested message. Step 1 to Step 4 should be performed sequentially, and the others are not. The procedure using the services listed in 6.2 and specified in 6.3 is as follows.

a) First, a user shall be authenticated in order to determine if he/she has a right to access the target resources using HRM_user_login". This step fulfills the security requirements specified in 5.2 by using methods such as SSL/TLS or SSH.

b) After the user authentication process, the setup process with the home network resource management process starts using “HRM_init” and “HRM_start” sequentially. In the initial setup process, functions and modules for the resource management process are initialised.

c) When management applications want to receive some specific events, they subscribe to a list of events related to home network resource management applications using

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"HRM_reqUserEvent". Only subscribed events are notified to the applications when they occur. The unsubscribed events are ignored.

d) When a resource management process collects home network information, it converts the information as a resource and creates a resource map that generates and analyses the relationship among resources. When it is generated, the resource management process notifies to the management application as an event "Event_Map_Constructed". The procedures from Step 1 to Step 4 should be carried out sequentially.

e) After a resource management application gets an event of "Event_Map_Constructed", it is possible to retrieve and to control all resources and associated relationship information. The resource information can be retrieved by the domain name, resource name, ID and relation information (see 6.2) using "HRM_getResourceInfoByID", "HRTM_getAllRelationInfoByID", and "HRM_setAction". When requested control is completed, it notifies the applications using "Event_ActionCompleted".

f) Before a management application ends a session with the resource management process, it first unregisters all events registered to it using "HRM_unreqUserEvent".

g) When a management application needs to end, it sends a "HRM_stop" message.

6 Home resource management interface (HRMI)

6.1 Overview

The HRMI (home resource management interface) is used for delivering home resource information, including resource objects and resource relation objects created and maintained by the resource management process, to management applications. In addition, it delivers events or responses from user requests to applications that occurred during the resource management process.

Through HRMI, a management application obtains information about resource objects and resource relation objects and requests commands for resource control.

This clause specifies the interface service procedures to be used for management applications and the detailed descriptions of data types, structures and interface functions for each procedure.

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