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Multimedia home network – Network interfaces for network adapter

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Réseaux résidentiels multimédia – Interfaces réseau pour adaptateur de réseau

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MULTIMEDIA HOME NETWORK – NETWORK INTERFACES FOR NETWORK ADAPTER

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FDIS	Report on voting
100/1354/FDIS	100/1389/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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INTRODUCTION

There are several obstacles to the spread of networked appliances that can be overcome by the concept of a Network Adapter described in this standard. As Home Networking technology is rapidly evolving, network functions which are pre-installed in home electrical appliances can easily become obsolete and may be difficult to upgrade. Many appliances strictly limit resources such as the CPU, power capacity, and memory to achieve cost savings. If all network functions are embedded in Home Networked appliances, this could result in a higher cost for new appliances and an additional barrier to wide adoption of such systems. In addition, when consumers want to add a new appliance to the network, they are forced to choose equipment with the same interconnecting systems as the existing network or add a router or gateway which can interconnect different systems.

To solve these problems, the network functions are divided into two parts. Since functions from OSI layer 1 to 7 (refer to ISO/IEC 7498 in Bibliography) are necessary to network home electrical appliances (including both multimedia equipment and household appliances such as televisions, computers, refrigerators, washing machines, and sensors), network functions from OSI layer 1 to 6 and most of layer 7 reside in an external Network Adapter and only a small part of layer 7 resides in the home appliances.

The advantages of applying this standard are:

- Users can upgrade a Home Network by simply changing the Network Adapters.

  NOTE 1 For example, when an end-user wants to have higher QoS media.

- An electrical appliance without embedded network functions can be connected to an existing Home Network with a Network Adapter.

  NOTE 2 For example, when an end-user wants to utilize some of the network application functions (i.e. energy conservation, etc) on an appliance which does not have all of the network function integrated.

- By selecting Network Adapters which use the same interconnecting system as the existing Home Network, routers or the gateways can be avoided.

  NOTE 3 For example, when an end-user's network is a powerline network, but the appliance the user wants to connect to has only an RF network connection.

  NOTE 4 For example, when an end-user's network is based on home networking standard "A" (layer 1-7), but the appliance the user wants to connect utilizes a home networking standard "B" (layer 1-7).

- Home appliance manufacturers can produce products that can be connected to Home Networks with minimal cost increases since most of the network functions are not required to be embedded in the appliance.

  NOTE 5 This standard is helpful for standardizing the manufacturing process for including the network function in appliances- especially when the market has a low penetration of appliances that are network-ready.

- Device objects are based on the same object-oriented methodology used in almost all existing network protocols.

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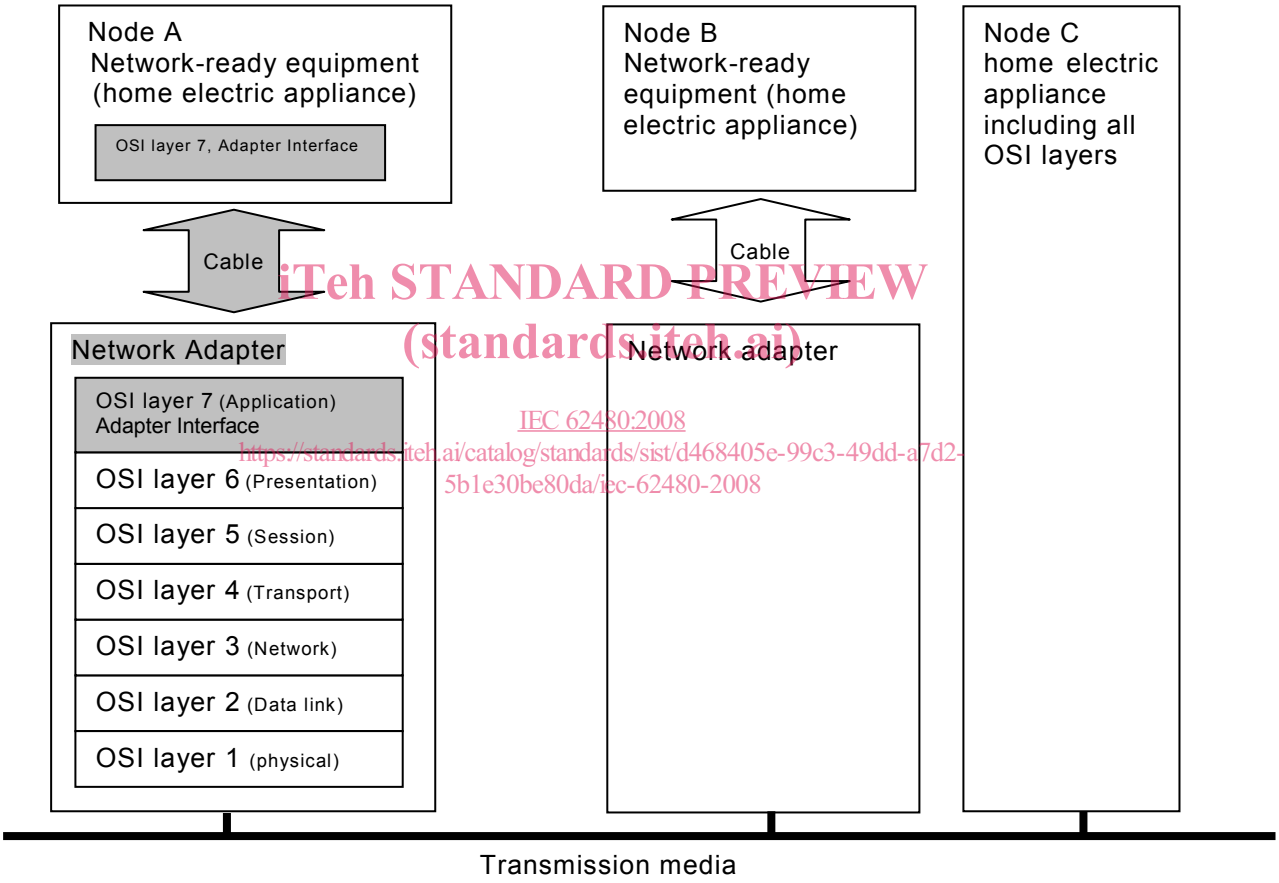
MULTIMEDIA HOME NETWORK – NETWORK INTERFACES FOR NETWORK ADAPTER

1 Scope

This International Standard specifies the requirements for the characteristics of the Network Adapter itself and the interface between the Network Adapter and Network-ready equipment as shown in Figure 1. Data exchanged between the Network Adapter and Network-ready equipment are basically for HES Class1. This standard does not specify the Home Networking Protocol by OSI layer 1-6 in the Network Adapter and any implementation of the software stack and hardware.



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NOTE Gray colored portions are standardized.

Figure 1 – The specified portions

2 Normative references

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

None.

3 Terms and definitions

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

3.1
Application Property Data
ADT
data value related to Application Property Code, such as status notification or specific setting and control; data size, code value, and data format for ADT are specified

3.2
Application Object
AOJ
a model of information to be disclosed to the network from information owned by the communications processing block, or an access procedure model. The information or control target owned by each device is specified as a property, and the operating method (setting, browsing) for this is specified as a service. X1, X2 and X3 are assigned for AOJ code

3.3
Application Property Code
APC
1 octet code for the Application Property of the Application Object

3.4
cold start
method for starting the Home Network node by starting initial setting processing while abandoning previous information related to Network addresses and Application Object data. Cold start (1) re-acquires all information, especially information related to Network addresses, cold start (2) re-acquires only lower layer address, and cold start (3) re-acquires only upper layer addresses. If the address is fixed, cold start (1), cold start (2), and cold start (3) are the same.

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3.5
Device object
helps the device operation functions of Application Objects to facilitate status confirmation and control between devices via communications and prepared for appliances such as air conditioner Application Objects, refrigerator objects, etc., with the Application Object definitions for such Application Objects to be specified separately and individually as classes.

3.6
Get/GetM
request for reading the property value of Application Object. Get is for non-element type property values. GetM is for element type property values; in this case, the element number is given

3.7
HES Class1
home electronic systems with transport capabilities for telecontrol applications such as control, monitoring, measurement, alarm and low speed data transfer. These capabilities are typically provided for by single packet-mode, low bandwidth channel and digital transmission

3.8
Home Network
generic name for various equipment-type Home Network standards for mainly household appliances; specifically, it refers to CEBus, Konnex, ECHONET, LonTalk, etc.

3.9
Network Adapter
Network Adapter contains the network functions from OSI layer 1 to 6, most of layer 7 and the Network Adapter communication interface. Network-ready equipment can communicate with a Home Network when connected via a Network Adapter

3.10
Network-ready equipment
network-ready equipment contains part of the network functions of OSI layer 7 and the Network Adapter communication interface. Network-ready equipment cannot function as part of a Home Network unless it is connected with a Network Adapter

3.11
Node
a communication node conforming to a Home Network standard. In a Home Network, this is a Home Network communication function to be uniquely identified by a Network address. There is no distinction between the application functions of nodes. The term node is used to describe the function of one communication terminal on a Home Network. This is referred to as node herein unless otherwise specified

3.12
Node Profile Object
the Application object that represents Node related data, such as the operating state, manufacturer data, address information, and the Device object list in the node, etc. These are specified to enable manipulation (read/write) by application software and other nodes

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3.13
NRZ method
non return to Zero method. This is one of the coding methods, in which 0 corresponds to low level on the signal line, and 1 corresponds to high level on the signal line

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3.14
Set/SetM
request for writing the property value of an Application Object. **Set** is for non-element type property values. **SetM** is for element type property values. In the latter case, the element number and setting value are given

3.15
Abbreviations

ADT	Application Property Data
AOJ	Application Object
APC	Application Property Code
CN	Command Number Code
DL	Data Length Code
FCC	Frame Check Code
FD	Frame Data
FN	Frame Number
FT	Frame Type

4 Network Adapter communication interfaces and requirements

4.1 Overview

In this standard, two types of protocol specifications for Network Adapter communication interface software are provided to minimize the burden placed on Network-ready equipment in relation to network-related processing. The first is an object generation type and the second is a peer-to-peer type.

a) Object generation type

AOJ related data are exchanged between the Network Adapter and Network-ready equipment using a standardized communication method. AOJ related data preinstalled in the Network-ready equipment (at least one) is configured in the Network Adapter using a standardized procedure.

b) Peer-to-peer type

AOJ related data are exchanged between the Network Adapter and Network-ready equipment using a vendor-defined communication method. The communication method is not defined in this standard.

One appropriate type for the Network Adapter communication interface is selected after equipment interface data recognition service. Figure 2 shows the Network Adapter communication software hierarchy. Each box in the figure is described later.

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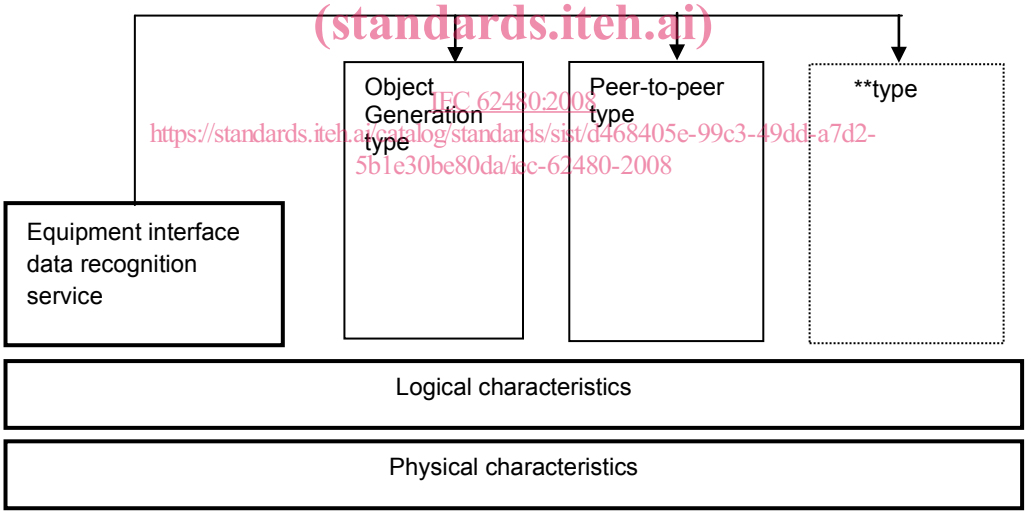


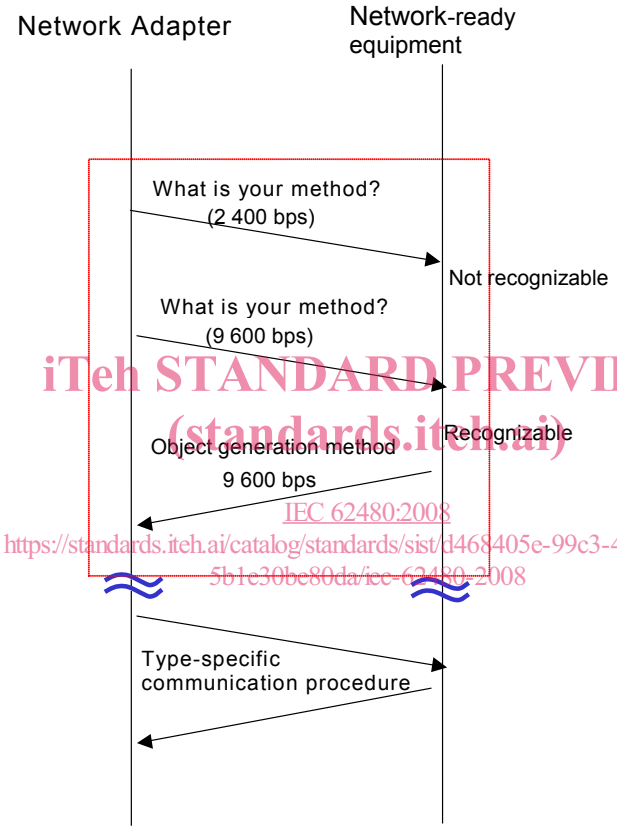
Figure 2 – Network Adapter communication software hierarchy

Table 1 shows examples of acceptable combinations (i.e. combinations with which communication is possible) of types supported by Network Adapters and types supported by Network-ready equipment.

Table 1 – Acceptable combinations of types supported by Network Adapters and types supported by Network-ready equipment

Network Adapter	Network-ready equipment
Object generation type	Object generation type
Peer-to-peer type	Peer-to-peer type

Figure 3 shows an example of an equipment interface data recognition service. The Network Adapter inquires the communication type to the Network-ready equipment at 2 400/9 600 bps.



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NOTE 1 The figure shows a case where the Network-ready equipment is capable of handling 9 600 bps communication and object generation method.

NOTE 2 This standard does not define the transmission speed confirmation order.

Figure 3 – Example of the equipment interface data recognition sequence