

INTERNATIONAL STANDARD

Information technology – Home electronic system (HES) architecture –
Part 5-1: Intelligent grouping and resource sharing for Class 2 and Class 3 –
Core protocol

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INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 5-1: Intelligent grouping and resource sharing for Class 2 and Class 3 – Core protocol

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International Standard ISO/IEC 14543-5-1 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 14543 series, under the general title *Information technology – Home electronic system (HES) architecture*, can be found on the IEC web site.

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.

INTRODUCTION

ISO/IEC 14543-5, Intelligent Grouping and Resource Sharing for HES (IGRS), is divided into six parts:

➤ **IGRS Part 5-1: Core Protocol**

- Specifies the TCP/IP protocol stack as the basis and the HTTP protocol as the message-exchanging framework among devices.
- Defines a series of device and service interaction/invocation standards, including device and service discovery protocol, device and service description, service invocation, security mechanisms, etc.
- Specifies core protocols for a type of home network that supports streaming media and other high-speed data transport within a home.

➤ **IGRS Parts 5-2#: Application profile** (under consideration)

- Based on the IGRS Core Protocol.
- Defines a device and service interaction mechanism, as well as application interfaces used in IGRS Basic Applications.
- Multiple application profiles are being developed, including:
 - Part 5-21: AV Profile (under consideration)
 - Part 5-22: File Profile (under consideration)
- Additional application profiles are planned (part numbers to be assigned; these projects are under consideration)
 - Part 5-2w: DVD Profile [ISO/IEC 14543-5-1:2010](https://standards.iteh.ai/catalog/standards/sist/0fa38395-214f-4224-8adf-2239a1ce219c/iso-iec-14543-5-1-2010)
 - Part 5-2x: QoS Profile
 - Part 5-2y: DMCP Profile
 - Part 5-2z: Universal Control Profile

➤ **IGRS Part 5-3: Basic Application** (under consideration)

- Includes an IGRS basic application list.
- Defines a basic application framework.
- Addresses operation specifics (device grouping, service description template, etc.), function definitions, and service invocation interfaces.

➤ **IGRS Part 5-4: Device Validation** (under preparation)

- Defines a standard method to validate an IGRS-compliant device.

➤ **IGRS Part 5-5: Device Types** (under consideration)

- Defines IGRS Device types used in IGRS applications.

➤ **IGRS Part 5-6: Service Types** (under consideration)

- Defines basic service types used in IGRS applications.

INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 5-1: Intelligent grouping and resource sharing for Class 2 and Class 3 – Core protocol

1 Scope

This part of the ISO/IEC 14543 specifies the services and protocol of the application layer for use by IGRS Devices in the Home Electronic System. An IGRS Device (Intelligent Grouping and Resource Sharing Device) includes the communications protocol specified in the multiple parts of ISO/IEC 14543-5. The objective of this standard is to enable resource sharing and service collaboration among devices. This standard describes:

- the interoperability mechanism;
- the process and messaging format of device discovery and device grouping;
- the process and messaging format of resource sharing among IGRS Devices;
- IGRS Device and service description requirements.

This standard is applicable to resource sharing and service collaboration among computers, consumer electronics, and communication devices in a Local Area Network (LAN) or Personal Area Network (PAN) environment, especially in a wireless dynamic network.

2 Normative references

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The provisions of the referenced specifications other than ISO/IEC, IEC, ISO and ITU documents, as identified in this clause, are valid within the context of this International Standard. The reference to such a specification within this International Standard does not give it any further status within ISO or IEC. In particular, it does not give the referenced specification the status of an International Standard.

ISO/IEC 9594-8:2005, *Information technology – Open Systems Interconnection – The directory: Public-key and attribute certificate frameworks*

ISO/IEC 10118-3:2004, *Information technology – Security techniques – Hash-functions – Part 3: Dedicated hash-functions*

ISO/IEC 18033-3, *Information technology – Security techniques – Encryption algorithms – Part 3: Block ciphers*

ISO/IEC 19790, *Information technology – Security techniques – Security requirements for cryptographic modules*

ISO/IEC 29341-1:2008, *Information technology – UPnP Device Architecture – Part 1: UPnP Device Architecture Version 1.0*

IEEE 1363:2000, *Standard Specifications For Public Key Cryptography*

IETF RFC 1510: *The Kerberos Network Authentication Service (V5)*

IETF RFC 1766: *Tags for the Identification of Languages*

IETF RFC 2234: *Augmented BNF for Syntax Specifications: ABNF*

IETF RFC 2616: *Hypertext Transfer Protocol -- HTTP/1.1*

IETF RFC 2774: *An HTTP Extension Framework*

IETF RFC 3447: *Public-Key Cryptography Standards (PKCS) #1: RSA Cryptography Specifications Version 2.1*

W3C-REC-XML-1998-210:1998, *Extensible Markup Language (XML) 1.0*

W3C SOAP 1.2: *Simple Object Access Protocol Version 1.2*

<http://www.w3.org/2002/12/soap-envelope>

W3C WSDL 2.0: *Web Service Description Language Version 2.0*

<http://www.w3.org/TR/wsdl20/>

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

centralised device group

set of IGRS Devices with one IGRS Device acting as the master

NOTE 1 The master is responsible for managing the setup, for dismissing a Device Group, and for processing a join request from other devices.

NOTE 2 The master device and other IGRS Devices in such a Device Group form a centralised or master-slave relationship.

3.1.2

client identifier

unique identifier associated with a Client on an IGRS Device to which that Client belongs

3.1.3

device group

multiple IGRS Devices that are organised into a logical group through the device group management mechanism in the IGRS specification

NOTE Each IGRS Device in a Device Group follows common interaction rules. Two types of Device Groups are defined: peer-to-peer Device Group and centralised (master-slave) Device Group.

3.1.4

device identifier

globally unique device identifier associated with one IGRS Device

3.1.5

device pipe

channel used to transfer device interaction messages

NOTE This channel is set up through the pipe setup mechanism in the IGRS Specification.

3.1.6

IGRS client

application that draws upon the services of one or more connected IGRS Devices

NOTE Multiple client instances can exist on a network at the same time.

3.1.7

IGRS device

information device that conforms to the IGRS specification

3.1.8

IGRS service

sharable resource encapsulated in an IGRS Device by implementing application interfaces and providing services for other IGRS Devices

NOTE An IGRS Service has an invocation interface that meets the requirements of the IGRS specification. These invocation interfaces are described and announced on the network through the IGRS Service Description Specification.

3.1.9

IGRS specification

ISO/IEC 14543-5 series of standards

3.1.10

IGRS user

owner of an IGRS Device and Client

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3.1.11

peer-to-peer device group

set of IGRS Devices where each IGRS Device in this set has a peer-to-peer relationship with each other

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3.1.12

service identifier

unique identifier assigned to a service provided by a specific IGRS Device

NOTE Note that the same type of service may be provided by multiple IGRS Devices within the same network. Each instance of a service has a unique service identifier on the IGRS Device providing that service.

3.1.13

service type

category of IGRS Service defined according to the set of resources encapsulated

NOTE The Service Type enables service applications in the same category to have common invocation interfaces.

3.1.14

user identifier

identifier of an IGRS user

3.2 Abbreviations

The following acronyms and abbreviations are used in this standard and commonly used in other industry publications.

3DES	3 Data Encryption Standard
ABNF	Augmented Backus-Naur Form
AES	Advanced Encryption Standard
CA	Certificate Authority

ECC-192	192-bit Elliptic Curve Cryptography
EIGamal	EIGamal Asymmetric Key Encryption Algorithm (Digital Signature Algorithm), see IEEE 1363-2000
FIPS	Federal Information Processing Standards
HTTP	Hypertext Transport Protocol
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IGRS	Intelligent Grouping and Resource Sharing, see ISO/IEC 14543-5 series
IGRS/1.0	Version 1.0 of the IGRS protocol, see this International Standard
ISDP	IGRS Service Discovery Protocol, see this International Standard
IP	Internet Protocol
PRNG	Pseudo-random Number Generator
RNG	Random Number Generator
RSA-1024	Rivest-Shamir-Adleman-1024
SHA-1	Secure Hash Algorithm 1
SHA-256	Secure Hash Algorithm 256
SSDP	Simple Service Discovery Protocol
SOAP	Simple Object Access Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
URL	Uniform Resource Locator
URI	Uniform Resource Identifier
UPnP	Universal Plug and Play/IEC 14543-5-1:2010
UUID	Universally Unique Identifier
W3C	World Wide Web Consortium
WSDL	Web Service Description Language
XML	Extended Markup Language, see W3C-REC-XML-1998-210:1998

4 Conformance

4.1 IGRS network

An IGRS Network is defined by the architecture specified in Clause 5, the IGRS Device interaction model specified in Clause 6, the message formats specified in Clause 7, device grouping procedures specified in Clause 9, and the resource sharing model specified in Clause 10. All mandatory requirements shall be implemented for conformance with this standard.

4.2 IGRS devices

To be considered IGRS compliant, each device shall meet the criteria defined by the IGRS Device interaction model requirements specified in Clause 6, the message format (sent and received) requirements specified in Clause 7, and the device and service description requirements according to the templates specified in Clause 8.

In addition, a basic IGRS-compliant device shall also support the following requirements.

- The device shall be able to send a Device Online Advertisement Message as specified in 9.1.