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INTERNATIONAL STANDARD

Information technology – Home electronic system (HES) architecture – Part 5-21: Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Application profile – AV profile

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INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 5-21: Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Application profile – AV profile

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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, Information technology – Home electronic system (HES) architecure – Part 5: Intelligent Grouping and Resource Sharing for HES (IGRS), consists of 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.
  - Specifies 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**
  - Based on the IGRS Core Protocol.
  - Specifies a device and service interaction mechanism, as well as application interfaces used in IGRS basic applications.
  - Multiple application profiles are specified, including:
    - Part 5-21: AV profile
    - Part 5-22: File profile
  - Additional application profiles are planned (part numbers to be assigned)
    - Part 5-2w: DVD profile
    - Part 5-2x: QoS profile
    - Part 5-2y: DMCP profile
    - Part 5-2z: Universal control profile
- **IGRS Part 5-3: Basic application**
  - Includes an IGRS basic application list.
  - Specifies a basic application framework.
  - Specifies operation details (device grouping, service description template, etc.), function definitions and service invocation interfaces.
- **IGRS Part 5-4: Device validation**
  - Specifies a standard method to validate an IGRS-compliant device.
- **IGRS Part 5-5: Device type**
  - Specifies IGRS Device types used in IGRS applications.
- **IGRS Part 5-6: Service type**
  - Specifies basic service types used in IGRS applications.

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INFORMATION TECHNOLOGY – HOME ELECTRONIC SYSTEM (HES) ARCHITECTURE –

Part 5-21: Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Application profile – AV profile

1 Scope

This part of ISO/IEC 14543 specifies the media data stream service profile, the device interaction flow, the request and response message format used in device interaction and the description format of services provided by the device.

This part of ISO/IEC 14543 is applicable to computers, household appliances and communication devices that implement media data streaming by wired or wireless means.

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.

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ISO/IEC 14543-5-1:2010, *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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ISO/IEC 14543-5-6:2012, *Information technology – Home electronic system (HES) architecture –Part 5-6:— Intelligent grouping and resource sharing for HES Class 2 and Class 3 – Service type*

ISO/IEC 29341-3-1:2008, *Information technology – UPnP Device Architecture – Part 3-1: Audio Video Device Control Protocol – Audio Video 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
audio video multicast device group
type of media device group consisting of a media server and media client with multicast capability for an AV multicast playback application

3.1.2
content index service device group
type of media device group which consists of multiple media servers for managing content across multiple media servers in a distributed, collaborative and load-balancing manner

3.1.3
IGRS client
application that invokes the services of one or more connected IGRS devices

NOTE Multiple client instances can exist on a network simultaneously.

3.1.4
IGRS device
information device that conforms to the IGRS specification

3.1.5
IGRS dynamic service invocation module
part of the AV application logic to orchestrate the interaction of application services according to the capability of the device or device group involved and to coordinate the service invocation sequence between the media server and media client

NOTE The IGRS dynamic service invocation module should be implemented on a media server, a media client or another separate device.

3.1.6
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.

3.1.7
IGRS specification
ISO/IEC 14543-5 series of standards

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3.1.8
media client
audio/video device in an IGRS network that possesses multimedia decoding capability

NOTE Examples of media client devices include a TV, set top box, etc. The media client may access content on the media server as the destination device in an audio/video application.

3.1.9
media device group
embodiment of device group in an audio/video system and a type of centralised device group defined in ISO/IEC 14543-5-1

NOTE A Media device group consists of two classes: content index service device group and audio video multicast device group.

3.1.10
media server
audio/video device in IGRS network that possesses storage and computing capabilities

NOTE Examples of media server devices include a PC, network storage server, etc. The media server may provide a network interface to other audio/video devices in order to access content managed by the media server as the source device in an audio/video application.

3.2 Abbreviations

AV	Audio/Video
BCM	Back Channel Message
CIS	Content Index Service
CMS	Connection Management Service
DRM	Digital Rights Management
IGRS	Intelligent Grouping and Resource Sharing
MAN	Mandatory, also refer to message definitions in ISO/IEC 14543-5-1
MC	Media Client
MCTMS	Media Client Transport Management Service
MP	Media Player
MR	Media Recorder
MS	Media Server
MSTMS	Media Server Transport Management Service
QoS	Quality of Service
RMS	Rendering Management Service
RTP	Real-time Transport Protocol
RTSP	Real-Time Streaming Protocol
SOAP	Simple Object Access Protocol
STB	Set Top Box

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3.3 Conventions

For the convenience of the implementer, a number of XML schemas specified in this standard can also be found on the World Wide Web. In case of any differences, the definitions of this standard shall prevail.

4 Conformance

For conformance to this International Standard the following applies.

- The IGRS AV profile interaction model shall conform to the architecture specification contained in Clause 5.
- The relevant AV device (media server or media client) and device group (CIS device group, AV multicast device group) shall conform to the specifications contained in Clause 6.
- AV service invocation flow shall conform to the specifications described in Clause 7.
- AV invocation session setup procedure and message formats shall conform to the specifications contained in Clause 8.

5 Architecture

5.1 Overview

The IGRS AV application profile describes the composition of an IGRS AV system and an interaction model for AV devices and device groups in AV applications. An AV device may be a TV, VCR, CD/DVD player, set top box (STB), audio system, camera or digital photo frame. An AV device group is a set of devices consisting of multiple AV devices. The IGRS AV application profile supports transporting multimedia contents among IGRS AV devices using any transport protocol and any media format.

The IGRS AV system specifies a flexible architecture to support many different types of AV applications. From the perspective of the device types involved in any given application, the IGRS AV system supports a single device AV application and a device group AV application. The IGRS AV system supports a range of application types from simple AV playback to advanced personalised content management.

The IGRS AV system typically should consist of three types of devices, as shown in Figure 1: media server, media client and media device group. Correspondingly, four types of interaction models between devices in an IGRS AV application should be supported: single media server and single media client (required), multiple media servers and single media client, single media server and multiple media clients, multiple media servers and multiple media clients. 5.2 specifies each interaction model in detail.

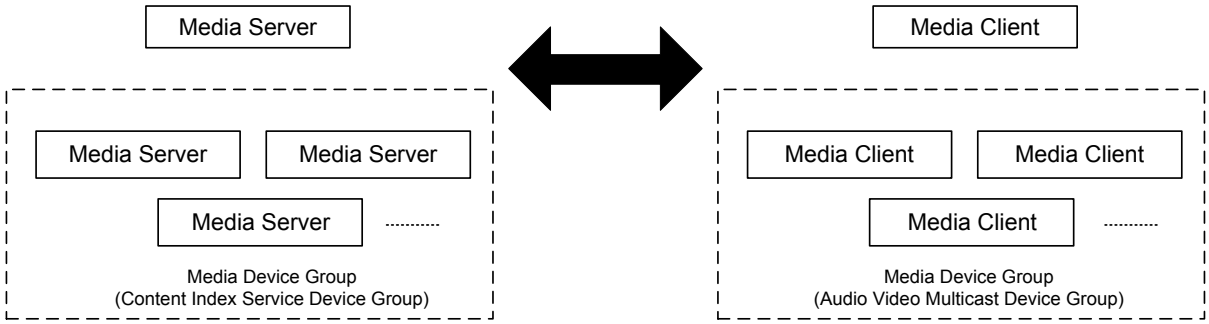

Figure 1 – Device grouping model of the IGRS AV profile

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5.2 Four types of device interaction models in the IGRS AV application

5.2.1 Interaction model between a single media server and a single media client

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When an IGRS AV application involves a single media server and a single media client (e.g., AV play between a media server and media client), it shall be specified by the interaction model between a single media server and a single media client (also see Clauses 4 and 5 of ISO/IEC 29341-3-1:2008), as shown in Figure 2.

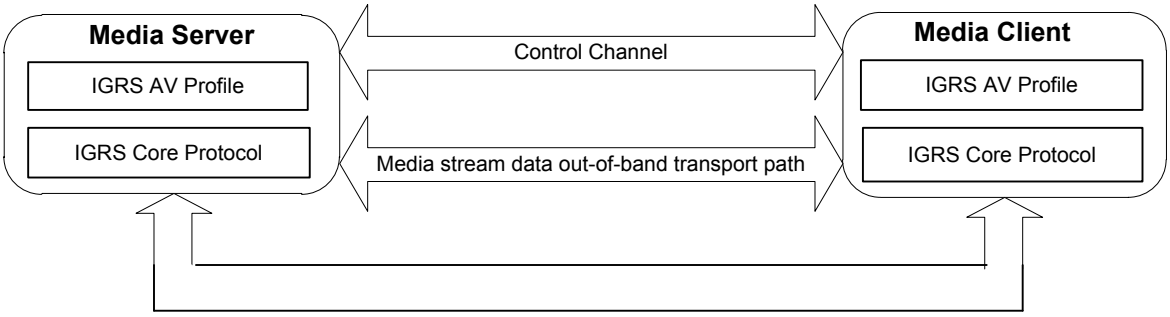

Figure 2 – Interaction model of a single media server and single media client

5.2.2 Interaction model between multiple media servers and a single media client

When an IGRS AV application involves multiple media servers and a single media client (e.g., the content is distributed in a media device group, specifically the content index service device group, consisting of multiple media servers), it should be specified by the interaction model between multiple media servers and a single media client, as shown in Figure 3.

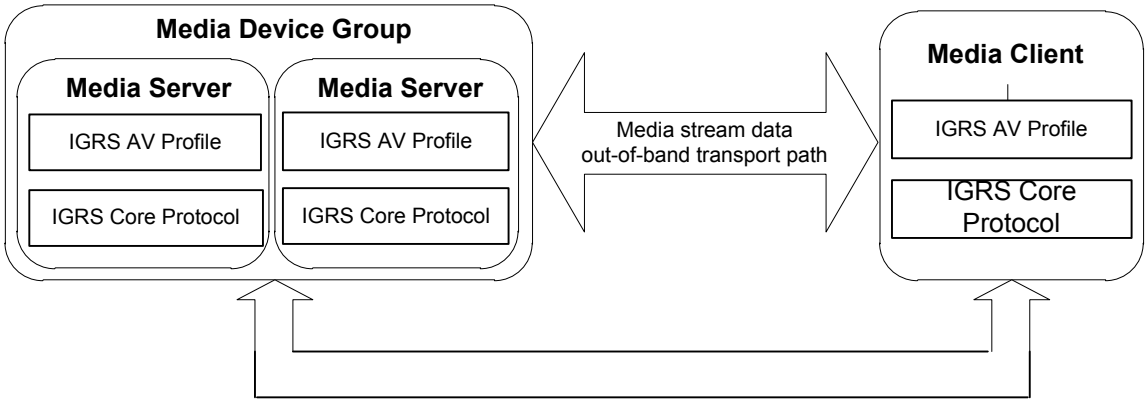

Figure 3 – Interaction model of multiple media servers and a single media client

5.2.3 Interaction model between a single media server and multiple media clients

When an IGRS AV application involves a single media server and multiple media clients (e.g., a media stream is transported from a media server to multiple media clients through multicast), it should be specified by the interaction model between a single media server and multiple media clients, as shown in Figure 4, where the media client is a member of a media device group, particularly the audio video multicast device group.

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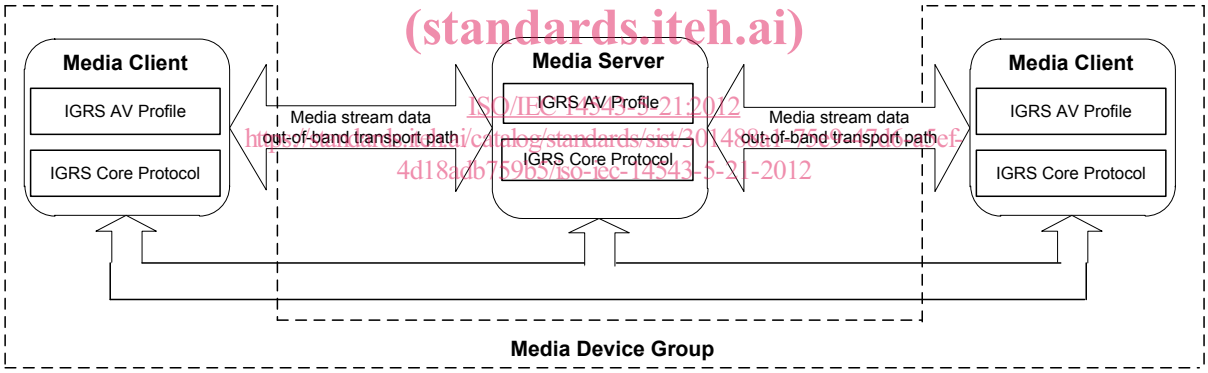

Figure 4 – Interaction model of a single media server and multiple media clients

5.2.4 Interaction model between multiple media servers and multiple media clients

When an IGRS AV application involves interactions among multiple media servers and multiple media clients, the application should be specified by the interaction model between multiple media servers and multiple media clients, as shown in Figure 5, where the media client is a member of another media device group, particularly the audio video multicast device group. An example of such an interaction consists of content that is distributed in a media device group, particularly the content index service device group, consisting of multiple media severs. The media stream is transported from the media device group consisting of multiple media servers to multiple media clients through multicast.

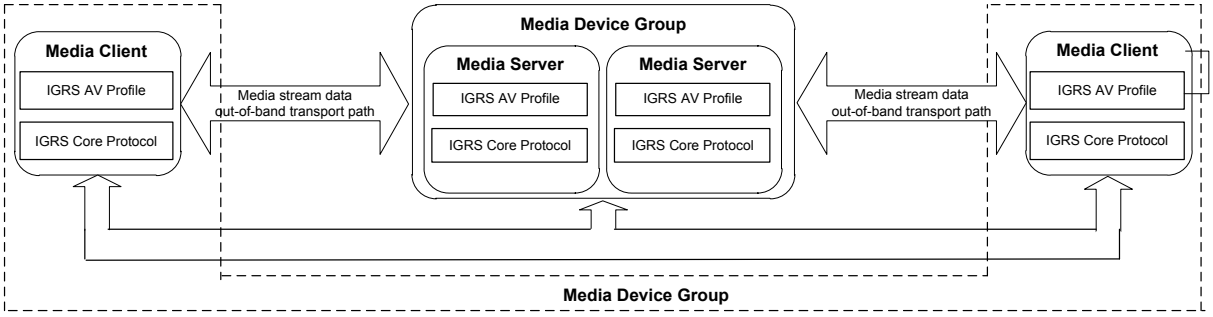

Figure 5 – Interaction model of multiple media servers and multiple media clients

6 Components of the IGRS AV system

6.1 IGRS AV applications

The IGRS AV system should support two types of AV applications: simple AV playback and advanced personalised content management. For the two types of AV applications, three different device types are specified: media server, media client and media device group. 6.2, 6.3 and 6.4 specify the composition of each device type.

6.2 Media server

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6.2.1 General

In the IGRS AV system, the media server is a device with powerful computing capability and storage capacity. For example, a computer or network storage server may become a media server. In an AV application, the media server usually is used as a source device whose manageable content is provided for a media client to access and to manipulate using a standard network interface. The media server also may be used as a destination device that allows media clients to upload the content stored in other devices on the network to a media server for universal content management. The components of the IGRS media server are specified in Figure 6.

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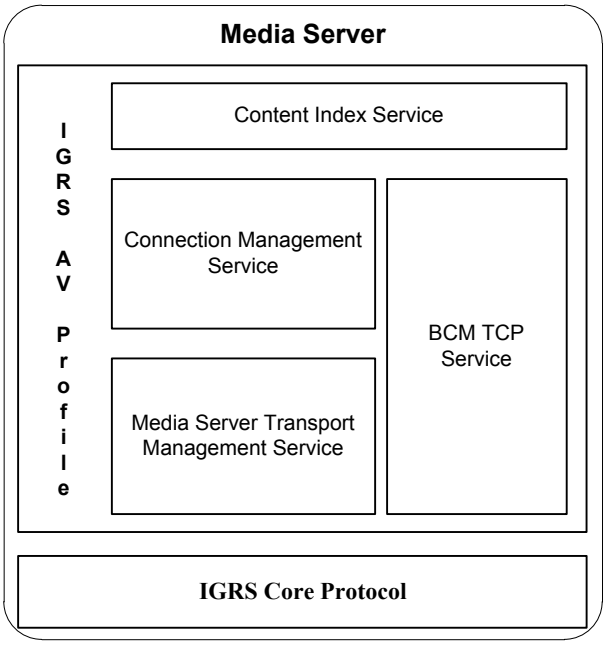

Figure 6 – Components of a media server

The components of the media server are summarised here and specified in the subsequent clauses.

– Content index service: a media server shall implement a content index service to enable a media client to browse, search and access the stored content through the interface function of the content index service.

– Connection management and transport control mechanism: a media client may select and play content on a media server. A media server shall support at least one connection management and transport control mechanism. Transport control manages the out-of-band data stream. An IGRS media server supports two types of connection management and transport control mechanisms:

  - Connection management and transport control mechanism based on BCM (Back Channel Message), specified in 6.2.3.
  - Connection management and transport control mechanism based on SOAP (Simple Object Access Protocol), specified in 6.2.4.

  A media server shall implement a BCM TCP service to support a BCM-based connection management and transport control mechanism. This allows the media server to perform both connection management and transport control on the out-of-band data stream.

  A media server shall implement the GetProtocolInfo() interface function of the connection management service to enable other devices on the network to inquire about the media format supported by a media server and retrieve the supported connection management and transport control mechanism.

  A media server may implement the connection management service and the media server transport management service using a SOAP-based connection management and transport control mechanism. BCM-based connection management and transport control are simplified access methods compared to SOAP and thus are preferred.

  A media server shall support HTTP-GET out-of-band transport data stream protocol.

  A media server should support RTSP/RTP out-of-band transport data stream protocol if multicast AV playback is implemented.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 14543-5-21:2012
https://standards.iteh.ai/catalog/standards/sist/3014e8a1-73c9-47d6-a5e1-4d1bada75965/iso-iec-14543-5-21-2012

6.2.2 Content index service

The content index service specifies the content representation framework of the IGRS AV system. Through a content metadata description, the content index service provides the basic information to match media format and transport mechanism in an AV playback application between the media server and media client and also provides the necessary advanced support for a personalised content management application. The detailed specifications of the content index service are contained in 8.1 of ISO/IEC 14543-5-6.

6.2.3 BCM TCP service

The back channel message (BCM) TCP service is a type of connection management and transport control mechanism used for AV playback specified in the IGRS AV system. It is essentially a command token control protocol over the TCP protocol, including the BCM Server and BCM Client. The detailed specifications of the BCM TCP service are contained in Clause 9 of ISO/IEC 14543-5-6.

6.2.4 IGRS SOAP service

6.2.4.1 General

The connection management service takes charge of connection management between a media server and media client. The media server transport management service takes charge of the transport control of an out-of-band data stream between the media server and media client.