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**Information technology – UPnP device architecture –
Part 4-13: Audio Video Device Control Protocol – Level 2 – Rendering Control
Service**

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INFORMATION TECHNOLOGY – UPnP DEVICE ARCHITECTURE –

Part 4-13: Audio Video Device Control Protocol – Level 2 – Rendering Control Service

FOREWORD

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International Standard ISO/IEC 29341-4-13 was prepared by UPnP Forum Steering committee¹, was adopted, under the fast track procedure, by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

This International Standard replaces ISO/IEC 29341-4-13, first edition, published in 2008, and constitutes a technical revision.

The list of all currently available parts of the ISO/IEC 29341 series, under the general title *Information technology – UPnP device 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.

¹ UPnP Forum Steering committee, UPnP Forum, 3855 SW 153rd Drive, Beaverton, Oregon 97006 USA. See also "Introduction".

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1 Overview and Scope

This service template is compliant with the UPnP Device Architecture version 1.0. It defines a service type referred to herein as RenderingControl.

1.1 Introduction

Most rendering devices contain a number of dynamically configurable attributes that affect how the current content is rendered. For example, video rendering devices, such as TVs, allow user control of display characteristics such as brightness and contrast, whereas audio rendering devices allow control of audio characteristics such as volume, balance, equalizer settings, etc. The RenderingControl service is intended to provide control points with the ability to query and/or adjust any rendering attribute that the device supports.

The RenderingControl service enables a control point to:

- Discover the set of attributes supported by the device.
- Retrieve the current setting of any supported attribute
- Change the setting of (that is: control) any modifiable attribute
- Restore the settings defined by a named Preset

The RenderingControl service DOES NOT:

- Control the flow of the associated content (for example, Play, Stop, Pause, Seek, etc.).
- Provide a mechanism to enumerate locally stored content.
- Provide a mechanism to select the content that is to be rendered.
- Provide a mechanism to send content to another device (via the home network or direct connection).

1.2 Multi-input Devices

Some high-end AV device are capable of receiving multiple pieces of content at the same time and combining that content together so that it can be rendered together using a single set of output hardware. For example, while displaying a TV program, high-end TVs can also display additional content (for example, VCR content) in a PIP (Picture-In-Picture) window. Similarly, a Karaoke machine can mix together the background music with a singer's voice so that both sounds are played together on the same set of speakers.

As with all devices, the RenderingControl service allows a control point to adjust the output characteristics of the post-mixed content before it is actually rendered. However, in many cases, control points may need to control the output characteristics of the individual input content before it is mixed together with the other input content. In order to support this, the RenderingControl service includes an *InstanceID* argument with each action that allows the control point to identify on which content the action is to be applied (for example, the post-mixed content or one of the pre-mixed input content items).

By convention, an *InstanceID* of 0 indicates that the invoked action MUST be applied to the post-mixed content. Similarly, each pre-mixed input content is assigned a unique *InstanceID* whose value is a non-zero, positive integer. Refer to Clause 2.5, "Theory of Operation" for additional information.

1.7 References

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