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# Information technology — UPnP Device Architecture —

## Part 28-10: Multiscreen device control protocol — Application management service

*Technologies de l'information — Architecture de dispositif UPnP —*

*Partie 28-10: Protocole de contrôle de dispositif multi-écran — Service de gestion des applications*

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see http://www.iso.org/directives).

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For an explanation on the voluntary nature of Standard, the meaning of the ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword – Supplementary information

ISO/IEC 29341-28-10 was prepared by UPnP Forum and adopted, under the PAS procedure, by joint technical committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

The list of all currently available parts of ISO/IEC 29341 series, under the general title *Information technology — UPnP Device Architecture*, can be found on the ISO web site.

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### Original UPnP Document

Reference may be made in this document to original UPnP documents. These references are retained in order to maintain consistency between the specifications as published by ISO/IEC and by UPnP Implementers Corporation and later by UPnP Forum. The following table indicates the original UPnP document titles and the corresponding part of ISO/IEC 29341:

| UPnP Document Title | ISO/IEC 29341 Part |
|---|---|
| UPnP Device Architecture 1.0 | ISO/IEC 29341-1:2008 |
| UPnP Device Architecture Version 1.0 | ISO/IEC 29341-1:2011 |
| UPnP Device Architecture 1.1 | ISO/IEC 29341-1-1:2011 |
| UPnP Device Architecture 2.0 | ISO/IEC 29341-1-2 |
| UPnP Basic:1 Device | ISO/IEC 29341-2 |
| UPnP AV Architecture:1 | ISO/IEC 29341-3-1:2008 |
| UPnP AV Architecture:1 | ISO/IEC 29341-3-1:2011 |
| UPnP AVTransport:1 Service | ISO/IEC 29341-3-10 |
| UPnP ConnectionManager:1 Service | ISO/IEC 29341-3-11 |
| UPnP ContentDirectory:1 Service | ISO/IEC 29341-3-12 |
| UPnP RenderingControl:1 Service | ISO/IEC 29341-3-13 |
| UPnP MediaRenderer:1 Device | ISO/IEC 29341-3-2 |
| UPnP MediaRenderer:2 Device | ISO/IEC 29341-3-2:2011 |
| UPnP MediaServer:1 Device | ISO/IEC 29341-3-3 |
| UPnP AVTransport:2 Service | ISO/IEC 29341-4-10:2008 |
| UPnP AVTransport:2 Service | ISO/IEC 29341-4-10:2011 |
| UPnP ConnectionManager:2 Service | ISO/IEC 29341-4-11:2008 |
| UPnP ConnectionManager:2 Service | ISO/IEC 29341-4-11:2011 |
| UPnP ContentDirectory:2 Service | ISO/IEC 29341-4-12 |
| UPnP RenderingControl:2 Service | ISO/IEC 29341-4-13:2008 |
| UPnP RenderingControl:2 Service | ISO/IEC 29341-4-13:2011 |
| UPnP ScheduledRecording:1 | ISO/IEC 29341-4-14 |
| UPnP ScheduledRecording:2 | ISO/IEC 29341-4-14:2011 |
| UPnP MediaRenderer:2 Device | ISO/IEC 29341-4-2 |
| UPnP MediaServer:2 Device | ISO/IEC 29341-4-3 |
| UPnP AV Datastructure Template:1 | ISO/IEC 29341-4-4:2008 |
| UPnP AV Datastructure Template:1 | ISO/IEC 29341-4-4:2011 |
| UPnP DigitalSecurityCamera:1 Device | ISO/IEC 29341-5-1 |
| UPnP DigitalSecurityCameraMotionImage:1 Service | ISO/IEC 29341-5-10 |
| UPnP DigitalSecurityCameraSettings:1 Service | ISO/IEC 29341-5-11 |
| UPnP DigitalSecurityCameraStillImage:1 Service | ISO/IEC 29341-5-12 |
| UPnP HVAC_System:1 Device | ISO/IEC 29341-6-1 |
| UPnP ControlValve:1 Service | ISO/IEC 29341-6-10 |
| UPnP HVAC_FanOperatingMode:1 Service | ISO/IEC 29341-6-11 |
| UPnP FanSpeed:1 Service | ISO/IEC 29341-6-12 |
| UPnP HouseStatus:1 Service | ISO/IEC 29341-6-13 |
| UPnP HVAC_SetpointSchedule:1 Service | ISO/IEC 29341-6-14 |
| UPnP TemperatureSensor:1 Service | ISO/IEC 29341-6-15 |
| UPnP TemperatureSetpoint:1 Service | ISO/IEC 29341-6-16 |
| UPnP HVAC_UserOperatingMode:1 Service | ISO/IEC 29341-6-17 |
| UPnP HVAC_ZoneThermostat:1 Device | ISO/IEC 29341-6-2 |

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| UPnP BinaryLight:1 Device | ISO/IEC 29341-7-1 |
| UPnP Dimming:1 Service | ISO/IEC 29341-7-10 |
| UPnP SwitchPower:1 Service | ISO/IEC 29341-7-11 |
| UPnP DimmableLight:1 Device | ISO/IEC 29341-7-2 |
| UPnP InternetGatewayDevice:1 Device | ISO/IEC 29341-8-1 |
| UPnP LANHostConfigManagement:1 Service | ISO/IEC 29341-8-10 |
| UPnP Layer3Forwarding:1 Service | ISO/IEC 29341-8-11 |
| UPnP LinkAuthentication:1 Service | ISO/IEC 29341-8-12 |
| UPnP RadiusClient:1 Service | ISO/IEC 29341-8-13 |
| UPnP WANCableLinkConfig:1 Service | ISO/IEC 29341-8-14 |
| UPnP WANCommonInterfaceConfig:1 Service | ISO/IEC 29341-8-15 |
| UPnP WANDSLLinkConfig:1 Service | ISO/IEC 29341-8-16 |
| UPnP WANEthernetLinkConfig:1 Service | ISO/IEC 29341-8-17 |
| UPnP WANIPConnection:1 Service | ISO/IEC 29341-8-18 |
| UPnP WANPOTSLinkConfig:1 Service | ISO/IEC 29341-8-19 |
| UPnP LANDevice:1 Device | ISO/IEC 29341-8-2 |
| UPnP WANPPPConnection:1 Service | ISO/IEC 29341-8-20 |
| UPnP WLANConfiguration:1 Service | ISO/IEC 29341-8-21 |
| UPnP WANDevice:1 Device | ISO/IEC 29341-8-3 |
| UPnP WANConnectionDevice:1 Device | ISO/IEC 29341-8-4 |
| UPnP WLANAccessPointDevice:1 Device | ISO/IEC 29341-8-5 |
| UPnP Printer:1 Device | ISO/IEC 29341-9-1 |
| UPnP ExternalActivity:1 Service | ISO/IEC 29341-9-10 |
| UPnP Feeder:1.0 Service | ISO/IEC 29341-9-11 |
| UPnP PrintBasic:1 Service | ISO/IEC 29341-9-12 |
| UPnP Scan:1 Service | ISO/IEC 29341-9-13 |
| UPnP Scanner:1.0 Device | ISO/IEC 29341-9-2 |
| UPnP QoS Architecture:1.0 | ISO/IEC 29341-10-1 |
| UPnP QosDevice:1 Service | ISO/IEC 29341-10-10 |
| UPnP QosManager:1 Service | ISO/IEC 29341-10-11 |
| UPnP QosPolicyHolder:1 Service | ISO/IEC 29341-10-12 |
| UPnP QoS Architecture:2 | ISO/IEC 29341-11-1 |
| UPnP QosDevice:2 Service | ISO/IEC 29341-11-10 |
| UPnP QosManager:2 Service | ISO/IEC 29341-11-11 |
| UPnP QosPolicyHolder:2 Service | ISO/IEC 29341-11-12 |
| UPnP QOS v2 Schema Files | ISO/IEC 29341-11-2 |
| UPnP RemoteUIClientDevice:1 Device | ISO/IEC 29341-12-1 |
| UPnP RemoteUIClient:1 Service | ISO/IEC 29341-12-10 |
| UPnP RemoteUIServer:1 Service | ISO/IEC 29341-12-11 |
| UPnP RemoteUIServerDevice:1 Device | ISO/IEC 29341-12-2 |
| UPnP DeviceSecurity:1 Service | ISO/IEC 29341-13-10 |
| UPnP SecurityConsole:1 Service | ISO/IEC 29341-13-11 |
| UPnP ContentDirectory:3 Service | ISO/IEC 29341-14-12:2011 |
| UPnP MediaServer:3 Device | ISO/IEC 29341-14-3:2011 |
| UPnP ContentSync:1 | ISO/IEC 29341-15-10:2011 |
| UPnP Low Power Architecture:1 | ISO/IEC 29341-16-1:2011 |
| UPnP LowPowerProxy:1 Service | ISO/IEC 29341-16-10:2011 |

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|---|---|
| UPnP LowPowerDevice:1 Service | ISO/IEC 29341-16-11:2011 |
| UPnP QoS Architecture:3 | ISO/IEC 29341-17-1:2011 |
| UPnP QosDevice:3 Service | ISO/IEC 29341-17-10:2011 |
| UPnP QosManager:3 Service | ISO/IEC 29341-17-11:2011 |
| UPnP QosPolicyHolder:3 Service | ISO/IEC 29341-17-12:2011 |
| UPnP QosDevice:3 Addendum | ISO/IEC 29341-17-13:2011 |
| UPnP RemoteAccessArchitecture:1 | ISO/IEC 29341-18-1:2011 |
| UPnP InboundConnectionConfig:1 Service | ISO/IEC 29341-18-10:2011 |
| UPnP RADAConfig:1 Service | ISO/IEC 29341-18-11:2011 |
| UPnP RADASync:1 Service | ISO/IEC 29341-18-12:2011 |
| UPnP RATAConfig:1 Service | ISO/IEC 29341-18-13:2011 |
| UPnP RAClient:1 Device | ISO/IEC 29341-18-2:2011 |
| UPnP RAServer:1 Device | ISO/IEC 29341-18-3:2011 |
| UPnP RADiscoveryAgent:1 Device | ISO/IEC 29341-18-4:2011 |
| UPnP SolarProtectionBlind:1 Device | ISO/IEC 29341-19-1:2011 |
| UPnP TwoWayMotionMotor:1 Service | ISO/IEC 29341-19-10:2011 |
| UPnP AV Architecture:2 | ISO/IEC 29341-20-1 |
| UPnP AVTransport:3 Service | ISO/IEC 29341-20-10 |
| UPnP ConnectionManager:3 Service | ISO/IEC 29341-20-11 |
| UPnP ContentDirectory:4 Device | ISO/IEC 29341-20-12 |
| UPnP RenderingControl:3 Service | ISO/IEC 29341-20-13 |
| UPnP ScheduledRecording:2 Service | ISO/IEC 29341-20-14 |
| UPnP MediaRenderer:3 Service | ISO/IEC 29341-20-2 |
| UPnP MediaServer:4 Device | ISO/IEC 29341-20-3 |
| UPnP AV Datastructure Template:1 | ISO/IEC 29341-20-4 |
| UPnP InternetGatewayDevice:2 Device | ISO/IEC 29341-24-1 |
| UPnP WANIPConnection:2 Service | ISO/IEC 29341-24-10 |
| UPnP WANIPv6FirewallControl:1 Service | ISO/IEC 29341-24-11 |
| UPnP WANConnectionDevice:2 Service | ISO/IEC 29341-24-2 |
| UPnP WANDevice:2 Device | ISO/IEC 29341-24-3 |
| UPnP Telephony Architecture:2 | ISO/IEC 29341-26-1 |
| UPnP CallManagement:2 Service | ISO/IEC 29341-26-10 |
| UPnP MediaManagement:2 Service | ISO/IEC 29341-26-11 |
| UPnP Messaging:2 Service | ISO/IEC 29341-26-12 |
| UPnP PhoneManagement:2 Service | ISO/IEC 29341-26-13 |
| UPnP AddressBook:1 Service | ISO/IEC 29341-26-14 |
| UPnP Calendar:1 Service | ISO/IEC 29341-26-15 |
| UPnP Presense:1 Service | ISO/IEC 29341-26-16 |
| UPnP TelephonyClient:2 Device | ISO/IEC 29341-26-2 |
| UPnP TelephonyServer:2 Device | ISO/IEC 29341-26-3 |
| UPnP Friendly Info Update:1 Service | ISO/IEC 29341-27-1 |
| UPnP MultiScreen MultiScreen Architecture:1 | ISO/IEC 29341-28-1 |
| UPnP MultiScreen Application Management:1 Service | ISO/IEC 29341-28-10 |
| UPnP MultiScreen Screen:1 Device | ISO/IEC 29341-28-2 |
| UPnP MultiScreen Application Management:2 Service | ISO/IEC 29341-29-10 |
| UPnP MultiScreen Screen:2 Device | ISO/IEC 29341-29-2 |
| UPnP IoT Management and Control Architecture Overview:1 | ISO/IEC 29341-30-1 |

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|---|---|
| UPnP DataStore:1 Service | ISO/IEC 29341-30-10 |
| UPnP IoT Management and Control Data Model:1 Service | ISO/IEC 29341-30-11 |
| UPnP IoT Management and Control Transport Generic:1 Service | ISO/IEC 29341-30-12 |
| UPnP IoT Management and Control:1 Device | ISO/IEC 29341-30-2 |
| UPnP Energy Management:1 Service | ISO/IEC 29341-31-1 |

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## 1 Scope

This document specifies the characteristics of the UPnP networked service named *ApplicationManagement*, version *1*. This service definition is compliant with UPnP Device Architecture 1.0 [1].

This service type enables to manage applications and the communications between applications providing various time-sensitive and interactive services including implementation-specific applications among various display devices, that is, Screen Devices [3] and Screen Control Points.

Screen Devices shall implement this service [3], but this service is allowed to be implemented for any UPnP devices as an add-on service.

## 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.

[1] – *UPnP Device Architecture, version 1.0*, UPnP Forum, October 15, 2008.
Available at: http://www.upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0-20081015.pdf.
Latest version available at: http://www.upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf.

[2] – *Multi-Screen Architecture:1*, UPnP Forum, September 30, 2014.
Available at: http://www.upnp.org/specs/ms/UPnP-ms-MultiScreenArchitecture-v1-20140930.pdf.
Latest version available at: http://www.upnp.org/specs/ms/UPnP-ms-MultiScreenArchitecture-v1.pdf.

[3] – *ScreenDevice:1*, UPnP Forum, September 30, 2014.
Available at: http://www.upnp.org/specs/ms/UPnP-ms-ScreenDevice-v1-Device-20140930.pdf.
Latest version available at: http://www.upnp.org/specs/ms/UPnP-ms-ScreenDevice-v1-Device.pdf.

[4] – *IETF RFC 3986, Uniform Resource Identifiers (URI): Generic Syntax*, January 2005.
Available at: http://www.ietf.org/rfc/rfc3986.txt.

[5] – *IETF RFC 1738, Uniform Resource Locators (URL)*, December 1994.
Available at: http://www.ietf.org/rfc/rfc1738.txt.

[6] – *IETF RFC 6455, The WebSocket Protocol*, December 2011.
Available at: http://www.ietf.org/rfc/rfc6455.txt.

[7] – *IETF RFC-6120, Extensible Messaging and Presence Protocol XMPP: Core*, March 2011.
Available at http://tools.ietf.org/html/rfc6120

[8] – *MediaRenderer:3*, UPnP Forum, March 31, 2013.
Available at: http://www.upnp.org/specs/av/UPnP-av-MediaRenderer-v3-Device-20130331.pdf.
Latest version available at: http://www.upnp.org/specs/av/UPnP-AV-MediaRenderer-v3-Device.pdf.

[9] – *DeviceProtection:1*, UPnP Forum, December 31, 2010.
Available at: http://www.upnp.org/specs/gw/UPnP-gw-DeviceProtection-v1-Service-20110224.pdf.
Latest version available at: http://www.upnp.org/specs/gw/UPnP-gw-DeviceProtection-v1-Service.pdf.

[10] – *XML Schema for AppInfoList XML Structures*, UPnP Forum, September 30, 2014.

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Available at: http://www.upnp.org/ schemas/ms/AppInfoList-v1-20140930.xsd.
Latest version available at: http://www.upnp.org/ schemas/ms/AppInfoList.xsd.

# 3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the terms and definitions given in the UPnP Device Architecture [1], the Multi-Screen Architecture:1 [2] and the following apply.

## 3.1 Terms specific to ApplicationManagement

### 3.1.1 *SECURITY feature*

An extension of the DeviceProtection service [9] to the actions (*Action Level Access*) of the ApplicationManagement service (see subclause 5.2.1).

### 3.1.2 *AM Roles*

Access level of a *Control Point* or *User Identity* to authorize a specific set of the ApplicationManagement actions (see subclauses 5.2.1.1 and 5.2.1.2).

### 3.1.3 Application

A software program designed to help people perform an activity.

### 3.1.4 Native Application

A type of application running directly on an OS platform. Typically, it needs to be installed before it can be started.

### 3.1.5 Web Application

A type of application typically written with web-native languages such as HTML, JavaScript and so on. It runs directly in a web browser. Typically, it does not need to be installed before it can be started.

# 4 Notations and Conventions

See the Multi-Screen Architecture:1 [2].

# 5 Service Modelling Definitions

## 5.1 Service Type

The following service type identifies a service that is compliant with this template:

**urn:schemas-upnp-org:service**:*ApplicationManagement:1*

## 5.2 Key Concepts

### 5.2.1 *SECURITY feature*

The *SECURITY feature* is an extension of the DeviceProtection service [9] to the actions (*Action Level Access*) of the ApplicationManagement service. The *SECURITY feature* is supported on a device which also implements the DeviceProtection service [9], and not allowed otherwise.

By defining *Action Level Access* based on the *Roles* defined by the DeviceProtection service [9] and the ApplicationManagement service, a ScreenDevice is able to restrict access from unidentified Control Points or Users, and to differentiate access levels for identified Control Points or Users with different *Roles*. Additionally, an implementation may define other vendor *Roles* with other *Action Level Access*.

If a Control Point has at least one *Role* that is not restricted from invoking a specific action, then it is said to have *Action Level Access*. Otherwise, the ApplicationManagement service implementation shall issue the error code 606 (see the UPnP Device Architecture [1]) in response to the action invocation.

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