
**Information technology — UPnP
Device Architecture —**

**Part 30-10:
IoT management and control device
control protocol — Data store service**

Technologies de l'information — Architecture de dispositif UPnP —

*Partie 30-10: Protocole de contrôle de dispositif de gestion et de
contrôle de l'Internet des objets — Service de stockage des données*

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ISO/IEC 29341-30-10 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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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
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UPnP ControlValve:1 Service	ISO/IEC 29341-6-10
UPnP HVAC_FanOperatingMode:1 Service	ISO/IEC 29341-6-11
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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
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UPnP HVAC_UserOperatingMode:1 Service	ISO/IEC 29341-6-17
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UPnP LANHostConfigManagement:1 Service	ISO/IEC 29341-8-10
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UPnP QosPolicyHolder:1 Service	ISO/IEC 29341-10-12
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UPnP QosPolicyHolder:2 Service	ISO/IEC 29341-11-12
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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

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
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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

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

1 Scope

1.1 Introduction

This document defines the service DataStore:1, which identifies Version 1 of the service named DataStore. This Publicly Available Specification is applicable to Standardized DCPs of the UPnP Forum which include this service.

This service definition is compliant with the UPnP Device Architecture, version 1.0.

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.

- [1] UPnP Device Architecture, version 1.0, UPnP Forum, June 13, 2000. Available at: http://upnp.org/specs/arch/UPnPDA10_20000613.pdf. Latest version available at: <http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf>.
- [2] ISO 8601 Data elements and interchange formats – Information interchange -- Representation of dates and times, International Standards Organization, December 21, 2000. Available at: <http://www.iso.org> (ISO 8601:2004)
- [3] IETF RFC 2119, Key words for use in RFCs to Indicate Requirement Levels, S. Bradner, 1997. Available at: <http://www.faqs.org/rfcs/rfc2119.html>.
- [4] HyperText Transport Protocol – HTTP/1.1, R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, June 1999. Available at: <http://www.ietf.org/rfc/rfc2616.txt>.
- [5] IETF RFC 3339, Date and Time on the Internet: Timestamps, G. Klyne, Clearswift Corporation, C. Newman, Sun Microsystems, July 2002. Available at: <http://www.ietf.org/rfc/rfc3339.txt>.
- [6] Extensible Markup Language (XML) 1.0 (Third Edition), François Yergeau, Tim Bray, Jean Paoli, C. M. Sperberg-McQueen, Eve Maler, eds., W3C Recommendation, February 4, 2004. Available at: <http://www.w3.org/TR/2004/REC-xml-20040204>.
- [7] XML Schema Part 2: Data Types, Second Edition, Paul V. Biron, Ashok Malhotra, W3C Recommendation, 28 October 2004. Available at: <http://www.w3.org/TR/2004/REC-xsd-schema-2-20041028>.
- [8] UPnP IotManagementAndControl Architecture Overview, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IotManagementAndControl-Architecture-v1-20130701.pdf>. Latest version available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IotManagementAndControl-Architecture-v1.pdf>.
- [9] UPnP IOTManagementAndControl Device, UPnP Forum July 1, 2013. Available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IOTManagementAndControl-v1-Device-20130701.pdf>. Latest version available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IOTManagementAndControl-v1-Device.pdf>.
- [10] UPnP IOTManagementAndControl GenericTransport:1 Service, UPnP Forum July 1, 2013. Available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IOTManagementAndControl-TransportGeneric-v1-Service-20130701.pdf>. Latest version available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IOTManagementAndControl-TransportGeneric-v1-Service.pdf>.

- [11] UPnP DataStore:1 Service, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/specs/ds/UPnP-ds-DataStore-v1-Service-20130701.pdf>. Latest version available at: <http://www.upnp.org/specs/ds/UPnP-ds-DataStore-v1-Service.pdf>.
- [12] UPnP IoTManagementAndControl Sensor DataModel Service, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IOTManagementAndControl-DataModel-v1-Service-20130701.pdf>. Latest version available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IOTManagementAndControl-DataModel-v1-Service.pdf>.
- [13] UPnP DeviceProtection:1 Service, UPnP Forum, February 24, 2011. 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>.
- [14] UPnP ConfigurationManagement:2 Service, UPnP Forum, February 16, 2012. Available at: <http://www.upnp.org/specs/dm/UPnP-dm-ConfigurationManagement-v2-Service-20120216.pdf>. Latest version available at: <http://www.upnp.org/specs/dm/UPnP-dm-ConfigurationManagement-v2-Service.pdf>.
- [15] XML Schema DataStore LastChange Eventing, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/ds/dsevent-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/ds/dsevent.xsd>.
- [16] XML Schema UPnP DataStore DataStoreInfo, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/ds/dsinfo-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/ds/dsinfo.xsd>.
- [17] XML Schema UPnP DataStore DataTableInfo, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/ds/dtinfo-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/ds/dtinfo.xsd>.
- [18] XML Schema UPnP DataStore DataStoreGroups, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/ds/dsgroups-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/ds/dsgroups.xsd>.
- [19] XML Schema UPnP DataStore DataRecord, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/ds/drecs-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/ds/drecs.xsd>.
- [20] XML Schema UPnP DataStore DataRecordFilter, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/ds/drecfilter-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/ds/drecfilter.xsd>.
- [21] XML Schema UPnP DataStore DataRecord Status, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/ds/drecstatus-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/ds/drecstatus.xsd>

3 Terms, Definitions and Abbreviations

For the purposes of this document, the terms and definitions given in [1] and [8] apply.

4 Notations and conventions

4.1 Notation

- Strings that are to be taken literally are enclosed in “double quotes”.
- Words that are emphasized are printed in *italic*.
- Keywords that are defined by the UPnP Working Committee are printed using the *forum* character style.
- Keywords that are defined by the UPnP Device Architecture are printed using the *arch* character style.