
**Information technology — UPnP
Device Architecture —**

**Part 30-1:
IoT management and control device
control protocol — IoT management
and control architecture overview**

Technologies de l'information — Architecture de dispositif UPnP —

*Partie 30-1: Protocole de contrôle de dispositif de gestion et de
contrôle de l'Internet des objets — Aperçu général de l'architecture de
gestion et de contrôle de l'Internet des objets*

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CONTENTS

1	Scope	1
1.1	Introduction	1
1.2	Goals	1
1.3	Non-Goals	1
1.4	IoTManagementAndControl and DataStore Specification Map	2
2	Normative references	3
3	Terms, definitions and abbreviations	4
3.1	IoTManagementAndControl terms and definitions	4
3.2	DataStore terms and definitions	5
3.3	Configuration Management terms and definitions	6
3.4	Device Protection terms and definitions	7
4	Architectural Overview	8
4.1	UPnP IoTManagementAndControl Device	8
4.1.1	Sensor Data Model	9
4.1.2	Sensor Collections	9
4.1.3	Sensor Control	9
4.1.4	Sensors DataItem(s)	9
4.1.5	Sensor DataItem Description Document	10
4.1.6	Sensors DataRecord(s)	10
4.1.7	Sensors Data Transport	10
4.1.8	Sensors Groups	10
4.1.9	Sensor Protection Model	10
4.2	UPnP DataStore Service	12
4.2.1	DataTable(s)	13
4.2.2	DataTable DataRecord(s)	13
4.2.3	DataTable Dictionary	13
4.2.4	DataItem types	13
4.2.5	DataTable Operations	14
4.2.6	DataStore Protection Model	14
4.3	DataItem Semantics	15
4.3.1	DataItem Name	15
4.3.2	DataItem Prefix	16
4.3.3	DataItem Type	16
4.3.4	DataItem Encoding	17
4.3.5	DataItem Description Document	17
4.4	DataItem Description XML Document	18
4.4.1	Introduction	18
4.4.2	DataItem Categories	18
4.4.3	DataItem Description Document Elements	18
4.5	DataItem Description Units of Measurement	26
4.5.1	SI Prefixes	26
4.5.2	SI Base Units	26
4.5.3	SI Derived Units	26
4.5.4	Non-SI in common use	27
4.5.5	British units in common use	27

4.5.6	Coordinates	27
4.5.7	Duration.....	28
4.5.8	Encoding	28
4.6	Theory of Operation (informative).....	29
4.6.1	IoTManagementAndControl Device.....	29
4.6.2	Configuring the DataStore service	36
Annex A	Sample Device Illustration (informative).....	44
Figure 1	IoTManagementAndControl Architectural Components.....	8
Figure 2	IoTManagementAndControl Device services	9
Figure 3	DataStore service	12
Figure 4	DataStore service - DataTable Components	13
Figure A.1	Sample Device	44
Table 1	Sensor Permissions	10
Table 2	access= attribute allowed values.....	20
Table 3	treatment= attribute allowed values (measurement).....	20
Table 4	accumulation= attribute allowed values (measurement).....	21
Table 6	relationtype= attribute (alarm)	22
Table 7	limittype= attribute (limit)	23
Table 8	relationtype= attribute allowed values (limit)	23
Table 9	relationtype= attribute allowed values (setting)	24
Table 10	units= attribute allowed values (interval)	24
Table 11	relationtype= attribute allowed values (interval)	25

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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](http://www.iso.org).

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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

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

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

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 describes the overall UPnP IoTManagementAndControl Architecture, which forms the foundation for the UPnP IoTManagementAndControl device [11] and UPnP DataStore service [13] specifications. The IoTManagementAndControl device hosts services to bridge sensor devices connected to both UPnP networks as well as non-UPnP based networks. The DataStore service provides persistent retention and distribution of both sensor data as well as data from mobile devices which may leave the UPnP network at any time. This service can be hosted within the UPnP IoTManagementAndControl device as well as within other UPnP compliant devices.

1.2 Goals

The UPnP IoTManagementAndControl Architecture was explicitly defined to meet the following goals:

- Describe sensors and actuators residing on both UPnP and non-UPnP networks.
- Provide data transport services for sensors and actuators to UPnP network clients.
- Define a service to describe, retain and distribute data received from sensors as well as other non-persistent data sources.
- Define an allowed device protection model for both the sensor and data retention components.

1.3 Non-Goals

The following are not initial goals of the IoTManagementAndControl architecture:

- Low-level control of bridged networks
The initial version of UPnP IoTManagementAndControl treats Sensors and Actuators as abstract data sources and sinks and does not expose details or provide direct access to bridging network protocols. Low-level control of selected bridged network protocols will be considered in subsequent versions of the architecture.
- Low-latency control of sensors and actuators
The initial version of UPnP IoTManagementAndControl treats sensors and actuators as autonomous objects requiring relatively infrequent supervision from home-network clients. Closed loop control of sensor and actuator pairs is better accomplished directly within the internal vendor-device sensor/actuator architecture with UPnP home-network clients providing overall supervision. However, UPnP IoTManagementAndControl does support sensors which have substantial throughput requirements using transport connections.

1.4 IoTManagementAndControl and DataStore Specification Map

IoTManagementAndControl Architecture Overview

[10]

- Sensor Discovery and Description
 - IoTManagementAndControl Detail Overview
 - Sensor Protection Model
 - DataStore Detail Overview
 - DataStore Protection Model
 - DataItem Description and Semantics
 - Sample Implementation Theory of Operation

IoTManagementAndControl Device

IoTManagementAndControl Device Specification [11]

- Sensor Components High-Level Overview
- IoTManagementAndControl Required/Allowed Services

IoTManagementAndControl Sensor DataModel Service Specification [14]

- Sensor Discovery and Description
 - Sensor URN Description
 - Sensor Event Model Description
 - ConfigurationManagement service action(s)
 - Mandatory DataItem(s)
 - Common Sensor Collection types
 - Sensor Data Model
 - IEEE-11073 Medical Device Data Model

SensorTransportGeneric Service Specification [12]

- Sensor Transport (SOAP/HTTP)
 - Sensor Transport action(s)
 - Sensor Data Record(s)

DataStore Service Specification [13]

- Persistent Data Retention
 - DataStore URN Description
 - DataStore (LastChange) Event Model
 - DataStore action(s)
 - DataTable schema(s)

Device Protection Service Specification [15]

- Device Protection
 - Device Protection action(s)

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, 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>.
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3 Terms, definitions and abbreviations

For initial readers of this document, it may be helpful to proceed to subclause 4, "Architectural Overview" and refer to this section for terms and definitions as needed.

3.1 IoTManagementAndControl terms and definitions

The following terms apply to the IoTManagementAndControl Device [11], IoTManagementAndControl Sensor DataModel Service [14], and IoTManagementAndControl SensorTransportGeneric Service [12] specifications.