
**Information technology — UPnP
Device Architecture —**
Part 30-11:
**IoT management and control device
control protocol — IoT management
and control data model service**

*Technologies de l'information — Architecture de dispositif UPnP —
Partie 30-11: Protocole de contrôle de dispositif de gestion et de
contrôle de l'Internet des objets — Service de modèle de données de
gestion et de contrôle de l'Internet des objets*



STANDARDSISO.COM : Click to view the full PDF of ISO/IEC 29341-30-11:2017



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

CONTENTS

1	Scope.....	viii
2	Normative References	1
3	Terms, Definitions and Abbreviations	2
4	Notations and conventions	2
4.1	Notation	2
4.2	Data Types	3
4.3	Vendor-defined Extensions	3
4.3.1	Extended Backus-Naur Form	3
5	IoT Management and Control Configuration Management Service Profile	4
5.1	Service Type	4
5.2	IoT Management and Control Device Architecture	4
5.2.1	Sensor Description	4
5.2.2	Sensor Data Interface	4
5.2.3	Sensor Data Records	4
5.2.4	SensorURNs	4
5.2.5	Sensor Required DataItems	4
5.2.6	Sensor Normative Type Identifiers	5
5.2.7	Event Model	6
5.3	State Variables	7
5.4	Actions	8
5.4.1	Introduction	8
5.4.2	<u>GetSupportedDataModels()</u>	9
5.4.3	<u>GetSelectedValues()</u>	10
5.4.4	<u>SetValues()</u>	10
5.4.5	<u>CreateInstance()</u>	10
5.4.6	<u>DeleteInstance()</u>	10
5.4.7	<u>SetAttributes()</u>	10
	Annex A IoT Management and Control General Data Model (normative)	11
	Annex B Required IoT Management and Control DataItem(s) (normative)	38
	Annex C Common Device Identifiers (normative)	39
	Annex D IEEE-11073 Personal Health Devices	49
	Figure A.1 — Script status state machine	26
	Figure A.2 — Sample Collection	31
	Figure A.3 — Sample of a GroupSet	34
	Figure A.4 — Sample of receiving the Brightness setting	35
	Figure D.1 — Blood Pressure Monitor – Medical Device System (Informative)	49
	Figure D.2 — Medical Device System with PM-store Object (informative)	57
	Table 4-1 — EBNF Operators	3
	Table 5-1 — Sensor URN [identifier-type] values	5
	Table 5-2 — Sensor URN [identifier-type-dependent] values	5

Table 5-3 — <SensorEvents> event= attribute allowed values.....	7
Table 5-4 — State Variables for Eventing	8
Table 5-5 — Actions	9
Table A.1 — IoT Management and Control General Parameters.....	11
Table A.2 — SensorEventEnable parameter allowed values.....	15
Table A.3 — Sensor Permissions	17
Table A.4 — GroupSetType values.....	19
Table A.5 — ScriptSettings Parameters for predefined Settings	20
Table A.6 — Default permission settings	21
Table A.7 — Default script permission settings	22
Table A.8 — Default permissions settings.....	23
Table A.9 —ScriptSettings Parameters for Scripts	24
Table A.10 — Script Attributes	25
Table A.11 — Script Status values	26
Table A.12 — Script default permissions	27
Table A.13 — Property-identifier values for Scripts	28
Table A.14 — property-identifier values for collections.....	29
Table A.15 — Sample Collection for Examples	31
Table A.16 — Sample Collection for Living Room Lights.....	35
Table A.17 — Continue Collection for Living Room Lights.....	36
Table A.18 — Collection for Living Room Lights Timer example.....	37
Table B.1 — IoT Management and Control required Dataltem(s).....	38
Table C.1 — Common Device Identifiers.....	39
Table C.2 — mapping of mandatory Dataltems per Common Device Identifier.....	43
Table D.1 — IEEE-11073 specific Medical Device System Parameters.....	50
Table D.2 — IEEE-11073 Medical Device Sensor Parameters.....	53
Table D.3 — Default Dataltem(s) for IEEE-11073 Medical Object Class Sensors.....	54
Table D.4 — Dataltem(s) for Medical Object Class Attributes.....	55
Table D.5 — Dataltem(s) for Medical Object Class Observations	56
Table D.6 — IEEE-11073 Persistent Metric Store Parameter Nodes.....	57
Table D.7 — IEEE-11073 Persistent Metric Segment Parameter Nodes.....	59
Table D.8 — IEEE-11073 Persistent Metric Segment Dataltem(s)	60

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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>).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of Standards, 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 29341-30-11 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](#).

Introduction

ISO and IEC draw attention to the fact that it is claimed that compliance with this document may involve the use of patents as indicated below.

ISO and IEC take no position concerning the evidence, validity and scope of these patent rights. The holders of these patent rights have assured ISO and IEC that they are willing to negotiate licenses under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with ISO and IEC.

Intel Corporation has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Intel Corporation
Standards Licensing Department
5200 NE Elam Young Parkway
MS: JFS-98
USA – Hillsboro, Oregon 97124

Microsoft Corporation has informed IEC and ISO that it has patent applications or granted patents as listed below:

6101499 / US; 6687755 / US; 6910068 / US; 7130895 / US; 6725281 / US; 7089307 / US;
7069312 / US; 10/783 524 / US

Information may be obtained from:

Microsoft Corporation
One Microsoft Way
USA – Redmond WA 98052

Philips International B.V. has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Philips International B.V. – IP&S
High Tech campus, building 44 3A21
NL – 5656 Eindhoven

NXP B.V. (NL) has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

NXP B.V. (NL)
High Tech campus 60
NL – 5656 AG Eindhoven

Matsushita Electric Industrial Co. Ltd. has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Matsushita Electric Industrial Co. Ltd.
1-3-7 Shiromi, Chuoh-ku
JP – Osaka 540-6139

Hewlett Packard Company has informed IEC and ISO that it has patent applications or granted patents as listed below:

5 956 487 / US; 6 170 007 / US; 6 139 177 / US; 6 529 936 / US; 6 470 339 / US; 6 571 388 / US; 6 205 466 / US

Information may be obtained from:

Hewlett Packard Company
1501 Page Mill Road
USA – Palo Alto, CA 94304

Samsung Electronics Co. Ltd. has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Digital Media Business, Samsung Electronics Co. Ltd.
416 Maetan-3 Dong, Yeongtang-Gu,
KR – Suwon City 443-742

Huawei Technologies Co., Ltd. has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Huawei Technologies Co., Ltd.
Administration Building, Bantian Longgang District
Shenzhen – China 518129

Qualcomm Incorporated has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Qualcomm Incorporated
5775 Morehouse Drive
San Diego, CA – USA 92121

Telecom Italia S.p.A. has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Telecom Italia S.p.A.
Via Reiss Romoli, 274
Turin - Italy 10148

Cisco Systems informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA – USA 95134

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

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

STANDARDSISO.COM : Click to view the full PDF of ISO/IEC 29341-30-11:2017

STANDARDSISO.COM : Click to view the full PDF of ISO/IEC 29341-30-11:2017

1 Scope

This part of Publicly Available Specification ISO/IEC 29341 specifies Sensor Data Models. It is intended to be an adjunct document to the IoT Management and Control Device [11] and DataStore Service [13] specifications.

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: [ISO 8601:2000](http://www.iso.org/iso/8601).
- [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-xmlschema-2-20041028>.
- [8] ISO/IEEE-11073-20601 Health informatics - Personal health device communication - Part 20601: Application Profile - Optimized exchange protocol, 2010. Available at: <http://www.iso.org/iso/search.htm?qt=11073&searchSubmit=Search&sort=rel&type=simple&published=true>
- [9] ISO/IEEE-11073-104zz Health informatics -- Personal health device communication -- Part 104zz: Device specialization -- <see specific specialization>. Available at: <http://www.iso.org/iso/search.htm?qt=11073&searchSubmit=Search&sort=rel&type=simple&published=true>
- [10] UPnP IoT Management and Control Architecture Overview, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IoTManagementAndControl-Architecture-Overview-v1-20130701.pdf>. Latest version available at: <http://www.upnp.org/specs/iotmc/UPnP-iotmc-IoTManagementAndControl-Architecture-Overview-v1.pdf>.
- [11] UPnP IoT Management and Control 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>.
- [12] UPnP IoT Management and Control Transport Generic: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>.

[13] UPnP DataStore:1 Service, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/specs/smgmt/UPnP-ds-DataStore-v1-Service-20130701.pdf>. Latest version available at: <http://www.upnp.org/specs/ds/UPnP-smgt-DataStore-v1-Service.pdf>.

[14] UPnP IoT Management and Control 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>.

[15] 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>.

[16] UPnP ConfigurationManagement:2 Service, UPnP Forum, December 31, 2010. 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>.

[17] XML Schema UPnP IoT Management and Control Sensor DataModel Events, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/smgmt/sdmevent-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/smgmt/sdmevent.xsd>.

[18] XML Schema UPnP IoT Management and Control Sensor DataModel DataItem Description, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/smgmt/sdmdid-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/smgmt/sdmdid.xsd>.

[19] XML Schema UPnP IoT Management and Control DataRecord Information, UPnP Forum, July 1, 2013. Available at: <http://www.upnp.org/schemas/smgmt/srecinfo-v1-20130701.xsd>. Latest version available at: <http://www.upnp.org/schemas/smgmt/srecinfo.xsd>.

[20] ISO/IEC 14977, *Information technology - Syntactic metalanguage - Extended BNF*, December 1996.

3 Terms, Definitions and Abbreviations

For the purposes of this document, the terms and definitions given in UPnP Device Architecture, version 1.0 [1] 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.
- A double colon delimiter, “::”, signifies a hierarchical parent-child (parent::child) relationship between the two objects separated by the double colon. This delimiter is used in multiple contexts, for example: Service::Action(), Action()::Argument, parentProperty::childProperty.

4.2 Data Types

This specification uses data type definitions from two different sources. The UPnP Device Architecture defined data types are used to define state variable and action argument data types [1]. The XML Schema namespace is used to define property data types [7].

For UPnP Device Architecture defined Boolean data types, it is strongly RECOMMENDED to use the value “0” for false, and the value “1” for true. The values “true”, “yes”, “false”, or “no” MAY also be used but are NOT RECOMMENDED. The values “yes” and “no” are deprecated and MUST NOT be sent out by devices but MUST be accepted on input.

For XML Schema defined Boolean data types, it is strongly RECOMMENDED to use the value “0” for false, and the value “1” for true. The values “true”, “yes”, “false”, or “no” MAY also be used but are NOT RECOMMENDED. The values “yes” and “no” are deprecated and MUST NOT be sent out by devices but MUST be accepted on input.

4.3 Vendor-defined Extensions

Whenever vendors create additional vendor-defined state variables, actions or properties, their assigned names and XML representation MUST follow the naming conventions and XML rules as specified in [1], Clause 2.5, “Description: Non-standard vendor extensions”.

4.3.1 Extended Backus-Naur Form

Extended Backus-Naur Form is used in this document for a formal syntax description of certain constructs. The usage here is according to the reference [20].

4.3.1.1 Typographic conventions for EBNF

Non-terminal symbols are unquoted sequences of characters from the set of English upper and lower case letters, the digits “0” through “9”, and the hyphen (“-”). Character sequences between 'single quotes' are terminal strings and shall appear literally in valid strings. Character sequences between (*comment delimiters*) are English language definitions or supplementary explanations of their associated symbols. White space in the EBNF is used to separate elements of the EBNF, not to represent white space in valid strings. White space usage in valid strings is described explicitly in the EBNF. Finally, the EBNF uses the following operators:

Table 4-1 — EBNF Operators

Operator	Semantics
<code>::=</code>	definition – the non-terminal symbol on the left is defined by one or more alternative sequences of terminals and/or non-terminals to its right.
<code> </code>	alternative separator – separates sequences on the right that are independently allowed definitions for the non-terminal on the left.
<code>*</code>	null repetition – means the expression to its left may occur zero or more times.
<code>+</code>	non-null repetition – means the expression to its left shall occur at least once and may occur more times.
<code>[]</code>	optional – the expression between the brackets is allowed.
<code>()</code>	grouping – groups the expressions between the parentheses.
<code>-</code>	character range – represents all characters between the left and right character operands inclusively.

5 IoT Management and Control Configuration Management Service Profile

5.1 Service Type

This specification reuses the ConfigurationManagement service exactly as specified in ConfigurationManagement service [16]:

urn:schemas-upnp-org:service:ConfigurationManagement:2

IoT Management and Control DataModel service defined in this specification refers to the same service type.

5.2 IoT Management and Control Device Architecture

The UPnP IoT Management and Control device [11] provides UPnP client access to Sensors and Actuators. These devices may be connected directly to the UPnP network or can be connected to non-UPnP based networks which are bridged by this device into the UPnP network. The IoT Management and Control device includes a UPnP ConfigurationManagement service [16] which describes Sensors to UPnP based clients.

5.2.1 Sensor Description

The UPnP IoT Management and Control DataModel service provides a set of uniform Sensor Properties as defined by Annex A, "IoT Management and Control General Data Model". These properties assist UPnP clients to identify sensors they may be capable of supporting. In addition to uniform Sensor properties described by the General Sensor Data Model, this specification also can reference additional sensor properties which are defined by the Sensor's parent ecosystem.

5.2.2 Sensor Data Interface

The UPnP IoT Management and Control device [11] also includes a UPnP IoT Management and Control TransportGeneric service [12]. This service treats Sensors and Actuators as abstract data sources and sinks. While the IoT Management and Control device performs much of the interfacing tasks for Sensors, the actual data formats delivered by the Sensors are largely determined by the parent ecosystems for each target Sensor or Actuator. UPnP describes Sensor and Actuator data inputs/outputs as named Dataltem(s). Sensor Dataltem(s) are described by providing a name, format, encoding (see UPnP IoT Management and Control Architecture Overview [10], subclause 4.3, "Dataltem Semantics" for additional information).

5.2.3 Sensor Data Records

A UPnP client may transfer data to/from a Sensor(s) supported by the IoT Management and Control device using actions in the included UPnP IoT Management and Control TransportGeneric service [12]. When requesting data, the UPnP client specifies an XML document conforming to the XML Schema UPnP DataRecord Information [19]. This document identifies a series of one or more Dataltem(s) supported by the target Sensor. The UPnP client may either read or write the Sensor directly via SOAP actions or may establish a transport connection allowing the Sensor to deliver DataRecord(s) directly to a transport client.

5.2.4 SensorURNs

A SensorURN identifies a set of Dataltem(s) a Sensor supports. See subclause 5.2.6, "Sensor Normative Type Identifiers" for requirements on construction of SensorURN values.

5.2.5 Sensor Required Dataltems

Implementation of certain Dataltem(s) is required by the IoT Management and Control specification. These Dataltem(s) shall be available for all Sensor URNs whether or not explicitly defined by the corresponding SensorURN definition. The required Dataltem(s) are listed in Annex B "Required Sensor Dataltems".

5.2.6 Sensor Normative Type Identifiers

UPnP IoT Management and Control defines a uniform template for generating normative identifiers. These identifiers include SensorCollectionType, SensorType and SensorURNs. The following template is used:

SensorIdentifier ::= "urn:" upnp-org ":" [identifier-type] ":" [generic-device-type] ":" [sensor-vendor-identifier] ":" [sensor-vendor-spec] ":" [vendor-identifier] : [vendor-model-identifier] ":" [identifier-type-dependent]

SensorIdentifier(s) using the [upnp-org] domain shall use the following [identifier-type] values:

Table 5-1 — Sensor URN [identifier-type] values

Sensor Identifier	[identifier-type] value
Sensor Collection Type	<u>smgt-sct</u>
Sensor Type	<u>smgt-st</u>
Sensor URN	<u>smgt-surn</u>

The [generic-device-identifiers] field is descriptive. UPnP IoT Management and Control defines device-identifiers for various common devices (see Annex C, "Common Device Identifiers"). If one of these values is suitable, then the UPnP defined value should be used. However, if a sensor application is unique, vendor-specific extensions are permitted.

The [sensor-vendor-identifier] shall contain the ICANN domain-name of the organization or vendor which defines the sensor specification. This name shall identify the vendor which defines the sensors for the device rather than the final integrator of the device.

The [sensor-vendor-spec] shall identify the specification the sensor conforms to.

The [vendor-identifier] shall contain the ICAN domain-name of the device vendor. This domain-name shall identify the vendor which the customer would normally identify as the manufacturer of the device.

The [vendor-model-identifier] shall provide vendor specific identifying information for the device.

The [identifier-type-dependent] field is defined based on the type of SensorIdentifier as follows:

Table 5-2 — Sensor URN [identifier-type-dependent] values

[identifier-type-dependent]	[identifier-types]	Description
<u>monitor</u>	<u>smgt-st, smgt-surn</u>	Dataltem(s) or Sensor(s) intended to periodically monitor or record device performance over a period of time.
<u>status</u>	<u>smgt-st, smgt-surn</u>	Dataltem(s) or Sensor(s) intended to provide current device status or settings.
<u>datafeed</u>	<u>smgt-st, smgt-surn</u>	Dataltem(s) or Sensor(s) which to provide a continuous source of sensor data.
<u>telemetry</u>	<u>smgt-st, smgt-surn</u>	Dataltem(s) or Sensor(s) intended to report data obtained by a Sensor.
<u>setting</u>	<u>smgt-st, smgt-surn</u>	Dataltem(s) or Sensor(s) intended to modify end-user settable characteristics of a device.
<u>control</u>	<u>smgt-st, smgt-surn</u>	Dataltem(s) or Sensor(s) intended to control aspects of a device not typically set by end-users
<u>alarms</u>	<u>smgt-st, smgt-surn</u>	Dataltem(s) or Sensor(s) intended to convey abnormal conditions for a device.

5.2.7 Event Model

The IoT Management and Control event model generates two categories of events.

- **Sensor Configuration events**
Configuration events indicate addition or removal of SensorCollection(s) or Sensor(s) within a collection. Reporting of Sensor and SensorCollection configuration events are always enabled.
- **Sensor Specific events**
Specific events indicate state changes to Sensor(s) such as data availability or transport connection errors. Reporting of Sensor events may be enabled on a per-Sensor basis via the SensorEventsEnable parameter.

Sensor events are reported via the SensorEvents parameter which provides an XML document conforming to XML Schema UPnP IoT Management and Control DataModel Events [17]. This parameter shall support the EventOnChange attribute value which shall be enabled by default and the AlarmOnChange attribute value which shall also be enabled by default.

Changes to the SensorEvents parameter shall be sent to subscribed control points via the ConfigurationManagement service ConfigurationUpdate state variable. The IOT Management and Control ConfigurationManagement service shall implement and set the AlarmsEnabled state variable to ("1") by default.

To maintain privacy and security sensor collection(s) and sensor(s) are only identified by their CollectionID and SensorID values. In order to obtain additional information a UPnP control point would need sufficient privileges to read to the corresponding Data Model nodes which describe the sensor collection or sensor.

The SensorEvents parameter value shall be set to an XML document conforming to the UPnP IoT Management and Control DataModel Events schema [17] and as described below:

```
<?xml version="1.0" encoding="utf-8"?>
<SensorEvents
  xmlns="urn:schemas-upnp-org:smgt:sdmevent"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:schemas-upnp-org:smgt:sdmevent
http://www.upnp.org/schemas/smgt/sdmevent-v1.xsd">
  <sensorevent
    collectionID="sensorCollectionID"
    sensorID="sensorID"
    event="sensor event or sensor collection event name "/>
  ...
</SensorEvents>
```

<?xml>

Required. Case Sensitive

<SensorEvents>

Required. Shall include the namespace declaration for the SensorEvents XML Schema ("urn:schemas-upnp-org:smgt:sdmevent"). Shall include the zero or more of the following element and attributes:

<sensorevent>

Required. Shall occur zero or more times. Indicates that a sensor or sensor collection event has occurred.

collectionID

Required. Indicates the CollectionID for the reported event.

sensorID

Required. Indicates the SensorID for the reported event. If there is no corresponding SensorID for a reported event this attribute shall be set to "".

event

Required. Indicates the type of sensor related event. The `event` attribute shall use one of the values as detailed in the following table.

Table 5-3 — <SensorEvents> event= attribute allowed values

| SensorEvent Name | Description |
|---|--|
| <u>SensorCollectionAdded</u> | A new sensor collection has been added.
Reporting of this event is enabled by default. |
| <u>SensorCollectionRemoved</u> | A previously reported sensor collection has been removed.
Reporting of this event is enabled by default. |
| <u>SensorAdded</u> | A new sensor has been added.
Reporting of this event is enabled by default. |
| <u>SensorRemoved</u> | A previously reported sensor has been removed.
Reporting of this event is enabled by default. |
| <u>SOAPDataAvailable</u> | The sensor has data available to be read by the <u>ReadSensor()</u> SOAP action.
Reporting of this event is disabled by default. Reporting of this event can be enabled by setting the <u>SensorEventsControl</u> parameter to "SOAPDataAvailableEnable,1". |
| <u>SOAPDataOverrun</u> | The sensor has discarded data which was not read by any SOAP client.
Reporting of this event is disabled by default. Reporting of this event can be enabled by setting the <u>SensorEventControl</u> parameter to "SOAPDataOverrunEnable,1". |
| <u>TransportDataAvailable</u> | The sensor has received data available to be sent to one or more transport connection for this sensor.
Reporting of this event is disabled by default. Reporting of this event can be enabled by setting the <u>SensorEventControl</u> parameter to "TransportDataAvailableEnable,1". |
| <u>TransportDataOverrun</u> | The sensor has discarded data which was not read by any active transport connection.
Reporting of this event is disabled by default. Reporting of this event can be enabled by setting the <u>SensorEventControl</u> parameter to "TransportDataOverrunEnable,1". |
| <u>TransportConnectionError</u> | An error has occurred on one or more active transport connections for this sensor.
Reporting of this event is disabled by default. Reporting of this event can be enabled by setting the <u>SensorEventControl</u> parameter to "TransportConnectionErrorEnable,1". |
| <u>SensorAvailable</u> | A currently configured sensor has become available.
Reporting of this event is disabled by default. Reporting of this event can be enabled by setting the <u>SensorEventControl</u> parameter to "SensorAvailabilityEnable,1". |
| <u>SensorUnavailable</u> | A currently configured sensor has become unavailable.
Reporting of this event is disabled by default. Reporting of this event can be enabled by setting the <u>SensorEventControl</u> parameter to "SensorAvailabilityEnable,1". |

5.3 State Variables

The IoT Management and Control device [11] reuses some of the state variables defined in the ConfigurationManagement service [16].

The Table 5-4 below lists all the eventable state variables used in the [IoT Management and Control](#) device. These state variables are defined in the CMS. The table also indicates the required/allowed constraint for the [IoT Management and Control](#) device.

All the required state variables from the CMS shall be implemented by IoT Management and Control, as specified in [1]. It is up to the implementation to choose whether to support allowed state variables.

The AttributeValuesUpdate state variable should be supported if the CMS implementation support the SetAttributeValues() for changing attribute values (i.e. the values of EventOnChange and Version, when it is also supported).

The IoT Management and Control device supports the A_ARG_TYPE state variables defined in the CMS depending on the required/allowed constraint of the respective actions for the IoT Management and Control. The A_ARG_TYPE_ state variables are not listed in this document, refer to the ConfigurationManagement service [16] for the details.

Table 5-4 — State Variables for Eventing

| Variable Name | CMS
R/A ^a | IOTManagement and Control
R/A ^a |
|---|-------------------------|---|
| <u>ConfigurationUpdate</u> | <u>R</u> | <u>R</u> |
| <u>CurrentConfigurationVersion</u> | <u>R</u> | <u>R</u> |
| <u>SupportedDataModelsUpdate</u> | <u>R</u> | <u>R</u> |
| <u>SupportedParametersUpdate</u> | <u>R</u> | <u>R</u> |
| <u>AttributeValuesUpdate</u> | <u>A</u> | <u>A</u> |
| <u>InconsistentStatus</u> | <u>A</u> | <u>A</u> |
| <u>AlarmsEnabled</u> | <u>CR</u> | <u>R</u> |
| ^a <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

Note: For first-time reader, it may be more insightful to read the theory of operations first and then the action definitions before reading the state variable definitions.

5.4 Actions

5.4.1 Introduction

The IoT Management and Control device reuses the actions defined in the CMS. Some of the actions which are allowed in CMS are required or conditionally required for IoT Management and Control.

Table 5-5 below lists all the CMS actions, with the following additional information:

- The column “CMS R/A” indicates whether the action is required or allowed in ConfigurationManagement service [16]; all the required actions from the CMS shall be implemented by the device supporting IOT Management and Control.
- The column “IoT Management and Control R/A” indicates whether the action is either required or allowed for the IoT Management and Control DataModel service [14]; some of the allowed actions are required for IoT Management and Control.
- The column “IoT Management and Control CP R/A” indicates whether the IoT Management and Control CP shall support the action to be fully compliant with the IoT Management and Control device specifications.

Refer to ConfigurationManagement service [16] for more detailed information on each action. The remaining subclauses of 5.4 give additional information on some of the actions as used by the IoT Management and Control profile.

Table 5-5 — Actions

| Name | CMS
R/A ^a | IoT Management and
Control
R/A ^b | IoT Management and
Control CP
R/A ^c |
|--|-------------------------|---|--|
| <u>GetSupportedDataModels()</u> | <u>R</u> | <u>R</u> | <u>R</u> |
| <u>GetSupportedParameters()</u> | <u>R</u> | <u>R</u> | <u>R</u> |
| <u>GetInstances()</u> | <u>R</u> | <u>R</u> | <u>R</u> |
| <u>GetValues()</u> | <u>R</u> | <u>R</u> | <u>R</u> |
| <u>GetSelectedValues()</u> | <u>A</u> | <u>A</u> | <u>A</u> |
| <u>SetValues()</u> | <u>A</u> | <u>R</u> | <u>A</u> |
| <u>CreateInstance()</u> | <u>A</u> | <u>CR</u> | <u>A</u> |
| <u>DeleteInstance()</u> | <u>A</u> | <u>CR</u> | <u>A</u> |
| <u>GetAttributes()</u> | <u>R</u> | <u>R</u> | <u>A</u> |
| <u>SetAttributes()</u> | <u>A</u> | <u>A</u> | <u>A</u> |
| <u>GetInconsistentStatus()</u> | <u>A</u> | <u>A</u> | <u>A</u> |
| <u>GetConfigurationUpdate()</u> | <u>R</u> | <u>R</u> | <u>A</u> |
| <u>GetCurrentConfigurationVersion()</u> | <u>R</u> | <u>R</u> | <u>A</u> |
| <u>GetSupportedDataModelsUpdate()</u> | <u>R</u> | <u>R</u> | <u>A</u> |
| <u>GetSupportedParametersUpdate()</u> | <u>R</u> | <u>R</u> | <u>A</u> |
| <u>GetAttributeValuesUpdate()</u> | <u>A</u> | <u>A</u> | <u>A</u> |
| <p>^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u>, <u>A-D</u>).</p> <p>^b For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u>, <u>A-D</u>).</p> <p>^c For a control point this column indicates whether a control point shall be capable of invoking this action, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u>, <u>A-D</u>).</p> | | | |

5.4.2 [GetSupportedDataModels\(\)](#)

The IoT Management and Control implementation shall provide an XML document compliant with the <SupportedDataModels> root element per the CMS namespace (urn:schemas-upnp-org:dm:cms). This element shall contain a <SubTree> child element which describing the IoT Management and Control DataModel as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<cms:SupportedDataModels
  xmlns:cms="urn:schemas-upnp-org:dm:cms"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:schemas-upnp-org:dm:cms
    http://www.upnp.org/schemas/dm/cms.xsd">
  <SubTree>
    <URI>
      urn:upnp-org:smgt:1
    </URI>
    <Location>
      /UPnP/SensorMgt
    </Location>
    <URL>
      http://www.upnp.org/specs/smgt/UPnP-smgt-SensorDataModel-v1-Service.pdf
    </URL>
    <Description>
      ... device vendor descriptive text ...
    </Description>
  </SubTree>
</SupportedDataModels>
```

<?xml>

Required. Case Sensitive

<SupportedDataModels>

Required. Shall include the name space declaration for the CMS XML Schema ("urn:schemas-upnp-org:dm:cms").

<SubTree>

Required. Shall include a <SubTree> element with the following elements:

<URI>

Required. Implementations complying with this specification shall provide the value:

urn:upnp-org:smgt:1

<Location>

Required. Implementations complying with this specification shall provide the value:

/UPnP/SensorMgt

<URL>

Allowed. Implementations may use the following value default value corresponding to the <URI> value (above) or may provide a reference to device vendor supplied specifications:

http://www.upnp.org/specs/smgt/UPnP-smgt-SensorDataModel-v1-Service.pdf

<Description>

Allowed. Implementations may provide descriptive text for their IoT Management and Control implementation or may omit this element.

5.4.3 **GetSelectedValues()**

The **GetSelectedValues()** action is an allowed action for the CMS, and also an allowed action in IoT Management and Control .

5.4.4 **SetValues()**

The **SetValues()** action is an allowed action for the CMS, but from the IoT Management and Control perspective it is a required action and shall be implemented.

This action is required since the IoT Management and Control Device DataModel service supports Parameters with write access. This action allows a IoT Management and Control CP to change the values of such Parameters.

5.4.5 **CreateInstance()**

The **CreateInstance()** action is an allowed action for the CMS, but the IoT Management and Control Device perspective it is a conditionally required action. This action shall be implemented if the IoT Management and Control device supports control point additions and/or deletions to a sensor's SensorGroups and/or SensorPermissions MultilInstance parameter nodes.

5.4.6 **DeleteInstance()**

The **DeleteInstance()** action is an allowed action for the CMS, but the IoT Management and Control perspective it is a conditionally required action. This action shall be implemented if the IoT Management and Control device supports control point additions and/or deletions to a Sensor's SensorGroups and/or SensorPermissions MultilInstance parameter nodes.

5.4.7 **SetAttributes()**

The **SetAttributes()** action is an allowed action for the CMS, and is also an allowed action for IoT Management and Control.

Annex A IoT Management and Control General Data Model (normative)

Table A.1 — IoT Management and Control General Parameters

| Name | Type | Acc | Req | Reference | EOC | Ver |
|--|----------------|-----|-----|-----------|-----|-----|
| /UPnP/SensorMgt/ | SingleInstance | RO | R | A.1.1.1 | | 0 |
| SensorEvents | string | RO | R | A.1.1.2 | 1 | 1 |
| SensorCollectionsNumberOfEntries | int | RO | R | A.1.1.3 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#!/ | MultInstance | RO | R | A.1.1.4 | | 0 |
| CollectionID | string | RO | R | A.1.1.5 | | 0 |
| CollectionType | string | RO | R | A.1.1.6 | | 0 |
| CollectionFriendlyName | string | RW | R | A.1.1.7 | | 0 |
| CollectionInformation | string | RW | R | A.1.1.8 | | 0 |
| CollectionUniqueIdentifier | string | RO | R | A.1.1.9 | | 0 |
| CollectionSpecific/ | SingleInstance | RO | CR | A.1.1.10 | | 0 |
| SensorsNumberOfEntries | int | RO | R | A.1.1.11 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/ | MultInstance | RO | R | A.1.1.12 | | 0 |
| SensorID | string | RO | R | A.1.1.13 | | 0 |
| SensorType | string | RO | R | A.1.1.14 | | 0 |
| SensorUniqueIdentifier | string | RO | A | A.1.1.15 | | 0 |
| SensorUpdateRequest | boolean | RW | A | A.1.1.15 | | 0 |
| SensorPollingInterval | Int | RW | A | A.1.1.16 | | 0 |
| SensorReportChangeOnly | boolean | RW | A | A.1.1.17 | | 0 |
| SensorEventsEnable | string | RW | A | A.1.1.18 | | 0 |
| SensorSpecific/ | SingleInstance | RO | CR | A.1.1.29 | | 0 |
| SensorRelatedNumberOfEntries | Int | RO | CA | A.1.1.19 | | 0 |
| SensorGroupsNumberOfEntries | Int | RO | CA | A.1.1.20 | | 0 |
| SensorDefaultPermissionsNumberOfEntries | Int | RO | CA | A.1.1.21 | | 0 |
| SensorURNsNumberOfEntries | Int | RO | R | A.1.1.30 | | 0 |
| | | | | | | |
| UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorRelated/#!/ | MultInstance | RO | A | A.1.1.22 | | 0 |
| SensorPath | string | RO | R | A.1.1.23 | | 0 |
| | | | | | | |
| UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorGroups/#!/ | MultInstance | RO | CR | A.1.1.24 | | 0 |
| SensorGroup | string | RW | R | A.1.1.25 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorDefaultPermissions/#!/ | MultInstance | RW | CA | A.1.1.26 | | 0 |
| SensorDefaultRole | string | RO | R | A.1.1.27 | | 0 |
| SensorDefaultPermissions | CSV(string) | RO | R | A.1.1.28 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/ | MultInstance | RO | R | A.1.1.31 | | 0 |

| | | | | | | |
|---|----------------|----|----|------------------|--|---|
| SensorURN | string | RO | R | A.1.1.32 | | 0 |
| DataItemsNumberOfEntries | Int | RO | R | A.1.1.33 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#/Sensors/#/SensorURNs/#/DataItems/#/ | MultInstance | RO | R | A.1.1.34 | | 0 |
| Name | string | RO | R | A.1.1.35 | | 0 |
| Type | string | RO | R | A.1.1.36 | | 0 |
| Encoding | string | RO | R | A.1.1.37 | | 0 |
| Description | string | RO | R | A.1.1.38 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorGroupSets/#/ | MultInstance | RW | CR | A.1.1.39 | | 0 |
| GroupSetID | string | RW | R | A.1.1.40 | | 0 |
| GroupSetType | string | RW | R | A.1.1.41 | | 0 |
| GroupSetFriendName | string | RW | R | A.1.1.42 | | 0 |
| GroupSetSpecific/ | SingleInstance | RW | CR | A.1.1.43 | | 0 |
| MembersNumberOfEntries | int | RW | R | A.1.1.44 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorGroupSets/#/Members/#/ | MultInstance | RO | CR | A.1.1.45 | | 0 |
| MemberID (CollectionID or SensorID) | string | RW | R | A.1.1.46 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#/ | MultInstance | RO | R | A.1.1.4 | | 0 |
| ParticipatingGroupSetID | string | RW | CR | A.1.1.47 | | 0 |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#/Sensors/#/ | MultInstance | RO | R | A.1.1.12A.1.1.12 | | 0 |
| ParticipatingGroupSetID | String | RW | CR | A.1.1.47 | | 0 |
| | | | | | | |

A.1 Introduction

This section describes IoT Management and Control Nodes and Parameters which are common to all sensor collections and sensors supported by the host IoT Management and Control device. Individual sensor collections appear as instances of the /UPnP/SensorMgt/SensorCollections/ MultInstance node. Nodes which are sensor collection type specific are listed under the /UPnP/SensorMgt/SensorCollections/#/CollectionSpecific/ node. Each SensorCollection node hosts zero or more Sensors nodes which appear as instances of the /UPnP/SensorMgt/SensorCollections/#/Sensors/ MultInstance node. Nodes which are sensor type specific are listed under the /UPnP/SensorMgt/SensorCollections/#/SensorSpecific/ node for each Sensor instance. Each Sensor supports zero or more Sensor URNs /UPnP/SensorMgt/SensorCollections/#/Sensors/#/SensorURNs/#/SensorURNs which identifies sets required and permitted DataItem(s) generated by each Sensor.

A.1.1 IoT Management and Control General Parameters

A.1.1.1 /UPnP/SensorMgt/

Type: SingleInstance

Description: The required SensorMgt SingleInstance node identifies the root node of the IoT Management and Control DataModel.

A.1.1.2 /UPnP/SensorMgt/SensorEvents**Type:** string

Description: The required SensorEvents parameter shall provide an XML document conforming to the XML Schema UPnP IoT Management and Control DataModel Events [17]. This document shall contain zero or more <sensorEvent> elements where each element occurrence reports a unique event condition as indicated by the event attribute for the SensorCollectionID and SensorID identified by the collectionID and sensorID attributes. This parameter shall remain unchanged for a minimum event moderation period (200mS). If additional events have accumulated a new SensorEvents XML document shall replace the current document after any active event moderation period has expired.

A.1.1.3 /UPnP/SensorMgt/SensorCollectionsNumberOfEntries**Type:** int

Description: The required SensorCollectionsNumberOfEntries parameter shall provide the number of SensorCollections MultInstance node entries.

A.1.1.4 /UPnP/SensorMgt/SensorCollections/**Type:** MultInstance

Description: The required SensorCollections MultInstance node identifies zero or more collections containing sensors and/or actuators supported by this IoT Management and Control device.

A.1.1.5 /UPnP/SensorMgt/SensorCollections/#/CollectionID**Type:** string

Description: The required CollectionID parameter provides a unique identifier for the purpose of issuing SOAP actions or identifying the sensor collection associated with events reported by the TransportGeneric service [12].

A.1.1.6 /UPnP/SensorMgt/SensorCollections/#/CollectionType**Type:** string

Description: The required CollectionType parameter value describes the type of sensor for this SensorCollections node instance. See the subclause 5.2.5, "Sensor Normative Type Identifiers" for required and allowed values for this parameter.

A.1.1.7 /UPnP/SensorMgt/SensorCollections/#/CollectionFriendlyName**Type:** string

Description: The required CollectionFriendlyName parameter provides a string identifying the sensor collection suitable for end-user display. The IoT Management and Control service is allowed to preset this parameter. The IoT Management and Control service shall allow this field to be written provided the requesting control point has sufficient privileges. The IoT Management and Control service should retain previously written values between reboots.

A.1.1.8 /UPnP/SensorMgt/SensorCollections/#/CollectionInformation**Type:** string

Description: The required CollectionInformation parameter provides a string describing the sensor collection suitable for end-user display. The IoT Management and Control service is allowed to preset this parameter. The IoT Management and Control service shall permit this parameter to be written provided the requesting control point has sufficient privileges. The IoT Management and Control service should retain previously written values between reboots.

A.1.1.9 /UPnP/SensorMgt/SensorCollections/#/CollectionUniqueIdentifier**Type:** string

Description: The required CollectionUniqueIdentifier parameter provides a string which uniquely identifies a sensor collection. For devices discoverable on a UPnP network, this value shall match the UDN of the corresponding UPnP Device. See sections describing specific classes of sensor collection(s) for other allowed values.

A.1.1.10 /UPnP/SensorMgt/SensorCollections/#!/CollectionSpecific/

Type: SingleInstance

Description: The conditionally required CollectionSpecific SingleInstance node provides ecosystem specific sensor collection information. The child nodes of the CollectionSpecific node depend on the CollectionType parameter value. See the sections describing specific classes of sensor collection(s) for required and allowed nodes for specific sensor collection types.

A.1.1.11 /UPnP/SensorMgt/SensorCollections/SensorsNumberOfEntries

Type: int

Description: The required SensorsNumberOfEntries parameter shall provide the number of Sensor MultiInstance node entries.

A.1.1.12 /UPnP/SensorMgt/SensorCollections/#!/Sensors/

Type: MultiInstance

Description: The required Sensors MultiInstance node shall describe a zero or more sensor(s) or actuator(s) managed by this service.

A.1.1.13 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorID

Type: string

Description: The required SensorID parameter provides a unique identifier for the purpose of issuing SOAP actions to the sensor. See the A_ARG_TYPE_SensorID in the TransportGeneric service specification [12] for further usage information about this parameter. The IoT Management and Control device is permitted to change assigned SensorID values between service restarts.

A.1.1.14 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorType

Type: string

Description: The required SensorType parameter value describes the type of sensor for this Sensors node instance. See the subclause 5.2.5, "Sensor Normative Type Identifiers" for required and allowed values for this parameter.

A.1.1.15 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorUpdateRequest

Type: boolean

Description: The allowed SensorUpdateRequest parameter when written to ("1") shall cause the IoT Management and Control DataModel service to request an update from the sensor associated with this Sensors instance. When the IoT Management and Control DataModel service completes the update process, it shall reset this parameter to ("0"). See the sections describing specific classes of sensor collection(s) to determine if implementation of this parameter is required.

A.1.1.16 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorPollingInterval

Type: int

Description: The allowed SensorPollingInterval parameter when written to a non-zero value (milliseconds) shall cause IoT Management and Control service to request periodic updates from the sensor associated with this Sensors instance.

A.1.1.17 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorReportChangeOnly

Type: int

Description: This allowed SensorReportChangeOnly parameter when written to a ("1") in addition to a non-zero SensorPollingInterval parameter shall cause the IoT Management and Control service to suppress reporting of identical sensor readings. The setting of this property shall not suppress sensor updates requested by setting the SensorUpdateRequest parameter.

A.1.1.18 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorEventsEnable

Type: string

Description: The required SensorsEventsEnable parameter shall enable reporting of events for the indicated sensor. On read of this parameter a CSV of pairs of supported event names

and a boolean value with ("1") indicating that the corresponding event is to be reported. On write a CSV of an event name and boolean value indicating the new enable/disable setting for a supported named event shall be accepted. Sensor events are reported by the SensorEvents XML document provided by the [/UPnP/SensorMgt/SensorEvents](#) parameter.

The following [SensorEventsEnable](#) names are defined:

Table A.2 — SensorEventEnable parameter allowed values

| SensorEventEnable Name | Description |
|--|--|
| SOAPDataAvailableEnable | Controls reporting of SOAPDataAvailable events indicating sensor data is available for reading by the ReadSensor() action of the SensorTransportGeneric service. |
| SOAPDataOverrunEnable | Controls reporting of SOAPDataOverrun events indicating the sensor has discarded data which was not read by any SOAP client. |
| TransportDataAvailableEnable | Controls reporting of TransportDataAvailable events indicating a sensor with one or more active transport connections has received data. |
| TransportDataOverrunEnable | Controls reporting of TransportDataOverrun events indicating a sensor with one or more active transport connections has discarded received data it was unable to forward to transport clients. |
| TransportConnectionErrorEnable | Controls reporting of TransportConnectionError events indicating a sensor with one or more active transport connections has detected a connection error. |
| SensorAvailabilityEnable | Controls reporting of SensorAvailable and SensorUnavailable events indicating a previously reported sensor has become accessible or inaccessible. |

The following example shows a sample SensorEventsEnable parameter and changing one of the reported event settings:

Request:

```
GetValues(
  "<?xml version='1.0' encoding='UTF-8'?>
  <ContentPathList xmlns='urn:schemas-upnp-org:dm:cms'
    xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
    xsi:schemaLocation='urn:schemas-upnp-org:dm:cms
      http://www.upnp.org/schemas/dm/cms.xsd'>

    <ContentPath>
      /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorEventsEnable
    </ContentPath>
  </ContentPathList>" )
```

Response:

```
GetValues(
  "<?xml version='1.0' encoding='UTF-8'?>
  <ParameterValueList xmlns='urn:schemas-upnp-org:dm:cms'
    xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
    xsi:schemaLocation='urn:schemas-upnp-org:dm:cms
      http://www.upnp.org/schemas/dm/cms.xsd'>

    <Parameter>
      <ParameterPath>
        /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorEventsEnable
      </ParameterPath>
      <Value>
        SOAPDataAvailableEnable,0,SOAPDataOverrunEnable,0,
        TransportDataAvailableEnable,0,TransportDataOverrunEnable,0,
        TransportConnectionErrorEnable,0
      </Value>
    </Parameter>
  </ParameterValueList>" )
```

A SOAP client which requests notification of SensorDataAvailable events updates this parameter as follows:

Request:

```
SetValues(
  "<?xml version='1.0' encoding='UTF-8'?>
  <ParameterValueList xmlns='urn:schemas-upnp-org:dm:cms'
    xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'
    xsi:schemaLocation='urn:schemas-upnp-org:dm:cms
      http://www.upnp.org/schemas/dm/cms.xsd'>

    <Parameter>
      <ParameterPath>
        /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorEventsEnable
      </ParameterPath>
      <Value>
        SOAPDataAvailableEnable,1
      </Value>
    </Parameter>
  </ParameterValueList>" )
```

Response:

```
SetValues(
  "ChangesCommitted")
```

A.1.1.19 /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorEventsEnable

Type: int

Description: The conditionally required *SensorEventsEnable* parameter shall provide the number of *SensorEventsEnable* MultInstance node entries. This parameter shall be implemented if the *SensorEventsEnable* MultInstance node is supported.

A.1.1.20 /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorGroupsNumberOfEntries

Type: int

Description: The conditionally required *SensorGroupsOfEntries* parameter shall provide the number of *SensorGroups* MultInstance node entries. This parameter shall be implemented if the *SensorGroups* MultInstance node is supported.

A.1.1.21 /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorDefaultPermissionsNumberOfEntries

Type: int

Description: The conditionally required *SensorPermissionNumberOfEntries* parameter shall provide the number of *SensorPermissions* MultInstance node entries. . This parameter shall be implemented if the *SensorDefaultPermissions* MultInstance node is supported

A.1.1.22 /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorsRelated/

Type: MultInstance

Description: The allowed *SensorsRelated* MultInstance node includes zero or more *SensorPath* parameter nodes identifying other sensors which have an operational relationship to this sensor. Note: This differs from the *SensorGroups* node where sensors are grouped for classification and device protection.

A.1.1.23 /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorsRelated/1/SensorPath

Type: string

Description: The required *SensorPath* parameter provides a relative path to a sensor operationally related to this sensor. This path shall start at the *SensorCollections* MultInstance node and shall end at the *Sensors/1* instance node identifying the sensor being referenced.

A.1.1.24 /UPnP/SensorMgt/SensorCollections/1/Sensors/1/SensorGroups/

Type: MultInstance

Description: The conditionally required *SensorGroups* MultInstance node includes zero or more *SensorGroup* parameter nodes identifying SensorGroup(s) this sensor is participating in.

The **SensorGroups** MultilInstance node shall be implemented when the DeviceProtection feature is supported.

Note: See IoT Management and Control Architecture Overview [10], subclause 4.1.9 "Sensor Protection Model" for further details on usage of SensorGroup(s) for DeviceProtection.

A.1.1.25 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorGroups/#!/SensorGroup

Type: string

Description: The required **SensorGroup** parameter identifies an individual SensorGroup the corresponding Sensor is participating in. An instance of the **SensorGroup** node shall be included for each sensor group the sensor is a member of.

A.1.1.26 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorDefaultPermissions/

Type: MultilInstance

Description: The conditionally allowed **SensorPermissions** MultilInstance node lists sensor permissions for default DeviceProtection roles. This node may be implemented if the IoT Management and Control device provides DeviceProtection support and is otherwise prohibited.

A.1.1.27 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorPermissions/#!/SensorDefaultRole

Type: string

Description: The required **SensorDefaultRole** parameter identifies a default DeviceProtection role. The allowed values for this parameter are the default DeviceProtection roles: "**Public**" or "**Basic**".

A.1.1.28 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorPermissions/#!/SensorDefaultPermissions

Type: CSV(string)

Description: The required **SensorDefaultPermissions** parameter lists SensorPermissions assigned to the corresponding default DeviceProtection role identified by the **SensorDefaultRole** parameter. This parameter shall be supported if the IoT Management and Control device provides DeviceProtection support. The following allowed values are defined.

Table A.3 — Sensor Permissions

| Permission | Description |
|---------------------------|---|
| smgt:ReadSensor | A control point is permitted to issue ReadSensor() actions to the corresponding Sensor. |
| smgt:WriteSensor | A control point is permitted to issue WriteSensor() actions to the corresponding Sensor. |
| smgt:ConnectSensor | A control point is permitted to issue ConnectSensor() and DisconnectSensor() actions to the corresponding Sensor. |
| smgt:CommandSensor | A control point is permitted to modify IoT Management and Control properties in the DataModel. |
| smgt:ViewSensor | A control point is permitted to view IoT Management and Control properties for this Sensor. |

A.1.1.29 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorSpecific/

Type: SingleInstance

Description: The required **SensorSpecific** SingleInstance node provides ecosystem specific Sensor information. The allowed and required children of this node depend on the specific type of sensor as indicated by the **SensorType** parameter. Values prefixed by "smgt:" are defined within this specification. See the sections describing specific classes of sensor collection(s) for required and allowed nodes for specific sensor types.

A.1.1.30 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorsURNsNumberOfEntries

Type: int

Description: The required [SensorURNsNumberOfEntries](#) parameter shall provide the number of [SensorURNs](#) MultilInstance node entries.

A.1.1.31 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/

Type: MultilInstance

Description: The required [SensorURNs](#) MultilInstance node lists URN values for sets of DatalItem(s) this sensor provides (or actuator accepts).

A.1.1.32 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/SensorURN

Type: string

Description: The required [SensorURN](#) parameter node identifies the URN value for each set of sensor DatalItem(s). See the sections describing specific classes of sensor collection(s) for required and allowed URN values for sensor types.

A.1.1.33 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/DatalItemsNumberOfEntries

Type: int

Description: The required [DatalItemsNumberOfEntries](#) parameter shall provide the number of [DatalItems](#) MultilInstance node entries.

A.1.1.34 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/DatalItems/

Type: MultilInstance

Description: The required [DatalItems](#) MultilInstance node identifies sets of DatalItem(s) supported for the corresponding [SensorURN](#) parameter value.

A.1.1.35 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/DatalItems/#!/Name

Type: MultilInstance

Description: The required [Name](#) parameter identifies the name of an individual DatalItem. See IoT Management and Control Architecture Overview [10] subclause 4.3, "DatalItem semantics" for further information.

A.1.1.36 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/DatalItems/#!/Type

Type: MultilInstance

Description: The required [Type](#) parameter identifies the type of an individual DatalItem described by the corresponding [SensorURN](#) parameter value. See IoT Management and Control Architecture Overview [10] subclause 4.3, "DatalItem semantics" for further information.

A.1.1.37 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/DatalItems/#!/Encoding

Type: MultilInstance

Description: The required [Encoding](#) parameter identifies the encoding of an individual [DatalItem](#) described by the corresponding [SensorURN](#) parameter value. See IoT Management and Control Architecture Overview [10] subclause 4.3, "DatalItem semantics" for further information.

A.1.1.38 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/DatalItems/#!/Description

Type: MultilInstance

Description: The required [Description](#) parameter shall provide a string containing an XML document which describes the named DatalItem or an empty string if no DatalItem Description document is available. This XML document shall comply with the DatalItem Description

schema. See IoT Management and Control Architecture Overview [10] subclause 4.3, "DataItem semantics" for further information.

A.1.1.39 /UPnP/SensorMgt/SensorGroupSets/

Type: MultiInstance

Description: The conditionally required [SensorGroupSets](#) MultiInstance node identifies zero or more [SensorGroupSets](#) definition. As [SensorGroupSet](#) can be made by ControlPoint after initial setting, this node and all the parameters under this node are writable. [SensorGroupSet](#) can contain any combination of [SensorCollections](#) or [Sensors](#).

A.1.1.40 /UPnP/SensorMgt/SensorGroupSets/#/GroupSetID

Type: string

Description: The required [GroupSetID](#) parameter provides a unique identifier for the purpose of accessing this [SensorGroupSet](#).

A.1.1.41 /UPnP/SensorMgt/SensorGroupSets/#/GroupSetType

Type: string

Description: The required [GroupSetType](#) parameter value describes the type of [SensorGroupSet](#). [GroupSetType](#) identifier is [sgmt-gst](#).

Table A.4 — GroupSetType values

| GroupSetType value | Description |
|--|--|
| sgmt-gst:access-control | GroupSet intended to define access control of this group members. The SensorPermissions MultiInstance node (see description in A.1.1.26) for this group will be placed under GroupSetSpecific Instance node. |
| sgmt-gst:control-group | GroupSet intended to define a control group in which members will be controlled as a single entity.
No GroupSetSpecific instance is required if all members have the same control scheme defined in the SensorURNs .
If it is desired to limit only a few SensorURNs for control, they will be listed under GroupSetSpecific instance. A SensorURNsNumberOfEntries parameter must be included indicating the number of SensorURNs listed. Then, a MultiInstance node SensorURNs with all SensorURN parameters is included.
If no GroupSetSpecific instance is defined, the common set of SensorURNs defined between the members will be used for control. |
| sgmt-gst:group-represent | GroupSet intended to define representing sensor that will represent other sensor members where similar sensors are located together. SensorID of that representing sensor will be described under GroupSetSpecific Instance. |

A.1.1.42 /UPnP/SensorMgt/SensorGroupSets/#/GroupSetFriendlyName

Type: string

Description: The required [GroupSetFriendlyName](#) parameter provides a string identifying the [SensorGroupSet](#) name suitable for end-user display.

A.1.1.43 /UPnP/SensorMgt/SensorGroupSets/#/GroupSetSpecific/

Type: SingleInstance

Description: The conditionally required [GroupSetSpecific](#) SingleInstance node provides ecosystem specific [SensorGroupSet](#) information. The child nodes of the [GroupSetSpecific](#) node depend on the [GroupSetType](#) parameter value.

A.1.1.44 /UPnP/SensorMgt/SensorGroupSets/#/MembersNumberOfEntries

Type: int

Description: The required [MembersNumberOfEntries](#) parameter shall provide the number of [Member](#) MultiInstance node entries.

A.1.1.45 /UPnP/SensorMgt/SensorGroupSets/#!/Members/#!/**Type:** MultiInstance

Description: The required *Members* MultiInstance node identifies zero or more members of this *SensorGroupSet*. As *SensorGroupSet* can contain any combination of SensorCollection or Sensor, member can be SensorCollection or Sensor or both.

A.1.1.46 /UPnP/SensorMgt/SensorGroupSets/#!/MemberID**Type:** string

Description: The required *MemberID* parameter provides a referencing identifier of this member. *CollectionID* or *SensorID* of the member is used here.

A.1.1.47 UPnP/SensorMgt/SensorCollections/#!/ ParticipatingGroupSetID, UPnP/SensorMgt/SensorCollections/#!/ Sensors/#ParticipatingGroupSetID**Type:** string

Description: The required *ParticipatingGroupSetID* parameter under *SensorCollection* or *Sensor* provides a referencing identifier to the participating *SensorGroupSet*.

A.2 Script Settings

Predefined settings for a group of sensors are allowed by the use of the Data Model tree namely *ScriptSettings*. Using *Settings* parameters it is possible to predefined *DataRecords* to be applied to a group of sensors. For example, it is possible to predefined lighting settings for movies in your living-room.

Table A.5 — ScriptSettings Parameters for predefined Settings

| Name | Type | Acc | Req | Reference | EOC | Ver |
|---|----------------|-----|-----|-----------|-----|-----|
| | | | | A.1.1.29 | | |
| /UPnP/ScriptSettings/ | SingleInstance | RO | A | | | 0 |
| SettingsNumberOfEntries | int | RO | R | | | 0 |
| | | | | | | |
| /UPnP/ScriptSettings/Permissions/#!/ | MultiInstance | RO | CA | | | |
| DefaultRole | string | RO | R | | | |
| SettingsDefaultPermissions | CSV (string) | RO | R | | | |
| ScriptsDefaultPermissions | CSV (string) | RO | R | | | |
| | | | | | | |
| /UPnP/ScriptSettings/Settings/#!/ | MultiInstance | RW | CR | | | 0 |
| SettingID | string | RW | R | | | |
| SettingDescription | string | RW | R | | | |
| ConfigsNumberOfEntries | int | RW | R | | | |
| | | | | | | |
| /UPnP/ScriptSettings/Settings/#!/Configs/#!/ | MultiInstance | RW | R | | | 0 |
| DeviceID | string | RW | R | | | |
| SensorURN | string | RW | R | | | 0 |
| DataRecords | string | RW | R | | | 0 |
| SettingPermissionsNumberOfEntries | int | RW | A | | | |
| | | | | | | |
| /UPnP/ScriptSettings/Settings/#!/SettingPermissions/#!/ | MultiInstance | RW | CA | | | |

| | | | | | | |
|---------------------------|--------------|----|---|--|--|--|
| SettingDefaultRole | string | RW | R | | | |
| SettingDefaultPermissions | CSV (string) | RW | R | | | |
| | | | | | | |

A.2.1 ScriptSettings General Parameters

A.2.1.1 /UPnP/ScriptSettings/

Type: SingleInstance

Description: The conditionally required ScriptSettings SingleInstance node shall be included for pre-defined Settings support.

A.2.1.2 /UPnP/ScriptSettings/SettingsNumberOfEntries

Type: int

Description: The conditionally required SettingsNumberOfEntries indicates the number of Settings available for this SensorManagement device.

A.2.1.3 /UPnP/ScriptSettings/SettingsScriptsPermissions

Type: MultiInstance

Description: The conditionally allowed SettingsScriptsPermissions MultiInstance node lists permissions for the addition of Settings and Scripts for default DeviceProtection roles. This node may be implemented if the SensorManagement device provides DeviceProtection support and is otherwise prohibited.

A.2.1.4 /UPnP/ScriptSettings/SettingsScriptsPermissions/#/DefaultRole

Type: string

Description: The required DefaultRole parameter identifies a default DeviceProtection role. The allowed values for this parameter are the default DeviceProtection roles: "Public" or "Basic". The default role "Admin" does not need to be listed and has permission to all operations.

A.2.1.5 /UPnP/ScriptSettings/SettingsScriptsPermissions/#/SettingsDefaultPermissions

Type: CSV (string)

Description: The required SettingsDefaultPermissions parameter lists SettingsScriptsPermissions assigned to the corresponding default DeviceProtection role identified by the DefaultRole parameter for Settings. This parameter shall be supported if the SensorManagement device provides DeviceProtection support. The allowed values are defined in Table A.6.

Table A.6 — Default permission settings

| Permission | Description |
|---------------------------------|---|
| <u>sset:CreateSetting</u> | A control point is permitted to create a node in the <u>Settings</u> multiinstance node in the DataModel. |
| <u>sset:ChangeAnySetting</u> | A control point is permitted to change any parameter values of any node in the <u>Settings</u> multiinstance node in the DataModel. |
| <u>sset>DeleteAnySetting</u> | A control point is permitted to remove any node in the <u>Settings</u> multiinstance node in the DataModel. |
| <u>sset:ViewAnySettings</u> | A control point is permitted to view properties and parameter of any node in the <u>Settings</u> multiinstance node in the DataModel. |

A.2.1.6 /UPnP/ScriptSettings/SettingsScriptsPermissions/#!/ScriptsDefaultPermissions**Type:** CSV (string)

Description: The required ScriptsDefaultPermissions parameter lists SettingsScriptsPermissions assigned to the corresponding default DeviceProtection role identified by the DefaultRole parameter for Scripts. This parameter shall be supported if the SensorManagement device provides DeviceProtection support. The allowed values are defined in Table A.7.

Table A.7 — Default script permission settings

| Permission | Description |
|--------------------------------|--|
| <u>sset:CreateScript</u> | A control point is permitted to create a node in the <u>Scripts</u> multiinstance node in the DataModel. |
| <u>sset:ChangeAnyScript</u> | A control point is permitted to change any parameter values of any node in the <u>Scripts</u> multiinstance node in the DataModel. |
| <u>sset>DeleteAnyScript</u> | A control point is permitted to remove any node in the <u>Scripts</u> multiinstance node in the DataModel. |
| <u>sset:ViewAnyScripts</u> | A control point is permitted to view any properties and parameter of any node in the <u>Scripts</u> multiinstance node in the DataModel. |

A.2.1.7 /UPnP/ScriptSettings/Settings/**Type:** MultiInstance

Description: The conditionally required Settings MultiInstance node identifies zero or more pre-defined settings for the IoT Management and Control Device.

A.2.1.8 /UPnP/ScriptSettings/Settings/#!/SettingID**Type:** string

Description: The conditionally required SettingID parameter provides a unique identifier for the purpose of applying this Setting based on a Script.

A.2.1.9 /UPnP/ScriptSettings/Settings/#!/SettingDescription**Type:** string

Description: The conditionally required SettingDescription provides a user-friendly description about this pre-defined Setting.

A.2.1.10 /UPnP/ScriptSettings/Settings/#!/ConfigsNumberOfEntries**Type:** string

Description: The conditionally required ConfigsNumberOfEntries parameter shall provide the number of Configs MultiInstance nodes.

A.2.1.11 /UPnP/ScriptSettings/Settings/#!/Configs/#!/**Type:** MultiInstance

Description: The conditionally required Configs MultiInstance node identifies one or more set of configuration parameters that are used in the Setting.

A.2.1.12 /UPnP/ScriptSettings/Settings/#!/Configs/#!/DeviceID**Type:** string

Description: The conditionally required DeviceID parameter identifies which SensorID or GroupSetID the following DataRecords must be applied.

A.2.1.13 /UPnP/ScriptSettings/Settings/#!/Configs/#!/SensorURN**Type:** string**Description:** The conditionally required SensorURN parameter identifies which SensorURN of the SensorID or GroupSetID the following DataRecords must be applied.**A.2.1.14 /UPnP/ScriptSettings/Settings/#!/Configs/#!/DataRecords****Type:** string**Description:** The conditionally required DataRecords parameter have the DataRecords XML to be applied on the desired SensorID or GroupSetID (See Section 5.4.5 of IoT Management and Control TransportGeneric Service).**A.2.1.15 /UPnP/ScriptSettings/Settings/#!/SettingPermissionsNumberOfEntries****Type:** int**Description:** The allowed SettingPermissionsNumberOfEntries indicates the number of SettingPermissions available for this Setting. This parameter shall be implemented if the SettingPermissions MultilInstance node is supported**A.2.1.16 /UPnP/ScriptSettings/Settings/#!/SettingPermissions/#!/****Type:** MultilInstance**Description:** The conditionally allowed SettingPermissions MultilInstance node lists permissions for changing the Setting for default DeviceProtection roles. This node may be implemented if the SensorManagement device provides DeviceProtection support and is otherwise prohibited.**A.2.1.17 /UPnP/ScriptSettings/Settings/#!/SettingPermissions/#!/SettingDefaultRole****Type:** string**Description:** The required SettingDefaultRole parameter identifies a default DeviceProtection role. The allowed values for this parameter are the default DeviceProtection roles: "Public" or "Basic". The default role "Admin" does not need to be listed and has permission to all operations.**A.2.1.18 /UPnP/ScriptSettings/Settings/#!/SettingPermissions/#!/SettingDefaultPermissions****Type:** CSV (string)**Description:** The required SettingDefaultPermissions parameter lists permissions assigned to the corresponding default DeviceProtection role identified by the SettingDefaultRole parameter for the Setting. This parameter shall be supported if the SensorManagement device provides DeviceProtection support. The allowed values are defined in Table A.8.**Table A.8 — Default permissions settings**

| Permission | Description |
|------------------------------|---|
| <u>sset:ChangeSetting</u> | A control point is permitted to change any parameter values of the parent <u>Setting</u> node in the DataModel. |
| <u>sset>DeleteSetting</u> | A control point is permitted to remove the parent <u>Setting</u> node in the DataModel. |
| <u>sset:ViewSetting</u> | A control point is permitted to view properties and parameter of the parent <u>Setting</u> node in the DataModel. If a node is allowed to <u>sset:ChangeSetting</u> and <u>sset>DeleteSetting</u> it is automatically allowed to <u>sset:ViewSetting</u> . |

A.3 Scripts

Scripts are used to apply Settings based on predefined Conditions. For example, it is possible to create a Script that turn off all lights of the living room after a presence Sensor indicates that nobody is there. The parameters to achieve this functionality are defined in Table A.9.

Table A.9 —ScriptSettings Parameters for Scripts

| Name | Type | Acc | Req | Reference | EOC | Ver |
|---|----------------|-----|-----|-----------|-----|-----|
| | | | | A.1.1.29 | | |
| /UPnP/ScriptSettings/ | SingleInstance | RO | A | | | 0 |
| SettingsNumberOfEntries | int | RO | R | | | 0 |
| ScriptsNumberOfEntries | int | RO | R | | | |
| | | | | | | |
| /UPnP/ScriptSettings/Scripts/#!/ | MultilInstance | RW | CR | | | 0 |
| ScriptID | string | RW | R | | | |
| ScriptDescription | string | RW | R | | | |
| ScriptAttributes | CSV(string) | RW | R | | | |
| ScriptStatus | string | RW | R | | | |
| Condition | string | RW | R | | | 0 |
| Then | CSV(string) | RW | CR | | | |
| ScriptPermissionsNumberOfEntries | int | RW | A | | | |
| | | | | | | |
| /UPnP/ScriptSettings/Scripts/#!/ScriptPermissions/#!/ | MultilInstance | RW | CA | | | |
| ScriptDefaultRole | string | RW | R | | | |
| ScriptDefaultPermissions | CSV(string) | RW | R | | | |
| | | | | | | |

A.3.1 ScriptSettings General Parameters for Scripts

A.3.1.1 /UPnP/ScriptSettings/ScriptsNumberOfEntries

Type: int

Description: The conditionally required ScriptsNumberOfEntries indicates the number of Scripts available for this SensorManagement device.

A.3.1.2 /UPnP/ScriptSettings/Scripts/

Type: MultilInstance

Description: The conditionally required Scripts MultilInstance node identifies zero or more set of scripts available for this SensorManagement device.

A.3.1.3 /UPnP/ScriptSettings/Scripts/#!/ScriptID

Type: string

Description: The conditionally required ScriptID parameter provides a unique identifier for the SensorManagement device.

A.3.1.4 /UPnP/ScriptSettings/Scripts/#!/ScriptDescription

Type: string

Description: The conditionally required ScriptDescription parameter provides a user-friendly description of this script.

A.3.1.5 /UPnP/ScriptSettings/Scripts/#!/ScriptAttributes**Type:** CSV (string)

Description: The conditionally required *ScriptAttributes* parameter provides a list of zero or more attributes that must be applied to the script. If no attribute is necessary for the *Script*, this parameter must be empty. The attributes that are supported are defined in Table A.10.

Table A.10 — Script Attributes

| Script Attribute | Description |
|-------------------|--|
| delay | Indicates that the “Then” will fire after a specified delay if “Condition” is still true |
| repeats | Indicates the number of times “Then” must be applied if “Condition” is still true. The keyword “infinite” can be used. |
| sched-start | Indicates that “Then” can only be activated after sched-start if “Condition” is still true |
| date-time-range | Indicates that “Then” can only be activated into this range if “Condition” is still true |
| date-time-expires | Indicates that the “Script” must be deactivated after date-time-expires |
| delay-expires | Indicates that the “Script” must be deactivated after delay-expires |
| periodic | Indicates a periodic time to keep executing the “Script”. |
| moderation-time | Indicates a “pause” period to execute the “Script” again |

The syntax is formally defined using EBNF. The syntax is described as follow:

```

delay                ::= duration
delay-expires        ::= duration
moderation-time      ::= duration
periodic             :: duration
date-time-expires    ::= date-time
sched-start          ::= date-time | day-of-yr-time | named-day-time | T-labeled-time
| 'NOW'
date-time-range      ::= date-time '/' date-time
duration             ::= 'P' [n 'D'] time

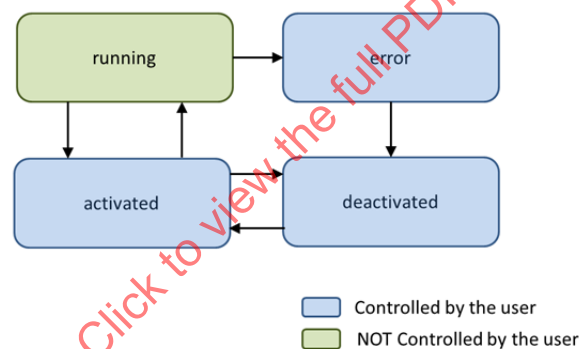
date-time            ::= yyyy '-' mm '-' dd T-labeled-time
day-of-yr-time       ::= mm '-' dd T-labeled-time
named-day-time       ::= named-day T-labeled-time
T-labeled-time       ::= 'T' time [zone]
time                 ::= HH ':' MM ':' SS
zone                 ::= 'Z' | (('+' | '-') HH ':' MM)
month-day            ::= mm '-' dd
named-day            ::= 'MON' | 'TUE' | 'WED' | 'THU' | 'FRI' | 'SAT' | 'SUN' | 'MON-FRI' | 'MON-SAT'
n                    ::= 1 * DIGIT (* non-negative integer *)
yyyy                 ::= 4 DIGIT (* 0001-9999 *)
mm                   ::= 2 DIGIT (* 01-12 *)
dd                   ::= 2 DIGIT (* 01-28, 01-29, 01-30, 01-31 based on month/year *)
HH                   ::= 2 DIGIT (* 00-23 *)
MM                   ::= 2 DIGIT (* 00-59 *)
SS                   ::= 2 DIGIT (* 00-59 *)

```

A.3.1.6 /UPnP/ScriptSettings/Scripts/#/ScriptStatus**Type:** string**Description:** The conditionally required *ScriptStatus* parameter provides the current status of the Script. The values that are supported are listed in Table A.11.**Table A.11 — Script Status values**

| Script Status | Description |
|---------------|--|
| activated | Indicates that the Script is activated, which means that Conditions will be evaluated. |
| deactivated | Indicates that the Script is deactivated, which means that Conditions will NOT be evaluated. |
| running | Indicates that the Script is activated and is evaluating the conditions OR applying the Settings. This ScriptStatus can NOT be changed by the user (or control point). |
| error | Indicates that the last time the script was executed an error occurred, and the script must be reviewed. |

The *ScriptStatus* *activated*, *deactivated* or *error* are controlled by the user (or control point). The *ScriptStatus* *running* are not controlled by the user (or control point), therefore, it is necessary to wait for its conclusion. The behavior of these *ScriptStatus* are illustrated in the state machine described in **Figure A.1**.

**Figure A.1 — Script status state machine****A.3.1.7 /UPnP/ScriptSettings/Scripts/#/Condition****Type:** string**Description:** The conditionally required *Condition* parameter must follow a specific syntax, as described in Section A.1.3, “Condition EBNF”.**A.3.1.8 /UPnP/ScriptSettings/Scripts/#/Then****Type:** CSV (string)**Description:** The conditionally required *Then* parameter lists one or more *Settings* to be applied. *Settings* must be applied in the order that they are listed. *Settings* must be referenced by its *SettingsID*.If the attribute *repeats* is not defined in the *ScriptAttributes* parameter, the script must be executed just one (1) time and go back to *deactivated* status.**A.3.1.9 /UPnP/ScriptSettings/Scripts/#/ScriptPermissionsNumberOfEntries****Type:** int

Description: The allowed ScriptPermissionsNumberOfEntries indicates the number of ScriptPermissions available for this Script. This parameter shall be implemented if the ScriptPermissions MultilInstance node is supported.

A.3.1.10 /UPnP/ScriptSettings/Scripts/#!/ScriptPermissions

Type: MultilInstance

Description: The conditionally allowed ScriptPermissions MultilInstance node lists permissions for changing the parent Script for default DeviceProtection roles. This node may be implemented if the SensorManagement device provides DeviceProtection support and is otherwise prohibited.

A.3.1.11 /UPnP/ScriptSettings/Scripts/#!/ScriptPermissions/#!/ScriptDefaultRole

Type: string

Description: The required ScriptDefaultRole parameter identifies a default DeviceProtection role. The allowed values for this parameter are the default DeviceProtection roles: "Public" or "Basic". The default role "Admin" does not need to be listed and has permission to all operations

A.3.1.12 /UPnP/ScriptSettings/Scripts/#!/ScriptPermissions/#!/ScriptDefaultPermissions

Type: CSV (string)

Description: The required ScriptDefaultPermissions parameter lists permissions assigned to the corresponding default DeviceProtection role identified by the ScriptDefaultRole parameter for the Script. This parameter shall be supported if the SensorManagement device provides DeviceProtection support. The allowed values are defined in Table A.12.

Table A.12 — Script default permissions

| Permission | Description |
|-----------------------------|---|
| <u>sset:ChangeScript</u> | A control point is permitted to change any parameter values of the parent <u>Script</u> node in the DataModel. |
| <u>sset>DeleteScript</u> | A control point is permitted to remove the parent <u>Script</u> node in the DataModel. |
| <u>sset:ViewScript</u> | A control point is permitted to view properties and parameter of the parent <u>Script</u> node in the DataModel. If a node is allowed to <u>sset:ChangeScript</u> and <u>sset>DeleteScript</u> it is automatically allowed to <u>sset:ViewScript</u> . |

A.3.2 Condition EBNF

The Condition parameter string syntax is described here formally using EBNF as described in Section 4.3.1, "Extended Backus-Naur Form". A SensorManagement Data Model service implementation MUST support the entire syntax as described below

```

condCrit      ::= condExp|true
condExp       ::= relExp|eventExp|
                 condExp wChar+ logOp wChar+ condExp |
                 '(' wChar* condExp wChar* ')'
logOp         ::= 'and' | 'or'
eventExp      ::= (* event property as defined in Section A.1.5 *)
relExp        ::= property wChar+ binOp wChar+ quotedVal |
                 property wChar+ existsOp wChar+ boolVal
binOp         ::= relOp|stringOp
relOp         ::= '=' | '!=' | '<' | '<=' | '>' | '>='
stringOp      ::= 'contains' | 'doesNotContain' | 'derivedfrom' |
                 'startsWith' | 'derivedFrom'
existsOp      ::= 'exists'

```

```

boolVal          ::= 'true' | 'false'
quotedVal        ::= dQuote escapedQuote dQuote
wChar            ::= space | hTab | lineFeed | vTab | formFeed | return
property         ::= (* script property name as defined in Section A.1.4 *)
escapedQuote     ::= (* double-quote escaped string as defined in
                        Section TBD *)
hTab             ::= (* UTF-8 code 0x09, horizontal tab character *)
lineFeed         ::= (* UTF-8 code 0x0A, line feed character *)
vTab             ::= (* UTF-8 code 0x0B, vertical tab character *)
formFeed         ::= (* UTF-8 code 0x0C, form feed character *)
return          ::= (* UTF-8 code 0x0D, carriage return character *)
space            ::= ' '
                  (* UTF-8 code 0x20, space character *)
dQuote           ::= '"'
                  (* UTF-8 code 0x22, double quote character *)
asterisk         ::= '*'
                  (* UTF-8 code 0x2A, asterisk character *)

```

A.3.2.1 Condition Examples

- 1) The Condition is true if the Sensor with SensorID "Sensor01" contains in its type the string "refrigerator" and if any of its DataItems with the Name "Temperature" has the value of 30.
 - smgt-st:Sensor01@SensorType contains "refrigerator" and smgt-st:Sensor01@SensorURNs/#!/DataItems/#!/Temperature/Value = "30"
- 2) The Condition is true when the event SensorAdded is fired and any Sensor contains in its type the string "refrigerator".
 - smgt-evt:SensorAdded and smgt-st:*@SensorType contains "refrigerator"

A.3.3 Script Properties

A Script property represents a Data Model parameter. These properties are used to check values for Conditions into a Script.

A property has the following general template:

- Property ::= [property-identifier]:[identifier-value]@[DataPath-from-BaseNode]

The [property-identifier] shall use the values defined in Table A.13.

Table A.13 — Property-identifier values for Scripts

| Property Name | [property-identifier] | Base Node |
|-------------------|-----------------------|--|
| Sensor Management | <u>smgt</u> | <u>/UPnP/SensorMgt/</u> |
| Sensor Collection | <u>smgt-sct</u> | /UPnP/SensorMgt/SensorCollections/#!/ |
| Sensor | <u>smgt-st</u> | /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/ |
| Sensor URN | <u>smgt-surn</u> | /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/ |
| Sensor Script | <u>sset-scrpt</u> | /UPnP/ScriptSettings/Scripts/#!/ |

If the property-identifier is *smgt*, the following template must be used:

- Property ::= smgt:[DataPath-from-BaseNode]

DataPath is the path from the *Base Node* to a parameter *Node* which might include the wild-chars # instead of table *Instances* numbers, however these can never be mixed within the same path.

Examples of *DataPaths* for *smgt* are:

- SensorCollections/#/CollectionID
 - Can be used to access all values of CollectionID
- SensorCollections/1/CollectionID
 - Can be used to access the value of CollectionID of *Instance* number 1.
- SensorCollections/2/
 - Can be used to check if the *Instance* number 2 exists.

The [identifier-value] is used to simplify the access for a specific parameter *Node* based on the *DataPath* and an identification (ID) parameter. For example, a Property can access nodes from a specific Collection based on its CollectionID value, or access a specific Sensor based on its SensorID value. The [identifier-value] for each [property-identifier] shall use the parameter values described in Table A.14.

Table A.14 — property-identifier values for collections.

| Property Name | [property-identifier] | [identifier-value] |
|-------------------|-----------------------|--------------------|
| Sensor Collection | <i>smgt-sct</i> | CollectionID value |
| Sensor | <i>smgt-st</i> | SensorID value |
| Sensor URN | <i>smgt-surn</i> | SensorURN value |
| Sensor Script | <i>sset-scr</i> | ScriptID value |

The [identifier-value] might include the wild-chars '*'.

Therefore, for each property-identifier the Property template is the following:

- smgt-sct:[CollectionID]@ [DataPath-from-BaseNode]
- smgt-st:[SensorID]@ [DataPath-from-BaseNode]
- smgt-surn:[SensorURN]@ [DataPath-from-BaseNode]
- sset-scr:[ScriptID]@ScriptStatus
 - The sset-scr property-identifier must only access the ScriptStatus parameter.

The value of a *DataItem* can be accessed through two methods by the use of a virtual parameter namely *Value*.

The first method is based on the *DataItem Name* and wild-chars #, as the following template:

- smgt-surn:[SensorURN] @DataItems/#/[Name]/Value
- smgt-st:[SensorID]@SensorURNs/#/DataItems/#/[Name]/Value
- smgt-sct: [CollectionID]@Sensors/#/SensorURNs/#/DataItems/#/[Name]/Value
- smgt:SensorCollections/#/Sensors/#/SensorURNs/#/DataItems/#/[Name]/Value

Where [Name] is the name of the *DataItem Name*.

Dataltem Values can be also accessed based on the *Dataltem Instance*, as the following template:

- smgt-surn:[SensorURN] @DataItems/1.../Value
- smgt-st:[SensorID]@SensorURNs/1.../DataItems/1.../Value
- smgt-sct: [CollectionID]@Sensors/1.../SensorURNs/1.../DataItems/1.../Value
- smgt:SensorCollections/1.../Sensors/1.../SensorURNs/1.../DataItems/1.../Value

A.3.3.1 Property Examples

Here are presented a list of property examples:

- *smgt-sct:Collection01@CollectionType*
 - Points to the *CollectionType* of *Collection01*
- *smgt-sct:Collection01@Sensors/#/SensorID*
 - It is the Set of *SensorIDs* into *Collection01*
- *smgt-sct:Collection*@Sensors/1/SensorID*
 - It is the Set of *SensorIDs* of first instances of all *Collections* starting with “Collection”
- *smgt-sct:Collection01@Sensors/1/SensorID*
 - Points to the *SensorID* value of the first instance of *Collection01*
- *smgt-st:Sensor01@SensorType*
 - Points to the *SensorType* value of *Sensor01*
- *smgt-st:Sensor01@SensorGroups/#/SensorGroup*
 - It is the Set of *SensorGroups* of *Sensor01*
- *smgt-st:Sensor*@SensorGroups/#/SensorGroup*
 - It is the Set of *SensorGroups* of all *Sensors* with *SensorID* starting with “Sensor”
- *smgt-st:Sensor01@SensorURNs/#/DataItems/#/Name*
 - It is the Set of *Names* of all *Dataltems* of *Sensor01*.
- *smgt-st:Sensor01@SensorURNs/1/DataItems/1/ Value*
 - It is the *Value* of the first *Dataltem* Instance of the first *SensorURN* Instance
- *smgt-surn:urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedController:LightsCorp:rf217acrs:control@DataItems/#/Name*
 - It is the *Name* of all *Dataltems* of *SensorURN*.
- *smgt-surn:urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedController:LightsCorp:rf217acrs:control@DataItems/1/ Value*
 - It is the Set of *Values* of the first *Dataltem* Instance of all *SensorURNs*
- *sset-scrpt:Script01@ScriptStatus*
 - Points to the *ScriptStatus* value of *Script01*.
- *smgt:SensorCollections/1/Sensors/1/SensorID*
 - Points to the *SensorID* value of the first *Sensor* Instance of the first *SensorCollection* Instance.
- *smgt:SensorCollections/#/Sensors/#/SensorID*
 - Points to all *SensorID* values of the *SensorManagement* Device.

A.3.4 Events Properties

Events properties checks if an event has happened. The use into the Condition EBNF indicates that the Condition depends of one of Sensor Management Events (see Section 5.2.7 of SensorManagement Data Model Service []) to be fired.

The Event Property shall use the following template:

- smgt-evt:[event-name]

Where [event-name] is the name of the Event as defined in table 5.3 of SensorManagement Data Model Service.

A.3.5 Examples

In this section are presented examples of how to use [SensorGroupSets](#), [Settings](#) and [Scripts](#). For all examples, the sample [SensorCollection](#) presented in the following figure and table is used. This sample [SensorCollection](#) has three (3) light [Sensors](#) (LightFloor0001, LightFloor0002 and LightCeiling0001) that are placed in the same living room. Two models are presented. Both models have the same [SensorURN](#) for the [PowerSwitch DataItem](#). However, they differ in the other [SensorURN](#), where one model sets only the [ColorRGB DataItem](#), and the other the [ColorRGB](#) and [Brightness DataItems](#).

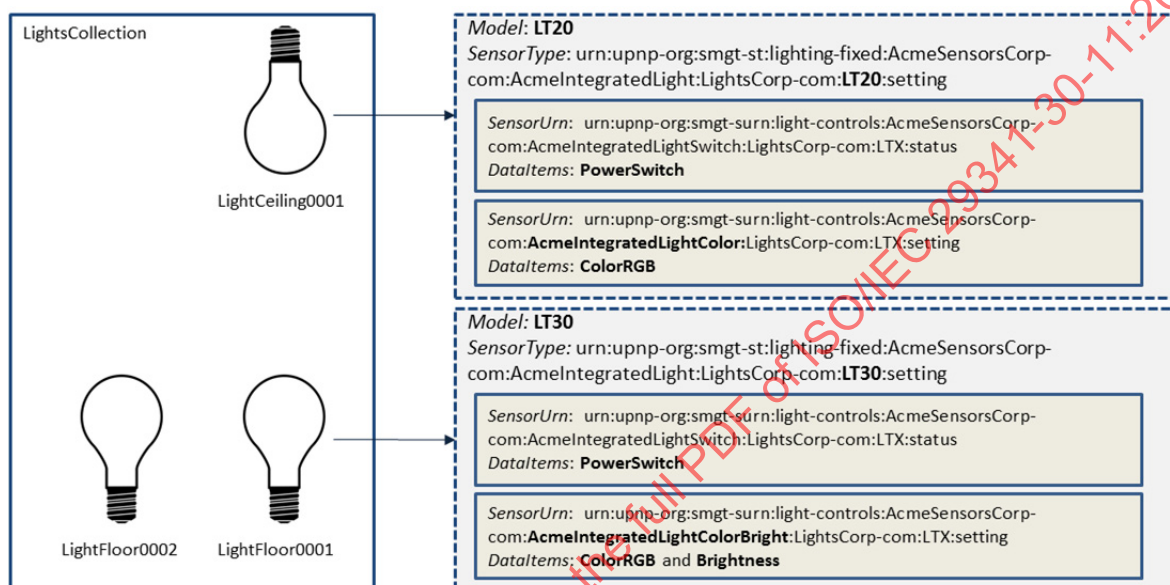


Figure A.2 — Sample Collection

Table A.15 — Sample Collection for Examples

| Parameters | Value |
|----------------------------------|--|
| /UPnP/SensorMgt | |
| SensorCollectionsNumberOfEntries | 1 |
| SensorCollections/ | |
| 1/CollectionID | LightsCollection |
| 1/CollectionType | urn:upnp-org:smgt-sct:lighting-fixed:AcmeSensorsCorp-com:AcmeIntegratedLight:LightsCorp-com:LT20:setting |
| 1/CollectionFriendlyName | "Living Room Lights" |
| 1/CollectionInformation | "Lights Controller Model" |
| 1/CollectionUniqueIdentifier | "123456789" |
| 1/CollectionSpecific | |
| 1/ParticipatingGroupSetID | LivingRoomCentralLight001 |
| 1/SensorsNumberOfEntries | 3 |
| 1/SensorID | LightCeiling0001 |
| 1/SensorType | urn:upnp-org:smgt-st:lighting-fixed:AcmeSensorsCorp-com:AcmeIntegratedLight:LightsCorp-com:LT20:setting |
| 1/SensorUpdateRequest | 0 |
| 1/SensorPollingInterval | 0 |
| 1/SensorReportChangeOnly | 0 |

| | |
|-----------------------------|---|
| 1/SensorsRelated/ | |
| 1/SensorGroups | |
| 1/SensorDefaultPermissions/ | |
| 1/SensorSpecific | |
| 1/SensorURNsNumberOfEntries | 2 |
| 1/SensorURNs | |
| 1/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightSwitch:LightsCorp-com:LTX:status |
| 1/DataItemsNumberOfEntries | 1 |
| 1/DataItems/ | |
| 1/Name | PowerSwitch |
| 1/Type | uda:string |
| 1/Encoding | ascii |
| 1/Description | See Annex E.3.20 |
| 2/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightColor:LightsCorp-com:LTX:setting |
| 2/DataItemsNumberOfEntries | 1 |
| 2/DataItems/ | |
| 1/Name | ColorRGB |
| 1/Type | uda:i32 |
| 1/Encoding | ascii |
| 1/Description | See Annex E.3.5 |
| 2/SensorID | LightFloor0001 |
| 2/SensorType | urn:upnp-org:smgt-st:lighting-fixed:AcmeSensorsCorp-com:AcmeIntegratedLight:LightsCorp-com:LT30:setting |
| 2/SensorUpdateRequest | 0 |
| 2/SensorPollingInterval | 0 |
| 2/SensorReportChangeOnly | 0 |
| 2/SensorsRelated/ | |
| 2/SensorGroups | |
| 2/SensorDefaultPermissions/ | |
| 2/SensorSpecific | |
| 2/ParticipatingGroupSetID | LivingRoomFloorLights |
| 2/SensorURNsNumberOfEntries | 2 |
| 2/SensorURNs | |
| 1/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightSwitch:LightsCorp-com:LTX:status |
| 1/DataItemsNumberOfEntries | 1 |
| 1/DataItems/ | |
| 1/Name | PowerSwitch |
| 1/Type | uda:string |
| 1/Encoding | ascii |
| 1/Description | See Annex E.3.20 |
| 2/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightColorBright:LightsCorp-com:LTX:setting |
| 2/DataItemsNumberOfEntries | 2 |

| | |
|--------------------------------|---|
| 2/DataItems/ | |
| 1/Name | ColorRGB |
| 1/Type | uda:i32 |
| 1/Encoding | ascii |
| 1/Description | See Annex E.3.5 |
| 2/Name | Brightness |
| 2/Type | uda:i32 |
| 2/Encoding | ascii |
| 2/Description | See Annex E.3.4 |
| 3/SensorID | LightFloor0002 |
| 3/SensorType | urn:upnp-org:smgt-st:lighting-fixed:AcmeSensorsCorp-com:AcmeIntegratedLight:LightsCorp-com:LT30:setting |
| 3/SensorUpdateRequest | 0 |
| 3/SensorPollingInterval | 0 |
| 3/SensorReportChangeOnly | 0 |
| 3/SensorsRelated/ | |
| 3/SensorGroups | |
| 3/SensorDefaultPermissions/ | |
| 3/SensorSpecific | |
| 3/ParticipatingGroupSetID | LivingRoomFloorLights |
| 3/SensorURNsNumberOfEntries | 2 |
| 3/SensorURNs | |
| 1/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightSwitch:LightsCorp-com:LTX:status |
| 1/DataItemsNumberOfEntries | 1 |
| 1/DataItems/ | |
| 1/Name | PowerSwitch |
| 1/Type | uda:string |
| 1/Encoding | ascii |
| 1/Description | See Annex E.3.20 |
| 2/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightColorBright:LightsCorp-com:LTX:setting |
| 2/DataItemsNumberOfEntries | 2 |
| 2/DataItems/ | |
| 1/Name | ColorRGB |
| 1/Type | uda:i32 |
| 1/Encoding | ascii |
| 1/Description | See Annex E.3.5 |
| 2/Name | Brightness |
| 2/Type | uda:i32 |
| 2/Encoding | ascii |
| 2/Description | See Annex E.3.4 |
| /UPnP/SensorMgt | |
| SensorGroupSetsNumberOfEntries | 2 |

| | |
|----------------------------|---|
| SensorGroupSets / | |
| 1/GroupSetID | LivingRoomCentralLight001 |
| 1/GroupSetType | smgt-gst:group-control |
| 1/GroupSetFriendName | Group of Lights in LivingRoom |
| 1/GroupSetSpecific/ | |
| 1/MembersNumberOfEntries | 1 |
| 1/Members/ | |
| 1/MemberID | LightsCollection |
| 2/GroupSetID | LivingRoomFloorLights |
| 2/GroupSetType | smgt-gst:group-control |
| 2/GroupSetFriendName | Group of Lights in LivingRoom Floor for RGB and Brightness control |
| 2/GroupSetSpecific/ | |
| SensorURNsNumberOfEntries/ | 1 |
| SensorURNs/ | |
| 1/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightColorBright:LightsCorp-com:LTX:setting |
| 2/Members/ | |
| 1/MemberID | LightFloor0001 |
| 2/MemberID | LightFloor0002 |

A.3.5.1 Living Room Lights – Simple Example

In this example, the user wants to control all lights in the living room by the use of a SensorGroupSets. In the IoT Management and Control Device the SensorGroupSet LivingRoomCentralLight001 is defined, where the whole SensorCollection is included, as illustrated in Figure A.3.

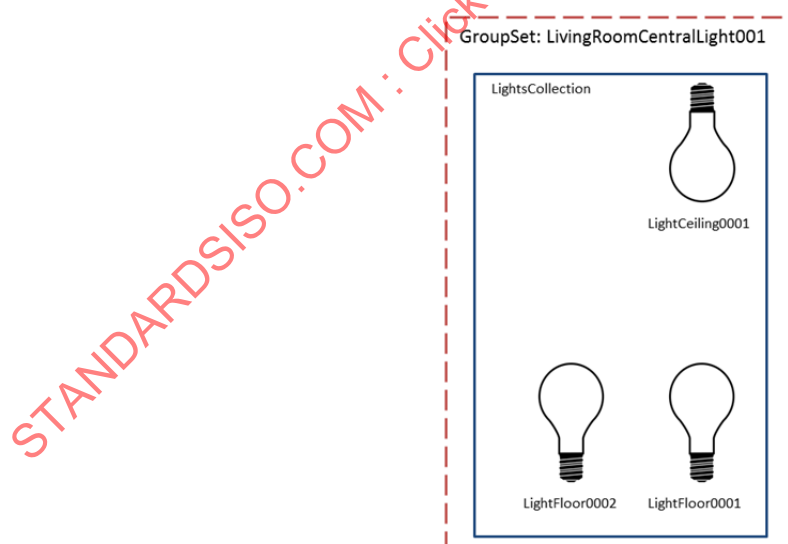


Figure A.3 — Sample of a GroupSet

In this usage example, when a ControlPoint writes a value to the PowerSwitch DataItem of LivingRoomCentralLight001 group, all three children Sensors receive the same value. The value is set by the use of IoT Management and Control TransportGeneric Service and WriteSensor action using the common SensorURN urn:upnp-org:smgt-surn:light-

controls:AcmeSensorsCorp-com:AcmeIntegratedLightSwitch:LightsCorp-com:LTX:status.

In another usage example, when a [ControlPoint](#) writes a value to the [Brightness Dataltem](#) of LivingRoomFloorLights group, just LightFloor0001 and LightFloor0002 receive this value, as LightCeiling0001 is not included in this group.

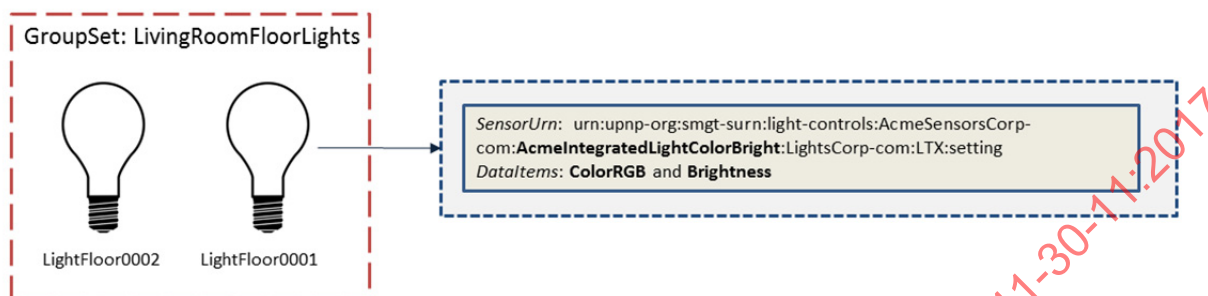


Figure A.4 — Sample of receiving the Brightness setting

In the latest usage example, if the [ControlPoint](#) tries to write a value to the [PowerSwitch Dataltem](#) of LivingRoomFloorLights groups, a “703 - Sensor URN not found error” is raised, as defined by [IoT Management and Control Transport Generic Service](#).

A.3.5.2 Living Room Lights – Pre-defined Settings Example

In this example, it is defined a pre-set of values for each light [PowerSwitch Dataltem](#) value. In this pre-defined setup, the LightCeiling0001 [PowerSwitch Dataltem](#) is set to OFF, and LightFloor0001 and LightFloor0002 [PowerSwitch Dataltem](#) is set to ON.

This [Setting](#) is represented by the Table A.16 with [SettingID](#) Setting001:

Table A.16 — Sample Collection for Living Room Lights

| Parameters | Value |
|--------------------------------|---|
| /UPnP/ScriptSettings/ | |
| SettingsNumberOfEntries | 1 |
| /UPnP/ScriptSettings/Settings/ | |
| 1/SettingID | Setting001 |
| 1/SettingDescription | "Living Room Lights For Movies" |
| 1/ConfigsNumberOfEntries | 3 |
| 1/Config/ | |
| 1/DeviceID | LightCeiling0001 |
| 1/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightSwitch:LightsCorp-com:LTX:status |
| 1/DataRecords | <pre><?xml version="1.0" encoding="UTF-8"?> <DataRecords xmlns="urn:schemas-upnp-org:ds:drecs" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:schemas-upnp-org:ds:drecs http://www.upnp.org/schemas/ds/drecs-v1.xsd"> <datarecord> <field name="PowerSwitch" type="uda:string" encoding="ascii">off</field> </datarecord> </DataRecords></pre> |

| | |
|---------------|--|
| 2/DeviceID | LightFloor0001 |
| 2/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightSwitch:LightsCorp-com:LTX:status |
| 2/DataRecords | <pre><?xml version="1.0" encoding="UTF-8"?> <DataRecords xmlns="urn:schemas-upnp-org:ds:drecs" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:schemas-upnp-org:ds:drecs http://www.upnp.org/schemas/ds/drecs-v1.xsd"> <datarecord> <field name="PowerSwitch" type="uda:string" encoding="ascii">on</field> </datarecord> </DataRecords></pre> |
| 3/Device | LightFloor0002 |
| 3/SensorURN | urn:upnp-org:smgt-surn:light-controls:AcmeSensorsCorp-com:AcmeIntegratedLightSwitch:LightsCorp-com:LTX:status |
| 3/DataRecords | <pre><?xml version="1.0" encoding="UTF-8"?> <DataRecords xmlns="urn:schemas-upnp-org:ds:drecs" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:schemas-upnp-org:ds:drecs http://www.upnp.org/schemas/ds/drecs-v1.xsd"> <datarecord> <field name="PowerSwitch" type="uda:string" encoding="ascii">on</field> </datarecord> </DataRecords></pre> |

As an addition, it is necessary to define one simple Script with ScriptID *Script001* to activate or deactivate Settings *Setting001*, as represented in the Table A.17 (which is a continuation of Table A.16):

Table A.17 – Continue Collection for Living Room Lights

| Parameters | Value |
|---------------------------------|------------------------------|
| /UPnP/ScriptSettings/ | |
| SettingsNumberOfEntries | 1 |
| ... | |
| ScriptsNumberOfEntries | 1 |
| /UPnP/ScriptSettings/Scripts/1/ | |
| 1/ScriptID | Script001 |
| 1/ScriptDescription | Script to apply Settings0001 |
| 1/ScriptAttributes | |
| 1/ScriptStatus | deactivated |
| 1/Condition | true |
| 1/Then | Setting001 |

To apply the *Script001* (and its associated *Setting001*), the ControlPoint must write in the parameter */UPnP/ScriptSettings/Scripts/1/ScriptStatus* the value of “*activated*”, and the Script will be executed based on the Condition, Then and ScriptAttributes parameters.

The Condition parameter has the value “true”, which means that the script will be applied every time the Script is activated. The ScriptAttributes parameter is empty, which means that the Script does not have any special attribute (such as a timer or period of execution). In the Then parameter just the `Setting001` is listed, meaning that only this Setting will be applied.

A.3.5.3 Living Room Lights – Timer Example

In this example it is demonstrated how to apply a Setting after a pre-defined timer delay using the ScriptAttributes parameter. Table A.18 describes a new Script `Script002`.

Table A.18 — Collection for Living Room Lights - Timer example

| Parameters | Value |
|---------------------------------|--|
| /UPnP/ScriptSettings/ | |
| SettingsNumberOfEntries | 1 |
| ... | |
| ScriptsNumberOfEntries | 2 |
| /UPnP/ScriptSettings/Scripts/1/ | |
| ... | |
| /UPnP/ScriptSettings/Scripts/2/ | |
| 2/ScriptID | Script002 |
| 2/ScriptDescription | Script to apply Settings0001 after delay |
| 2/ScriptAttributes | delay=00:01:00,delay-expires=00:02:00 |
| 2/ScriptStatus | deactivated |
| 2/Condition | * |
| 2/Then | Setting001 |

In this Script, when its status is changed to “activated”, the `Setting001` is applied after the delay of one (1) minute as described on its ScriptAttributes. After it is activated, its ScriptStatus will be changed to “deactivated” two (2) minutes later.

Annex B Required IoT Management and Control Dataltem(s) (normative)

B.1 Introduction

The following Sensor Dataltems shall be supported for all SensorURNs.

Table B.1 — IoT Management and Control required Dataltem(s)

| Name | Type | Encoding | Description |
|---|-------------------------------------|-------------------------------|--|
| <u>ClientID</u> | <u>xsd:string</u> | <u>string</u> | <p>The required <u>ClientID</u> Dataltem shall match the value of the <u>SensorClientID</u> argument of the SensorTransportGeneric service <u>ConnectSensor()</u> or <u>ReadSensor()</u> actions.</p> <p>This Dataltem can be used by sensor transport clients to label the transport connection (or SOAP action) which is requesting the sensor data.</p> |
| <u>ReceiveTimestamp</u> | <u>xsd:dateTime</u> | <u>string</u> | <p>The required <u>ReceiveTimestamp</u> Dataltem shall provide a date-time stamp indicating when the sensor data was received by the IoT Management and Control device</p> <p>For example both of these timestamps represent the same time:</p> <p>2013-02-01T20:00:01Z
2013-02-01T12:00:00-08:00</p> |

Annex C Common Device Identifiers (normative)

C.1 Introduction

The following table lists common device identifiers. If one of these device identifiers apply to the IoT Management and Control application, then this value should be used in URN [device-identifier] fields.

Table C.1 — Common Device Identifiers

| id | Category and Device | Comment | subid | Subclassification
(incl. UPnP classification) |
|----|--------------------------------|---|-------|--|
| | Space Conditioning (11) | | | |
| 1 | Unitary System | window and wall units without external components; self-contained | 1S1 | <u>Climate</u> |
| 2 | Boiler | device that heats water (or other liquid). | 2S1 | <u>HotWater Heater</u> |
| 3 | Furnace | device that heats air (or other gas) | | |
| 4 | Pump | device that moves water (or other liquid) | | |
| 5 | Fan | device that moves air (or other gas) | | |
| 6 | Condensing Unit | always includes a compressor | | |
| 7 | Condensor | no compressor; just fan | | |
| 8 | Humidifier | adds moisture to air | | |
| 9 | Dehumidifier | removes moisture from air | | |
| 10 | HVAC - control | directs operation of other HVAC devices; includes HVAC sensors | 10S1 | <u>Controller</u> |
| | | | 10S2 | <u>HVAC</u> |
| | | | 10S3 | <u>Thermostat</u> |
| | | | 10S4 | Damper |
| 11 | HVAC - other | not readily classified into any of the above | 11S1 | <u>HVAC</u> |
| | | | 11S2 | <u>RoomAirConditioner</u> |
| | | | | |
| | Lighting (5) | | | |
| 12 | Lighting - outdoor | | | |
| 13 | Lighting - fixed | hardwired | 13S1 | <u>Light</u> |
| 14 | Lighting - portable | has normal plug | | |
| 15 | Lighting - controls | incl. sensors for lighting | | |
| 16 | Lighting - other | not readily classified into any of the above | | |
| | | | | |
| | Appliance (10) | large devices; small in misc. | | |

| | | | | |
|----|-------------------------|---|------|------------------------|
| 17 | Clothes dryer | | 17S1 | <u>Dryer</u> |
| 18 | Clothes washer | incl. combined washer/dryer | 18S1 | <u>Washing machine</u> |
| 19 | Dishwasher | | | |
| 20 | Freezer | | | |
| 21 | Ice machine | | | |
| 22 | Oven | incl. warming drawer | | |
| 23 | Range | incl. cooktop and combined cooktop/oven | | |
| 24 | Refrigerator | including wine coolers, fridge/freezer combo | | |
| 25 | Water heater | | | |
| 26 | Appliance - other | not readily classified into any of the above | 26S1 | <u>Microwave</u> |
| | | | 26S2 | Coffee Maker |
| | Electronics (21) | | | |
| 27 | Audio system | integrated source and speaker; incl. radio, boombox | | |
| 28 | Audio/video player | e.g. CD, DVD, VCR, cassette, turntable | 28S1 | <u>MediaRenderer</u> |
| 29 | Camera | | | |
| 30 | Computer, desktop | incl. integrated | | |
| 31 | Computer, notebook | | | |
| 32 | Computer, server | | | |
| 33 | Computer, other | | | |
| 34 | Data storage | | | |
| 35 | Display | incl. monitor, projectors, TVs, digital picture frame | | |
| 36 | Electronics - portable | can be operated by battery and not otherwise classified | | |
| 37 | Game console | | | |
| 38 | Imaging equipment | fax, multi-function device, scanner, printer, label printer | | |
| 39 | Musical instrument | also incl. recording devices, mixers, amplifiers | | |
| 40 | Network equipment | modems, switches, routers, access points, etc. | | |
| 41 | Phone handset | incl. tablet | | |
| 42 | Receiver | incl. amplifier, home theatre system | 42S1 | Audio Amp |
| | | | 42S2 | Tuner |
| | | | 42S3 | Audio Equalizer |
| | | | 42S4 | A/V Switch |

| | | | | |
|----|---------------------------|--|------|----------------------|
| 43 | Set-top box | cable, satellite, Internet | | |
| 44 | Telephony | base stations, answering machines, corded phones | | |
| 45 | Television | | | |
| 46 | Audio/video - other | | | |
| 47 | Electronics - other | not readily classified into any of the above, incl. clocks | 47S1 | <u>MediaServer</u> |
| | | | 47S2 | Intercom |
| | | | | |
| | Miscellaneous (29) | | | |
| 48 | Agriculture | incl. irrigation timers | 48S1 | <u>LawnSprinkler</u> |
| 49 | Air compressors | | | |
| 50 | Bathroom device | toilets, faucets, hand dryers, etc. | | |
| 51 | Battery charger | | | |
| 52 | Business equipment | money or office paper related | | |
| 53 | Cleaning equipment | incl. vacuum | | |
| 54 | Cooking - portable | | | |
| 55 | Decorations/hobby/leisure | fountains, aquaria, kilns, baby rockers, massage chairs | 55S1 | Fountain |
| 56 | Entertainment | gambling, arcade, etc. | | |
| 57 | Exercise machine | | | |
| 58 | Food service/prep | ice cream machine, fryer, steam cooker | | |
| 59 | Household | non-food; incld iron, sewing machine, ... | | |
| 60 | HVAC - portable | humidifiers, portable fans, heaters | | |
| 61 | Industrial | process equipment and related | | |
| 62 | Kitchen | small devices | | |
| 63 | Laboratory equipment | | | |
| 64 | Lighting - decorative | | 64S1 | <u>Light</u> |
| 65 | Lighting - emergency | incl. exit lights | | |
| 66 | Medical equipment | for professional settings | | |
| 67 | Microwave oven | | | |
| 68 | Outdoor appliance | mowers, trimmers, snow melting coils, grill | | |
| 69 | Personal - health | hair dryers, curlers, shavers, trimmers, toothbrush | | |
| 70 | Pool - spa | | | |
| 71 | Sanitation | garbage disposal, trash | 71S1 | <u>Disposal</u> |

| | | | | |
|----|----------------------------|--|-------|--|
| | | compactor, wastewater pump, water filter | 71S2 | <u>TrashCompactor</u> |
| 72 | Sign | not incl. electronic displays | | |
| 73 | Tool - construction | | | |
| 74 | Tool - non-construction | e.g. auto, beauty | | |
| 75 | Vending machine | | | |
| 76 | Water dispenser | | | |
| | Infrastructure (11) | Devices not used directly by people | | |
| 77 | Breakers | incl. AFI/GFCI | 77S1 | Load Center |
| 78 | Doors / Windows | incl. garage doors, gates, window shades | 78S1 | <u>Door_Lock</u> |
| | | | 78S2 | <u>Door_Sensor</u> |
| | | | 78S3 | <u>Window_Sensor</u> |
| | | | 78S4 | <u>Keypad</u> |
| | | | 78S5 | <u>Keyfob</u> |
| | | | 78S6 | <u>GarageDoorOpener</u> |
| | | | 78S7 | <u>WindowCovering</u> |
| | | | 78S8 | Skylight |
| 79 | Fireplace | | | |
| 80 | Motor | actuators | 80S1 | <u>Actuator</u> |
| 81 | Power - portable | power strips, surge protectors, UPS, timer | | |
| 82 | Power - fixed | transformers, switchgears, inverters, voltage regulators, power conditioners | | |
| 83 | Pump | | 83S1 | <u>HeatPump</u> |
| | | | 83S2 | <u>PoolPump</u> |
| 84 | Security | security cameras, systems | 84S1 | <u>Surveillance</u> |
| | | | 84S2 | <u>Alarm_Panel</u> |
| | | | 84S3 | <u>Panic_Pendant</u> |
| 85 | Sensors | incl. detectors: fire, smoke, gas, fluids | 85S1 | <u>Sensor</u> |
| | | | 85S2 | <u>Motion_Sensor</u> |
| | | | 85S3 | <u>Occupancy_Sensor</u> |
| | | | 85S4 | <u>Temperature_Sensor</u> |
| | | | 85S5 | <u>Glass_break_Sensor</u> |
| | | | 85S6 | <u>CO_Sensor</u> |
| | | | 85S7 | <u>Heat_Sensor</u> |
| | | | 85S8 | <u>Smoke_Sensor</u> |
| | | | 85S9 | <u>Flammable_Gas_Sensor</u> |
| | | | 85S10 | <u>Humidity_Sensor</u> |
| | | | 85S11 | <u>Wind_Speed_Sensor</u> |
| | | | 85S12 | <u>Wind_Direction_Sensor</u> |
| | | | 85S13 | <u>Rain_Sensor</u> |

| | | | | |
|----|---------------------------|---|-------|-----------------------------------|
| | | | 85S14 | <u>Dewpoint Sensor</u> |
| | | | 85S15 | <u>Barometric Pressure Sensor</u> |
| | | | 85S16 | <u>Stress Sensor</u> |
| | | | 85S17 | <u>Flux Sensor</u> |
| | | | 85S18 | <u>Weight Sensor</u> |
| | | | 85S19 | Light Sensor |
| 86 | Signage | | | |
| 87 | Meter | utility and other | 87S1 | Power meter |
| | | | | |
| | Transportation (4) | | | |
| 88 | Transport, fixed | elevator, escalator, lifts, etc. | | |
| 89 | Vehicle-large | | | |
| 90 | Vehicle-small | incl. wheelchair, golf cart | | |
| 91 | Transport, other | incl. auto engine heater, vehicle charger, parking meter, parking equipment | | |
| | | | | |
| | Other (1) | | | |
| 92 | Other | truly unclassifiable | 92S1 | <u>Safety</u> |

Table C.1 was prepared at Lawrence Berkeley National Laboratory under Contract No. DE-AC02-05CH11231 with the U.S. Department of Energy.”

Table C.2 — mapping of mandatory Dataltems per Common Device Identifier

| <u>id</u> | <u>Category and Device</u> | <u>Related Mandatory Dataltem (unless specified optional)</u> | <u>Section</u> |
|-----------|--------------------------------|---|----------------|
| | Space Conditioning (11) | | |
| 1 | Unitary System | | |
| 1S1 | <u>Climate</u> | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 2 | Boiler | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 2S1 | <u>HotWater Heater</u> | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 3 | Furnace | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 4 | Pump | <u>Switch</u> | E.3.30 |
| | | <u>Flow</u> | E.3.10 |
| 5 | Fan | <u>Switch</u> | E.3.30 |
| | | <u>Direction</u> (optional) | E.3.9 |
| | | <u>RelSpeed</u> (optional) | E.3.26 |
| 6 | Condensing Unit | <u>Switch</u> | E.3.30 |
| 7 | Condensor | <u>Switch</u> | E.3.30 |

| | | | |
|------|---------------------------|------------------------------|--------|
| 8 | Humidifier | <u>Switch</u> | E.3.30 |
| | | <u>Humidity</u> | E.3.14 |
| 9 | Dehumidifier | <u>Switch</u> | E.3.30 |
| | | <u>Humidity</u> | E.3.14 |
| 10 | HVAC - control | | |
| 10S1 | <u>Controller</u> | | |
| 10S2 | <u>HVAC</u> | | |
| 10S3 | <u>Thermostat</u> | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| | | <u>Humidity</u> (optional) | E.3.14 |
| 10S4 | Damper | <u>Switch</u> | E.3.30 |
| 11 | HVAC - other | | |
| 11S1 | <u>HVAC</u> | | |
| 11S2 | <u>RoomAirConditioner</u> | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| | | <u>Humidity</u> (optional) | E.3.14 |
| | | | |
| | Lighting (5) | | |
| 12 | Lighting - outdoor | <u>Switch</u> | E.3.30 |
| 13 | Lighting - fixed | <u>Switch</u> | E.3.30 |
| 13S1 | <u>Light</u> | <u>Switch</u> | E.3.30 |
| | | <u>Brightness</u> (optional) | E.3.4 |
| | | <u>ColorRGB</u> (optional) | E.3.5 |
| 14 | Lighting - portable | <u>Switch</u> | E.3.30 |
| 15 | Lighting - controls | <u>Switch</u> | E.3.30 |
| 16 | Lighting - other | <u>Switch</u> | E.3.30 |
| | | | |
| | Appliance (10) | | |
| 17 | Clothes dryer | <u>Switch</u> | E.3.30 |
| | | <u>DryingState</u> | E.3.40 |
| 17S1 | <u>Dryer</u> | <u>Switch</u> | E.3.30 |
| | | <u>DryingState</u> | E.3.40 |
| 18 | Clothes washer | <u>Switch</u> | E.3.30 |
| | | <u>WashState</u> | E.3.45 |
| 18S1 | <u>Washing machine</u> | <u>Switch</u> | E.3.30 |
| | | <u>WashState</u> | E.3.45 |
| 19 | Dishwasher | <u>Switch</u> | E.3.30 |
| | | <u>WashState</u> | E.3.45 |
| | | <u>DryingState</u> | E.3.40 |
| 20 | Freezer | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 21 | Ice machine | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 22 | Oven | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 23 | Range | <u>Switch</u> | E.3.30 |

| | | | |
|------|---------------------------|---------------------|--------|
| | | <u>Temperature</u> | E.3.31 |
| 24 | Refrigerator | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 25 | Water heater | <u>Switch</u> | E.3.30 |
| | | <u>Temperature</u> | E.3.31 |
| 26 | Appliance - other | <u>Switch</u> | E.3.30 |
| 26S1 | <u>Microwave</u> | <u>Switch</u> | E.3.30 |
| | | <u>Power</u> | E.3.19 |
| 26S2 | Coffee Maker | <u>Switch</u> | E.3.30 |
| | | | |
| | Electronics (21) | | |
| 27 | Audio system | <u>Switch</u> | E.3.30 |
| 28 | Audio/video player | <u>Switch</u> | E.3.30 |
| 28S1 | <u>MediaRenderer</u> | <u>Switch</u> | E.3.30 |
| 29 | Camera | <u>Switch</u> | E.3.30 |
| 30 | Computer, desktop | <u>Switch</u> | E.3.30 |
| 31 | Computer, notebook | <u>Switch</u> | E.3.30 |
| 32 | Computer, server | <u>Switch</u> | E.3.30 |
| 33 | Computer, other | <u>Switch</u> | E.3.30 |
| 34 | Data storage | <u>Switch</u> | E.3.30 |
| 35 | Display | <u>Switch</u> | E.3.30 |
| 36 | Electronics - portable | <u>BatteryState</u> | E.3.37 |
| 37 | Game console | <u>Switch</u> | E.3.30 |
| 38 | Imaging equipment | <u>Switch</u> | E.3.30 |
| 39 | Musical instrument | <u>Switch</u> | E.3.30 |
| 40 | Network equipment | <u>Switch</u> | E.3.30 |
| 41 | Phone handset | <u>BatteryState</u> | E.3.37 |
| 42 | Receiver | <u>Switch</u> | E.3.30 |
| 42S1 | Audio Amp | <u>Switch</u> | E.3.30 |
| 42S2 | Tuner | <u>Switch</u> | E.3.30 |
| 42S3 | Audio Equalizer | <u>Switch</u> | E.3.30 |
| 42S4 | A/V Switch | <u>Switch</u> | E.3.30 |
| 43 | Set-top box | <u>Switch</u> | E.3.30 |
| 44 | Telephony | <u>Switch</u> | E.3.30 |
| 45 | Television | <u>Switch</u> | E.3.30 |
| 46 | Audio/video - other | <u>Switch</u> | E.3.30 |
| 47 | Electronics - other | <u>Switch</u> | E.3.30 |
| 47S1 | <u>MediaServer</u> | <u>Switch</u> | E.3.30 |
| 47S2 | Intercom | <u>Switch</u> | E.3.30 |
| | | | |
| | Miscellaneous (29) | | |
| 48 | Agriculture | | |
| 48S1 | <u>LawnSprinkler</u> | <u>Switch</u> | E.3.30 |
| 49 | Air compressors | <u>Switch</u> | E.3.30 |
| 50 | Bathroom device | <u>Switch</u> | E.3.30 |
| 51 | Battery charger | <u>Switch</u> | E.3.30 |

| | | | |
|------|----------------------------|-------------------------------|--------|
| | | <u>BatteryState</u> | E.3.37 |
| 52 | Business equipment | | |
| 53 | Cleaning equipment | <u>Switch</u> | E.3.30 |
| | | <u>CleanerState</u> | E.3.38 |
| 54 | Cooking - portable | | |
| 55 | Decorations/hobby/leisure | | |
| 55S1 | Fountain | <u>Switch</u> | E.3.30 |
| 56 | Entertainment | | |
| 57 | Exercise machine | <u>Switch</u> | E.3.30 |
| 58 | Food service/prep | <u>Switch</u> | E.3.30 |
| 59 | Household | <u>Switch</u> | E.3.30 |
| 60 | HVAC - portable | | |
| 61 | Industrial | | |
| 62 | Kitchen | | |
| 63 | Laboratory equipment | | |
| 64 | Lighting - decorative | <u>Switch</u> | E.3.30 |
| 64S1 | <u>Light</u> | <u>Switch</u> | E.3.30 |
| 65 | Lighting - emergency | <u>Switch</u> | E.3.30 |
| 66 | Medical equipment | | |
| 67 | Microwave oven | <u>Switch</u> | E.3.30 |
| 68 | Outdoor appliance | | |
| 69 | Personal - health | | |
| 70 | Pool - spa | | |
| 71 | Sanitation | | |
| 71S1 | <u>Disposal</u> | <u>Switch</u> | E.3.30 |
| 71S2 | <u>TrashCompactor</u> | <u>Switch</u> | E.3.30 |
| 72 | Sign | | |
| 73 | Tool - construction | | |
| 74 | Tool - non-construction | | |
| 75 | Vending machine | <u>Switch</u> | E.3.30 |
| 76 | Water dispenser | <u>Switch</u> | E.3.30 |
| | | | |
| | Infrastructure (11) | | |
| 77 | Breakers | | |
| 77S1 | Load Center | <u>EnergyOverloadDetector</u> | E.3.47 |
| 78 | Doors / Windows | <u>Lock</u> | E.3.42 |
| 78S1 | <u>Door_Lock</u> | <u>Lock</u> | E.3.42 |
| 78S2 | <u>Door_Sensor</u> | <u>RelPosition</u> | E.3.24 |
| 78S3 | <u>Window_Sensor</u> | <u>RelPosition</u> | E.3.24 |
| 78S4 | <u>Keypad</u> | | |
| 78S5 | <u>Keyfob</u> | | |
| 78S6 | <u>GarageDoorOpener</u> | <u>Lock</u> | E.3.42 |
| | | <u>RelPosition</u> | E.3.24 |
| 78S7 | <u>WindowCovering</u> | <u>RelPosition</u> | E.3.24 |
| 78S8 | <u>Skylight</u> | <u>Lock</u> | E.3.42 |
| | | <u>RelPosition</u> | E.3.24 |

| | | | |
|-------|-----------------------------------|-------------------------------|--------|
| 79 | Fireplace | <u>Switch</u> | E.3.30 |
| 80 | Motor | <u>Switch</u> | E.3.30 |
| | | <u>RelPosition</u> (optional) | E.3.24 |
| 80S1 | <u>Actuator</u> | <u>Switch</u> | E.3.30 |
| | | <u>RelPosition</u> (optional) | E.3.24 |
| 81 | Power - portable | | |
| 82 | Power - fixed | | |
| 83 | Pump | <u>Switch</u> | E.3.30 |
| 83S1 | <u>HeatPump</u> | <u>Switch</u> | E.3.30 |
| 83S2 | <u>PoolPump</u> | <u>Switch</u> | E.3.30 |
| 84 | Security | | |
| 84S1 | <u>Surveillance</u> | <u>Switch</u> | E.3.30 |
| 84S2 | <u>Alarm_Panel</u> | | |
| 84S3 | <u>Panic_Pendant</u> | | |
| 85 | Sensors | | |
| 85S1 | <u>Sensor</u> | <u>Count</u> | E.3.7 |
| 85S2 | <u>Motion_Sensor</u> | <u>MovementDetector</u> | E.3.47 |
| 85S3 | <u>Occupancy_Sensor</u> | <u>OccupanyDetector</u> | E.3.47 |
| 85S4 | <u>Temperature_Sensor</u> | <u>HeatDetector</u> | E.3.47 |
| | | <u>Temperature</u> | E.3.31 |
| 85S5 | <u>Glass_break_Sensor</u> | <u>GlassBreakDetector</u> | E.3.47 |
| 85S6 | <u>CO_Sensor</u> | <u>CODetector</u> | E.3.47 |
| 85S7 | <u>Heat_Sensor</u> | <u>HeatDetector</u> | E.3.47 |
| 85S8 | <u>Smoke_Sensor</u> | <u>SmokeDetector</u> | E.3.47 |
| 85S9 | <u>Flammable_Gas_Sensor</u> | <u>GasDetector</u> | E.3.47 |
| 85S10 | <u>Humidity_Sensor</u> | <u>Humidity</u> | E.3.14 |
| 85S11 | <u>Wind_Speed_Sensor</u> | <u>Speed</u> | E.3.28 |
| 85S12 | <u>Wind_Direction_Sensor</u> | <u>WRDirection</u> | E.3.36 |
| 85S13 | <u>Rain_Sensor</u> | <u>RainDetector</u> | E.3.47 |
| 85S14 | <u>Dewpoint_Sensor</u> | <u>Dewpoint</u> | E.3.48 |
| 85S15 | <u>Barometric_Pressure_Sensor</u> | <u>Pressure</u> | E.3.22 |
| 85S16 | <u>Stress_Sensor</u> | <u>Force</u> | E.3.50 |
| 85S17 | <u>Flux_Sensor</u> | <u>Flow</u> | E.3.10 |
| 85S18 | <u>Weight_Sensor</u> | <u>Mass</u> | E.3.15 |
| 85S19 | <u>Light_Sensor</u> | <u>LightDetector</u> | E.3.47 |
| 86 | Signage | | |
| 87 | Meter | <u>Count</u> | E.3.7 |
| 87S1 | Power meter | <u>Power</u> | E.3.19 |
| | | | |
| | Transportation (4) | | |
| 88 | Transport, fixed | | |
| 89 | Vehicle-large | | |
| 90 | Vehicle-small | | |
| 91 | Transport, other | | |
| | | | |

| | | | |
|------|------------------|--|--|
| | Other (1) | | |
| 92 | Other | | |
| 92S1 | <u>Safety</u> | | |

STANDARDSISO.COM : Click to view the full PDF of ISO/IEC 29341-30-11:2017

Annex D IEEE-11073 Personal Health Devices

D.1 IoT Management and Control for IEEE-11073 Personal Health Medical Device Systems

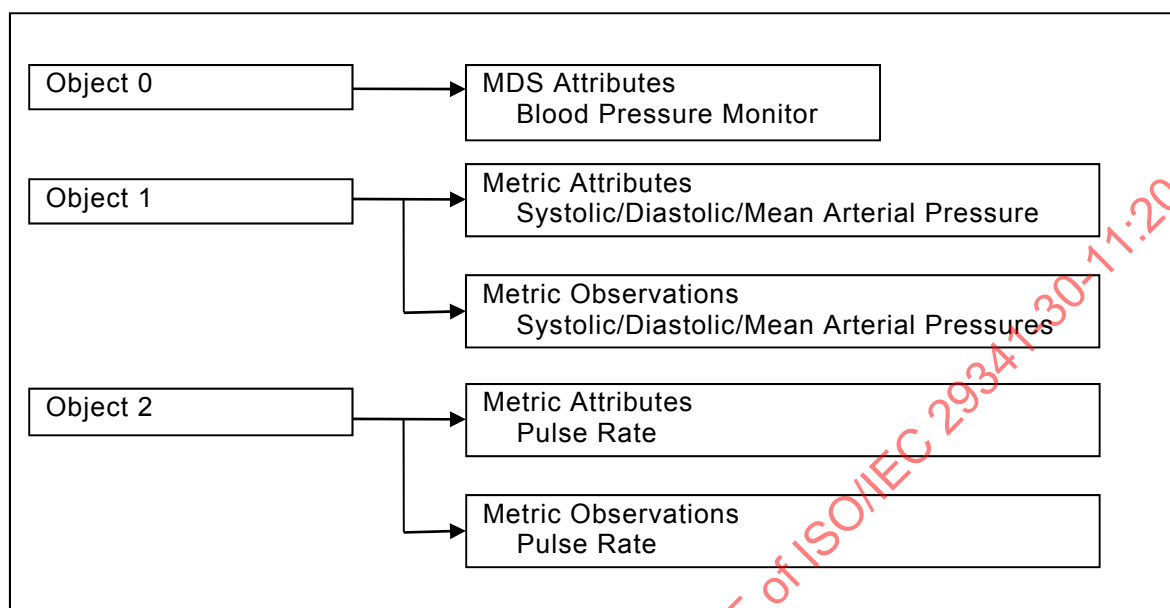


Figure D.1 — Blood Pressure Monitor – Medical Device System (Informative)

This annex describes UPnP *IoT Management and Control* device requirements for support of IEEE-11073 Personal Health Medical Device Systems (agents). A UPnP IoT Management and Control device supporting IEEE-11073 Personal Health Devices encapsulates the functionality provided by an IEEE-11073 Manager which in turn implements IEEE-11073 communication protocols per IEEE-11073 Part 20601: Application Profile - Optimized Exchange [8]. IEEE-11073 Medical Device Systems are described as a set of objects. At a top level, Object 0 represents the properties of the medical device itself including identifying information for the device. Objects 1-n describe various measurement functions the medical device can perform. IEEE-11073 protocols separate data description and data transmission, therefore received measurement data (observations) only contain the minimal data relating to the quantities being measured. The attributes of the corresponding measurement object provide context such as measurement type, units of measure and observation data formats. Depending on the medical device being described measurement data may contain both time information as well as multiple measured quantities. Therefore, it is important that both measurement data and measurement object attributes are provided to UPnP clients processing data from IEEE-11073 agent devices. See the IEEE-11073-104zz Device specialization [9] series for detailed information on specific measurement devices. Attribute information from medical devices is conveyed in a tag-length-value format based on IEEE-11073 Medical Device Encoding Rules (MDER) as described in IEEE-11073 Part 20601: Application Profile - Optimized Exchange.

UPnP IoT Management and Control exposes IEEE-11073 Medical Devices to UPnP clients as a sensor collection and sensor. The sensor collection exposes identifying information extracted from the Object 0 of the Medical Device System. The Sensor supports a set of Dataltem(s) representing the attributes and observation data for each medical device object reported by the IEEE-11073 Manager component. Additional Dataltem(s) supply timestamps for the time of observation (if available) as well as the time of reception by the UPnP IoT Management and Control device.

UPnP IoT Management and Control support of Persistent Metric Storage objects (PM-store) is described in Annex D.4.

D.1.1 IEEE-11073 Personal Health Device Parameters

This section describes extensions to the IoT Management and Control General Data Model for IEEE-11073 Personal Health Devices.

Table D.1 — IEEE-11073 specific Medical Device System Parameters

| Name | Type | Acc | Req | Reference | EOC | Ver |
|--|----------------|-----|-----|-----------|-----|-----|
| /UPnP/SensorMgt/SensorCollections/#!/CollectionSpecific/IEEE-11073/ | SingleInstance | | | D.1.1.2 | | |
| SystemType | string | | | D.1.1.3 | | |
| SystemModel | string | | | D.1.1.4 | | |
| SystemID | string | | | D.1.1.5 | | |
| ConfigurationsNumberOfEntries | int | | | | | |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#!/CollectionSpecific/IEEE11073/Association/ | SingleInstance | | | D.1.1.6 | | |
| RequestConfig | int | | | D.1.1.7 | | |
| CurrentConfig | int | | | D.1.1.8 | | |
| LastConfig | int | | | D.1.1.9 | | |
| ConfigurationsNumberOfEntries | int | | | | | |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#!/CollectionSpecific/IEEE11073/Configurations/#!/ | MultiInstance | | | | | |
| ConfigID | int | | | | | |
| ConfigData | string | | | | | |
| | | | | | | |

D.1.1.1 /UPnP/SensorMgt/SensorCollections/#!/CollectionType

Type: string

Description: The following CollectionType value shall be used for IEEE-11073 Personal Health Devices.

```
MDS-Collection-Type ::= urn:upnp-org:smgt-sct:ieee-11073_mds:ieee-org:11073_104zzz
                        :<MDS-vendor>:<MDS-model>
```

Where: 11073_104zzz indicates the IEEE document number defining the Medical Device Specialization.

D.1.1.2 /UPnP/SensorMgt/SensorCollections/#!/CollectionSpecific/IEEE-11073/

Type: SingleInstance

Description: The conditionally required IEEE-11073 *SingleInstance* node shall be included for IEEE-11073 Personal Health Devices.

D.1.1.3 /UPnP/SensorMgt/SensorCollections/#!/CollectionSpecific/IEEE-11073/SystemType

Type: CSV(string)

Description: The required SystemType parameter indicates the type of IEEE-11073 Medical Device System. The contents of the SystemType parameter correspond to the System-Type or System-Type-Spec-List attribute(s) as described in IEEE-11073 Part 20601: Application Profile - Optimized Exchange [8] - MDS Class. Values for the SystemType parameter shall be presented in text format as defined by the individual IEEE-11073-104zz Device specialization [9] documents.

For example a IEEE-11073 Blood Pressure measurement device is encoded as the CSV(string) value:

```
MDC_DEV_SPEC_PROFILE_BP, 1
```

D.1.1.4 /UPnP/SensorMgt/SensorCollections/#/CollectionSpecific/IEEE-11073/SystemModel

Type: CSV(string)

Description: The required *SystemModel* parameter indicates the manufacturer and model of a IEEE-11073 Medical Device System. The contents of the *SystemModel* parameter correspond to the *System-Model* attribute as described in IEEE-11073 Part 20601: Application Profile - Optimized Exchange [8] - MDS Class Values for the *SystemModel* parameter shall be presented in text format as defined by individual IEEE-11074-104zz Device specialization [9] documents.

For example, a IEEE-11073 Blood Pressure measurement device with Device-Vendor: The Company and with Device-Model: TheBPM ABC, is encoded as the CSV(**string**) value consisting of the Device-Vendor identification followed by the Device-Model identification:

```
TheComany,TheBPM ABC
```

D.1.1.5 /UPnP/SensorMgt/SensorCollections/#/CollectionSpecific/IEEE-11073/SystemID

Type: string

Description: The required *SystemID* parameter provides a 64-bit extended unique identifier value for the IEEE-11073 Medical Device System. The contents of the *SystemID* parameter correspond to the *System-Id* attribute as described in IEEE-11073 Part 20601: Application Profile - Optimized Exchange [8] - MDS Class. The values for this *parameter* shall be presented as a 16-digit character hexadecimal string.

For example a IEEE-11073 Blood Pressure measurement device would be encoded as:

```
1122334455667707
```

D.1.1.6 /UPnP/SensorMgt/SensorCollections/#/CollectionSpecific/IEEE-11073/Association

Type: SingleInstance

Description: The required *Association* *SingleInstance* node includes parameters which control the association process for IEEE-11073 Medical Device Systems.

D.1.1.7 /UPnP/SensorMgt/SensorCollections/#/CollectionSpecific/IEEE-11073/Association/RequestConfig

Type: int

Description: The required *RequestConfig* parameter shall request the IoT Management and Control device begin a new association process with the corresponding Medical Device System. This value corresponds to the *Dev-Config-Id* value as described in IEEE-11073 Part 20601: Application Profile - Optimized Exchange [8]. If this parameter is written to ("0"), the IoT Management and Control device shall terminate any current association and shall disable further associations with this IoT Management and Control device. If this parameter is set to ("-1"), then the IoT Management and Control device shall automatically associate with any acceptable configuration presented by the corresponding IEEE-11073 Medical Device System.

D.1.1.8 /UPnP/SensorMgt/SensorCollections/#/CollectionSpecific/IEEE-11073/Association/CurrentConfig

Type: int

Description: The required *CurrentConfig* parameter shall indicate the current association for the corresponding Medical Device System. If there is no current association, then this parameter shall be ("0").

D.1.1.9 /UPnP/SensorMgt/SensorCollections/#/CollectionSpecific/IEEE-11073/Association/LastConfig

Type: int

Description: The required *LastConfig* parameter shall indicate the last (or currently active) associated configuration for the corresponding Medical Device System. This parameter shall retain its value regardless of whether or not the Medical Device System is currently associated. If there was no known prior associated configuration this parameter shall be ("0").

STANDARDSISO.COM : Click to view the full PDF of ISO/IEC 29341-30-11:2017

D.2 IoT Management and Control for IEEE-11073 Medical Device Sensors**D.3 IoT Management and Control Parameters for IEEE-11073 Personal Health Sensors**

The UPnP IoT Management and Control device represents IEEE-11073 Personal Health Devices as a SensorCollection and an included Sensor. The Sensor shall include the following parameters:

Table D.2 — IEEE-11073 Medical Device Sensor Parameters

| Name | Type | Acc | Req | Reference | EOC | Ver |
|---|--------------|-----|-----|---------------------|-----|-----|
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorType | MultInstance | | | | | |
| SensorType | string | | | D.3.1.1 | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/SensorURN | MultInstance | | | | | |
| SensorURN | string | | | D.3.1.3 | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/DataItems/#!/Name | MultInstance | | | | | |
| Name | string | | | D.3.1.5,
D.3.1.6 | | |
| Type | string | | | D.3.1.5,
D.3.1.6 | | |
| Encoding | string | | | D.3.1.5,
D.3.1.6 | | |

D.3.1.1 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorType

Type: string

Description: The following SensorType value shall be used for IEEE-11073 Medical Device Systems:

```
MOC-Sensor-Type ::= urn:upnp-org:smgt-st:ieee-11073_mds:ieee-org:11073_104zzz
                    :<MDS-vendor>:<MDS-model>:telemetry
```

Where: 11073_104zzz indicates the IEEE document number defining the Medical Device Specialization.

D.3.1.2 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorSpecific/

Type: SingleInstance

Description: There are no defined child nodes for IEEE-11073 Medical Object Class sensors.

D.3.1.3 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/SensorURN

Type: string

Description: The SensorURN parameter for IEEE-11073 Medical Object Class Sensors shall use the following value:

```
MOC-SensorURN ::= urn:upnp-org:smgt-surn:ieee-11073_mds:ieee-org:11073_104zzz
                  :<MDS-vendor>:<MDS-model>:telemetry
```

Where: 11073_104zzz indicates the IEEE document number defining the Medical Device Specialization.

D.3.1.4 DataItems for IEEE-11073 Medical Object Class Sensors

Type: MultInstance

Description: The IEEE-11073 *SensorURN* shall support the following Dataltem(s) as listed in the table below. Each Dataltem shall be described by a set of three parameter nodes:

/UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/SensorURN/Dataltems/#!/

Name

Type

Encoding

The following table lists the settings for the three parameters above to generate the named Dataltem described.

Note: These Sensor parameters do not directly report sensor data, instead they describe named Dataltems which are returned by the sensor using either SOAP actions or transport connections to the sensor.

Table D.3 — Default Dataltem(s) for IEEE-11073 Medical Object Class Sensors

| Name | Type | Encoding | Description |
|-----------------------------|---------------------|---------------|--|
| <u>ClientID</u> | <u>xsd:string</u> | <u>string</u> | <u>ClientID</u> argument value provided from the SensorTransportGeneric ConnectSensor() action. |
| <u>ReceiveTimeStamp</u> | <u>xsd:dateTime</u> | <u>string</u> | The required <u>ReceiveTimeStamp</u> Dataltem for an IEEE-11073 Sensor shall provide a date-time stamp indicating when the Medical Device observation was received by the IoT Management and Control device.
For example:
2013-02-01T20:00:01Z
2013-02-01T12:00:00-08:00 |
| <u>ObservationTimeStamp</u> | <u>xsd:dateTime</u> | <u>string</u> | The required <u>ObservationTimeStamp</u> Dataltem for an IEEE-11073 Sensor shall provide a date-time stamp indicating when the observation was recorded by the Medical Device. If the Medical Device observation does not provide timestamp information, the value of this Dataltem shall be empty.
For example:
2013-02-01T20:00:01Z
2013-02-01T12:00:00-08:00 |
| <u>PersonID</u> | <u>int</u> | <u>string</u> | The allowed PersonID corresponds to the IEEE-11073 <i>person-id</i> attribute. |

D.3.1.5 Dataltem(s) for IEEE-11073 Medical Object Class Sensor Attributes

Type: MultilInstance

Description: The IEEE-11073 SensorURN shall support the following Dataltem(s) to report the attributes of each Medical Object Class Handle within a IEEE-11073 Medical Device System. Each Dataltem shall be described by a set of three parameter nodes:

/UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/SensorURN/Dataltems/#!/

Name

Type

Encoding

The following table summarizes the settings for the three parameter values listed above which define named Dataltem(s) that return attributes for IEEE-11073 Medical Objects.

Note: These Sensor parameters do not directly report sensor data, instead they describe named Dataltem(s) which are returned by the sensor using either SOAP actions or transport connections to the sensor. See Sensor Transport Generic specification [12] for further details.

Table D.4 — Dataltem(s) for Medical Object Class Attributes

| Name | Type | Encoding |
|--|--|-------------------------------|
| <u>\$[MDS-Handle]-Attr</u> | <u>mds:MDSAttributes</u> | <u>Base64</u> |
| <u>\$[MDS-Handle]-Attr</u> | <u>mds:MOCMetricAttributes</u> | <u>Base64</u> |

Where: [\[MDS-Handle\]](#) is substituted with the Handle value of the corresponding Medical Device System Object.

For MDS Object 0, the Dataltem [Type](#) parameter value [IEEE-11073-MDSAttributes](#) shall be used. The value of this Dataltem shall be MDS Object 0 attributes ([MDER ASN.1 AttributeList](#) structure) as defined in IEEE-11073 Part 20601: Application Profile - Optimized Exchange [x] - MDS Attributes. This Dataltem shall be returned as a Base64 encoded string.

For MDS Objects 1-n, the Dataltem [Type](#) parameter value [IEEE-11073-MetricAttributes](#) shall be used. The value of this Dataltem shall be MDS Object 1-n attributes ([MDER ASN.1 AttributeList](#) structure) as defined in IEEE-11073 Part 20601: Application Profile - Optimized Exchange [8] - Metric Attribute. This Dataltem shall be returned as a Base64 encoded string.

For example:

The Dataltem named

[\\$0-Attr](#)

provides a Base-64 encoded string containing the MDS Object Attributes ([MDER ASN.1 AttributeList](#) structure) for the entire Personal Health Device.

The Dataltem named

[\\$1-Attr](#)

provides a Base-64 encoded string containing the Medical Class Object Attributes ([MDER ASN.1 AttributeList](#) structure) for Handle 1 within the Medical Device System.

D.3.1.6 Dataltem(s) for IEEE-11073 Medical Object Class Sensors Observations

Type: MultilInstance

Description: IEEE-11073 SensorURN shall support the following Dataltem(s) to report The observations for each Medical Object Class Handle within a IEEE-11073 Medical Device System. The Dataltem shall be described by a set of three parameter nodes:

[/UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/SensorURN/Dataltems/#!/](#)

[Name](#)

[Type](#)

[Encoding](#)

The following table summarizes the settings for the three parameter values listed above which define named Dataltem(s) that return observations from IEEE-11073 Medical Objects.

Note: These Sensor parameters do not directly report sensor data, instead they describe named Dataltems which are returned by the sensor using either SOAP actions or transport connections to the sensor.

Table D.5 — Dataltem(s) for Medical Object Class Observations

| Name | Type | Encoding |
|----------------------------------|----------------------------------|----------------------|
| <u><i>\$[MDS-Handle]-Obs</i></u> | <u><i>mds:MDSObservation</i></u> | <u><i>Base64</i></u> |

Where: *[MDS-Handle]* is substituted with the Handle value of the corresponding Medical Device System Metric Object. The Dataltem *Type* parameter value *IEEE-11073-MDSObservation* shall be used. The value of this Dataltem shall be MDS Object 1-n attributes (*MDER ASN.1 ObservationScanList* structure) as defined in IEEE-11073 Part 20601: Application Profile - Optimized Exchange [8]. This Dataltem shall be returned as a Base64 encoded string.

For example the Dataltem named

\$1-Obs

provides a Base-64 encoded string containing the MDS Object observation (*MDER ASN.1 ObservationScanList* structure) for Handle 1 of the IEEE-11073 Personal Health Device.

D.4 IoT Management and Control for IEEE-11073 Persistent Metric Stores (PM-Store)

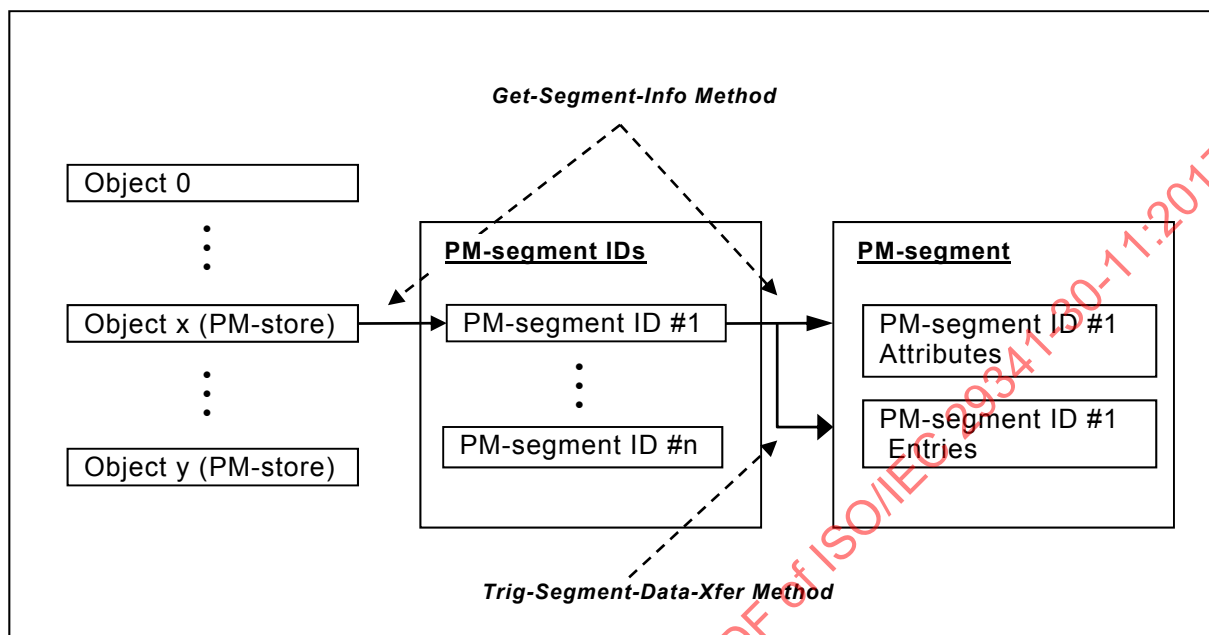


Figure D.2 — Medical Device System with PM-store Object (informative)

The UPnP IoT Management and Control device supports IEEE-11073 Persistent Metric Store (PM-store) objects. Each PM-store object supports zero or more PM-segments. Each PM-Segment contains zero or more Entries with each Entry containing an allowed timestamp header and a series of zero or more Elements. Each Element consists of a defined set of observations from one or more Metric Objects within the medical device. PM-segment's attributes define the data format which applies to all Elements within a given PM-segment.

The UPnP IoT Management and Control device allocates a separate [Sensor](#) node within the UPnP IoT Management and Control DataModel for each PM-store object with a [SensorType](#) parameter value of "upnp-org:sensors:IEEE-11073_PM-store". This [Sensor](#) node supports parameters which control operations for the PM-store object such requesting the transfer the current contents of PM-store segments to the UPnP IoT Management and Control device. In addition, each detected PM-segment is allocated a separate [Sensor](#) node with a [SensorType](#) parameter value of "upnp-org:sensors:IEEE-11073_PM-segment". Each [Sensor](#) node corresponding PM-segment(s) supports Dataltem(s) to read the attributes of the PM-segment and to identify and read the contents (observations) of each Element in the PM-segment.

The UPnP [IoT Management and Control](#) device treats each element within a PM-segment as a separate occurrence providing Dataltems ([SegEntryIndex](#) and [SegElementIndex](#)) which indicate the position of the Element within the PM-segment. When reading the PM-segment sensor all available entries within the PM-segment are sent to the UPnP Client.

D.4.1 IoT Management and Control Parameters for IEEE-11073 Persistent Metric Stores (PM-Store)

The UPnP IoT Management and Control device represents IEEE-11073 Personal Health Devices as a SensorCollection and an included Sensor. The Sensor shall include the following parameters:

Table D.6 — IEEE-11073 Persistent Metric Store Parameter Nodes

| Name | Type | Acc | Req | Reference | EOC | Ver |
|------|------|-----|-----|-----------|-----|-----|
|------|------|-----|-----|-----------|-----|-----|

| | | | | | | |
|---|--------------|--|--|---------|--|--|
| UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorsRelated/#!/ | MultInstance | | | | | |
| SensorPath | string | | | D.4.1.2 | | |
| | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/ | MultInstance | | | | | |
| SensorType | string | | | D.4.1.3 | | |
| SensorUpdateRequest | | | | D.4.1.4 | | |
| | | | | | | |

D.4.1.1 /UPnP/SensorMgt/SensorCollection/#!/Sensors/#!/SensorRelated/**Type:** MultInstance

Description: The conditionally required SensorRelated MultInstance node shall be included for IEEE-11073 Medical Device Persistent Metric Store sensors. An instance of this node shall be generated for each PM-segment sensor this PM-store sensor currently supports.

D.4.1.2 /UPnP/SensorMgt/SensorCollection/#!/Sensors/#!/SensorRelated/#!/SensorPath**Type:** string

Description: The required SensorPath parameter shall provide a partial path to a PM-segment sensor supported by this PM-store sensor.

D.4.1.3 /UPnP/SensorMgt/SensorCollection/#!/Sensors/#!/SensorType**Type:** string

Description: The following SensorType value shall be used for IEEE-11073 Medical Device Persistent Metric Store sensors.

```
PM-store-SensorType ::= urn:upnp-org:smgt-st:ieee-11073_pm-store
                        :ieee-org:11073_104zzz:<MDS-vendor>:<MDS-model>:telemetry
```

Where: 11073_104zzz indicates the IEEE document number defining the Medical Device Specialization.

D.4.1.4 /UPnP/SensorMgt/SensorCollection/#!/Sensors/#!/SensorUpdateRequest**Type:** boolean

Description: The conditionally required SensorUpdateRequest parameter shall be implemented for IEEE-11073 PM-store Segment Sensors. When written to ("1") this parameter shall cause IoT Management and Control to perform the following updates:

- Update the PM-store attributes (as reported by corresponding the PM-store-Handle-Attr DataItem).
- Create new PM-Segment Sensor instances for any PM-store segments not already instantiated.

D.5 IoT Management and Control Parameters for IEEE-11073 Persistent Metric Segments (PM-Segment)

D.6 IoT Management and Control Parameters for IEEE-11073 Persistent Metric Segments (PM-Segment)

The UPnP IoT Management and Control device represents IEEE-11073 Personal Health Devices as a SensorCollection and an included Sensor. The Sensor shall include the following parameters:

Table D.7 — IEEE-11073 Persistent Metric Segment Parameter Nodes

| Name | Type | Acc | Req | Reference | EOC | Ver |
|---|--------------|-----|-----|-----------|-----|-----|
| UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorsRelated/#!/ | MultInstance | | | | | |
| SensorPath | string | | | D.6.1.3 | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/ | MultInstance | | | | | |
| SensorType | string | | | D.6.1.1 | | |
| SensorUpdateRequest | | | | | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/ | MultInstance | | | | | |
| SensorURN | string | | | D.6.1.5 | | |
| /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/DataItems/#!/ | MultInstance | | | | | |
| Name | string | | | D.6.1.6 | | |
| Type | string | | | D.6.1.6 | | |
| Encoding | string | | | D.6.1.6 | | |
| | | | | | | |

D.6.1.1 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorType

Type: string

Description: The following *SensorType* value shall be used for IEEE-11073 Medical Device Persistent Metric Segment sensors.

```
PM-segment-SensorType ::= urn:upnp-org:smgt-st:ieee-11073_pm-segment
                           :ieee-org:11073_104zzz
                           :<MDS-vendor>:<MDS-model>:telemetry
```

Where: 11073_104zzz indicates the IEEE document number defining the Medical Device Specialization.

D.6.1.2 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorRelated/

Type: MultInstance

Description: The conditionally required *SensorRelated* MultInstance node shall be included for IEEE-11073 PM-segment sensors. An instance of this node shall be generated for the PM-store sensor that manages this PM-segment sensor.

D.6.1.3 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorRelated/#!/SensorPath

Type: string

Description: The required [SensorPath](#) parameter shall provide a partial path to a PM-store sensor which includes this PM-segment.

D.6.1.4 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorUpdateRequest

Type: boolean

Description: The conditionally required [SensorUpdateRequest](#) parameter shall be implemented for IEEE-11073 PM-store segment sensors. When written to “1” shall cause IoT Management and Control service transfer and retain a copy of the PM-store segment associated with this Sensor. When the transfer is complete this parameter shall be set to “0”.

D.6.1.5 /UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/SensorURN

Type: string

Description: The [SensorURN](#) parameter for IEEE-11073 PM-segment Sensors shall use the following value:

```
PM-segment-SensorURN ::= urn:upnp-org:smgt-surn:ieee-11073_pm-segment
                        :ieee-org:11073_104zzz:<MDS-vendor>:<MDS-model>:telemetry
```

Where: 11073_104zzz indicates the IEEE document number defining the Medical Device Specialization [9].

D.6.1.6 Dataltems for IEEE-11073 Persistent Metric Segment Objects

Type: MultiInstance

Description: The IEEE-11073 SensorURN shall support the following *DataItem*(s) as listed in the table below. Each *DataItem* shall be described by a set of three parameter nodes:

[/UPnP/SensorMgt/SensorCollections/#!/Sensors/#!/SensorURNs/#!/SensorURN/Dataltems/#!/](#)

[Name](#)

[Type](#)

[Encoding](#)

The following table lists the settings for the three parameters above to generate the named *DataItem* described.

Note: These Sensor parameters do not directly report sensor data, instead they describe named *DataItem*(s) which are returned by the sensor using either SOAP actions or transport connections to the sensor.

Table D.8 — IEEE-11073 Persistent Metric Segment DataItem(s)

| Name | Type | Encoding | Description |
|--------------------------------------|---|------------------------|---|
| ReceiveTimeStamp | xsd:dateTime | string | See Table D.3 |
| ObservationTimeStamp | xsd:dateTime | string | See Table D.3 |
| PersonID | int | string | See Table D.3 |
| SegInstanceNumber | int | string | The required SegInstanceNumber DataItem returns the instance number of the PM-Store segment. |
| SegEntryIndex | int | string | The required SegEntryIndex DataItem provides a zero-based index corresponding to this entry within the PM-Store segment.. |
| SegElementIndex | int | string | The required SegElementIndex DataItem provides a zero-based index corresponding to this element within the PM-Store segment entry. |
| SegEntryHeader | mds:AbsoluteTime
mds:RelativeTime
mds:HighResRelativeTime | Base64 | The required SegEntryHeader DataItem provides the segment entry header contents which prefix the corresponding PM-Store segment entry. If no segment entry header is defined for this PM-Store segment this entry shall return an empty |

| | | | |
|--|--|-------------------------------|--|
| | | | string. |
| <u>SegEntryMap</u> | <u>mds:PmSegmentEntryMap</u> | <u>Base64</u> | The required <u>SegEntryMap</u> Dataltem provides the contents of the PMSegmentEntryMap IEEE-11073 data type which describes the PM-Store entry segment header and element(s). |
| <u>SegEntryElement</u> | <u>mds:SegmentElement</u> | <u>Base64</u> | The required <u>SegEntryElement</u> Dataltem provides the contents of a single PM-Store segment element. The <u>SegmentEntryIndex</u> and <u>SegmentElementIndex</u> Dataltem(s) shall reflect to indices of this element within the PM-store segment. |

STANDARDSISO.COM : Click to view the full PDF of ISO/IEC 29341-30-11:2017

Annex E Common Dataltem Names (Normative)

E.1 Introduction

This annex contains a list of predefined Dataltem names. The Dataltem naming convention is specified in (see UPnP IoT Management and Control Overview [10], subclause 4.3, "Dataltem Semantics" for additional information).

The described Dataltems are specified in such way that they will have a default unit. The used unit can be made explicit by using the units of measurement xml section in the Dataltem description (see UPnP IoT Management and Control Architecture Overview [10], subclause 4.5 for additional information).

DataModels can have the vector indication “_xyz” as suffix. This means that this value is a vector defined for [X,Y,Z]. The contents will then be then formatted as CSV with the values in order of X,Y,Z.

DataModel names can have the set point indication “_sp” or current value indication “_cur” as suffixes. This is done to when a sensor has latency to achieve a set point value. The value suffixed with “_sp” is the set point value and the value suffixed with “_cur” the current value. When the “_sp” and “_cur” value have the same value then the set point is achieved.

Note that both extensions are possible but should have the order of vector indication followed by setpoint or current value indication.

E.2 Alphabetical list of the Dataltem Names

Table D-9 Alphabetical list of common Dataltem names

| Dataltem Name | Section number |
|----------------------|----------------|
| <u>Acceleration</u> | E.3.1 |
| <u>Angle</u> | E.3.2 |
| <u>Area</u> | E.3.3 |
| <u>BatteryState</u> | E.3.37 |
| <u>Brightness</u> | E.3.4 |
| <u>CleanerState</u> | E.3.38 |
| <u>Clock</u> | E.3.46 |
| <u>CloseToDevice</u> | E.3.39 |
| <u>CODetector</u> | E.3.47 |
| <u>CO2Detector</u> | E.3.47 |
| <u>ColorRGB</u> | E.3.5 |

| | |
|-------------------------------|--------|
| <u>ControlValve</u> | E.3.6 |
| <u>Count</u> | E.3.7 |
| <u>Current</u> | E.3.8 |
| <u>Detector</u> | E.3.47 |
| <u>Dewpoint</u> | E.3.48 |
| <u>Direction</u> | E.3.9 |
| <u>Doorbell</u> | E.3.49 |
| <u>DryingState</u> | E.3.40 |
| <u>ElectricalResistance</u> | E.3.54 |
| <u>Energy</u> | E.3.51 |
| <u>EnergyOverloadDetector</u> | E.3.47 |
| <u>Flow</u> | E.3.10 |
| <u>FlowDirection</u> | E.3.11 |
| <u>Force</u> | E.3.50 |
| <u>ForceResistance</u> | E.3.55 |
| <u>Frequency</u> | E.3.12 |
| <u>GasDetector</u> | E.3.47 |
| <u>GlassBreakDetector</u> | E.3.47 |
| <u>GPS</u> | E.3.13 |
| <u>HeatDetector</u> | E.3.47 |
| <u>Humidity</u> | E.3.14 |
| <u>LightDetector</u> | E.3.47 |
| <u>Location</u> | E.3.41 |
| <u>Lock</u> | E.3.42 |
| <u>MagnetoMeter</u> | E.3.43 |
| <u>Mass</u> | E.3.15 |

| | |
|--------------------------|--------|
| <u>MassFlow</u> | E.3.52 |
| <u>Moisture</u> | E.3.16 |
| <u>MotionDetector</u> | E.3.47 |
| <u>OccupancyDetector</u> | E.3.47 |
| <u>Percentage</u> | E.3.17 |
| <u>Position</u> | E.3.18 |
| <u>Power</u> | E.3.19 |
| <u>PowerSwitch</u> | E.3.20 |
| <u>Precipitation</u> | E.3.53 |
| <u>Presence</u> | E.3.21 |
| <u>Pressure</u> | E.3.22 |
| <u>Proximity</u> | E.3.23 |
| <u>Radiation</u> | E.3.56 |
| <u>RainDetector</u> | E.3.47 |
| <u>RelPosition</u> | E.3.24 |
| <u>RelProximity</u> | E.3.25 |
| <u>RelSpeed</u> | E.3.26 |
| <u>Saturation</u> | E.3.27 |
| <u>SmokeDetector</u> | E.3.47 |
| <u>Speed</u> | E.3.28 |
| <u>SpeedDirection</u> | E.3.29 |
| <u>Switch</u> | E.3.30 |
| <u>Temperature</u> | E.3.31 |
| <u>Ventilation</u> | E.3.57 |
| <u>Vibration</u> | E.3.32 |
| <u>Voltage</u> | E.3.33 |

| | |
|----------------------|--------|
| <u>Voltage_dc</u> | E.3.34 |
| <u>Volume</u> | E.3.35 |
| <u>WashProgram</u> | E.3.44 |
| <u>WashState</u> | E.3.45 |
| <u>WaterDetector</u> | E.3.47 |
| <u>WRDirection</u> | E.3.36 |

E.3 Dataltem Definitions

E.3.1 Dataltem Name Acceleration

This Annex describes the dataltem model of the Acceleration actuator/sensor.

E.3.1.1 Dataltem Acceleration definition

The Dataltem is defined with the fields defined in **Table 5-10**.

Acceleration_xyz defines the acceleration with a specific direction.

Table 5-10 — Dataltem Acceleration definition

| Field | Value | R/A |
|--|---------------------|----------|
| <u>Name</u> | <u>Acceleration</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Acceleration is default expressed in [m/s²].

E.3.1.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smg/sdmdid-v1.xsd"
itemname="Acceleration"
access="rw">
<description>The Acceleration</description>
</DataltemDescription>
```

E.3.2 Dataltem Name Angle

This Annex describes the dataltem model of the Angle actuator/sensor.

E.3.2.1 Dataltem Angle definition

The Dataltem is defined with the fields defined in **Table 5-11**.

Table 5-11 — Dataltem Angle definition

| Field | Value | R/A |
|--|--------------|----------|
| <u>Name</u> | <u>Angle</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Angle is default expressed in degrees between [0,360].

E.3.2.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgt/sdmddid-v1.xsd"
itemname="Angle"
access="rw">
<description>The Angle</description>
</DataltemDescription>
```

E.3.3 Dataltem Name Area

This Annex describes the dataltem model of the Area sensor.

E.3.3.1 Dataltem Area definition

The sensor is defined with the fields defined in **Table 5-12**.

Table 5-12 — Dataltem Area definition

| Field | Value | R/A |
|--|--------------|----------|
| <u>Name</u> | <u>Area</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Area is default expressed in square meters [m²].

E.3.3.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgt/sdmddid-v1.xsd"
```

```

itemname="Area"
access="rw">
<description>The Area measurement</description>
</DataItemDescription>

```

E.3.4 Dataltem Name Brightness

This Annex describes the dataltem model of the Brightness actuator/sensor.

E.3.4.1 Dataltem Brightness definition

The sensor is defined with the fields defined in **Table 5-13**.

Table 5-13 — Dataltem Brightness definition

| Field | Value | R/A |
|--|-------------------|----------|
| <u>Name</u> | <u>Brightness</u> | <u>R</u> |
| <u>Type</u> | uda:int32 | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Brightness is used for specifying the brightness of a light/display. This model specifies the intensity on a scale of 0 to 100, with 0 (zero) indicating the minimum intensity.

E.3.4.2 Dataltem description xml

```

<DataItemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgt/sdmdid-v1.xsd"
itemname="Brightness"
access="rw">
<description>The Brightness of a light</description>
</DataItemDescription>

```

E.3.5 Dataltem Name ColorRGB

This Annex describes the dataltem model of the ColorRGB actuator/sensor.

E.3.5.1 Dataltem ColorRGB definition

The sensor is defined with the fields defined in **Table 5-14**.

Table 5-14 — Dataltem ColorRGB definition

| Field | Value | R/A |
|--|-----------------|----------|
| <u>Name</u> | <u>ColorRGB</u> | <u>R</u> |
| <u>Type</u> | uda:int32 | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The **RGBColor** model is used for specifying colors. This model specifies the intensity of red, green, and blue on a scale of 0 to 255, with 0 (zero) indicating the minimum intensity. The settings of the three colors are converted to a single integer value by using this formula:
 RGB value= Red + (Green*256) + (Blue*256*256)

E.3.5.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="ColorRGB"
access="rw">
<description>RGB value</description>
</DataltemDescription>
```

E.3.6 Dataltem Name **ControlValve**

This Annex describes the dataltem model of the ControlValve actuator/sensor.

E.3.6.1 Dataltem **ControlValve** definition

The sensor is defined with the fields defined in **Table 5-15**.

Table 5-15 — Dataltem **ControlValve definition**

| Field | Value | R/A |
|---|---------------------|----------|
| Name | ControlValve | <u>R</u> |
| Type | uda:string | <u>R</u> |
| Encoding | <u>ascii</u> | <u>R</u> |
| access | <u>rw</u> | <u>R</u> |
| a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The **ControlValve** can be expressed as: "open", "close" and "auto".

E.3.6.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="ControlValve"
access="rw">
<description>The controlvalve value</description>
</DataltemDescription>
```

E.3.7 Dataltem Name **Count**

This Annex describes the dataltem model of an Count actuator/sensor.

This is an abstracted value that can be used count or set occurrences.

E.3.7.1 Dataltem **Count** definition

The sensor is defined with the fields defined in **Table 5-16**.

Table 5-16 — Dataltem **Count** definition

| Field | Value | R/A |
|--|--------------|----------|
| <u>Name</u> | <u>Count</u> | <u>R</u> |
| <u>Type</u> | uda:int32 | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

E.3.7.2 Dataltem description xml

```

<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="Count"
access="rw">
<description>counted value</description>
</DataltemDescription>

```

E.3.8 Dataltem Name **Current**

This Annex describes the dataltem model of an Current sensor.

E.3.8.1 Dataltem **Current** definition

The sensor is defined with the fields defined in Table 5-17.

Table 5-17 — Dataltem **Current** definition

| Field | Value | R/A |
|--|----------------|----------|
| <u>Name</u> | <u>Current</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>ro</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Current is default expressed in Ampere [A].

E.3.8.2 Dataltem description xml

```

<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="Current"
access="ro">
<description>Current value</description>
</DataltemDescription>

```

E.3.9 Dataltem Name Direction

This Annex describes the dataltem model of an Direction actuator/sensor.

E.3.9.1 Dataltem Direction definition

The sensor is defined with the fields defined in **Table 5-18**.

Table 5-18 — Dataltem Direction definition

| Field | Value | R/A |
|--|------------------|----------|
| <u>Name</u> | <u>Direction</u> | <u>R</u> |
| <u>Type</u> | uda:string | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Direction is expressed with values: "up", "down", "left", "right", "forward", "reverse" and the values specified for WRDirection (see section E.3.36).

E.3.9.2 Dataltem description xml

```

<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgt/sdmddid-v1.xsd"
itemname="Direction"
access="rw">
<description>Direction measurement</description>
</DataltemDescription>

```

E.3.10 Dataltem Name Flow

This Annex describes the dataltem model of an Flow actuator/sensor.

E.3.10.1 Dataltem Flow definition

The sensor is defined with the fields defined in **Table 5-19**.

Table 5-19 — Dataltem Flow definition

| Field | Value | R/A |
|--|--------------|----------|
| <u>Name</u> | <u>Flow</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Flow is default expressed in [m³/s].

E.3.10.2 Dataltem description xml

```

<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"

```

```

xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgt/sdmdid-v1.xsd"
itemname="Flow"
access="rw">
<description>Flow sensor</description>
</DataltemDescription>

```

E.3.11 Dataltem Name FlowDirection

This Annex describes the dataltem model of an FlowDirection actuator/sensor.

E.3.11.1 Dataltem FlowDirection definition

The sensor is defined with the fields defined in Table 5-20.

Table 5-20 — Dataltem FlowDirection definition

| Field | Value | R/A |
|--|----------------------|----------|
| <u>Name</u> | <u>FlowDirection</u> | <u>R</u> |
| <u>Type</u> | uda:string | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <i>rw</i> | <u>R</u> |
| a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The FlowDirection is expressed as: "in" and "out".

E.3.11.2 Dataltem description xml

```

<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgt/sdmdid-v1.xsd"
itemname="FlowDirection"
access="rw">
<description>FlowDirection sensor</description>
</DataltemDescription>

```

E.3.12 Dataltem Name Frequency

This Annex describes the dataltem model of an (voltage) Frequency sensor/actuator.

E.3.12.1 Dataltem Frequency definition

The sensor is defined with the fields defined in Table 5-21.

Table 5-21 — Dataltem Frequency definition

| Field | Value | R/A |
|-----------------|------------------|----------|
| <u>Name</u> | <u>Frequency</u> | <u>R</u> |
| <u>Type</u> | uda:int32 | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <i>ro</i> | <u>R</u> |

| Field | Value | R/A |
|--|-------|-----|
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Frequency is default expressed in [Hz].

E.3.12.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgmt/sdmdid-v1.xsd"
itemname="Frequency"
access="ro">
<description>Frequency</description>
</DataltemDescription>
```

E.3.13 Dataltem Name GPS

This Annex describes the dataltem model of an GPS sensor.

E.3.13.1 Dataltem GPS definition

The sensor is defined with the fields defined in **Table 5-22**.

Table 5-22 — Dataltem GPS definition

| Field | Value | R/A |
|--|--------------|----------|
| <u>Name</u> | <u>GPS</u> | <u>R</u> |
| <u>Type</u> | uda:string | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>ro</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The GPS coordinate is defined in unit coord-gps or as unit coord-dms section 4.5.6 of [10].

E.3.13.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgmt/sdmdid-v1.xsd"
itemname="GPS"
access="ro">
<description>GPS position</description>
</DataltemDescription>
```

E.3.14 Dataltem Name Humidity

This Annex describes the dataltem model of an Humidity sensor.

E.3.14.1 Dataltem Humidity definition

The sensor is defined with the fields defined in **Table 5-23**.

Table 5-23 — Dataltem **Humidity** definition

| Field | Value | R/A |
|--|-----------------|----------|
| <u>Name</u> | <u>Humidity</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>ro</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Humidity is expressed in percentage of water in the atmosphere.

E.3.14.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="Humidity"
access="ro">
<description>Humidity</description>
</DataltemDescription>
```

E.3.15 Dataltem Name **Mass**

This Annex describes the dataltem model of an Mass sensor.

E.3.15.1 Dataltem **Mass** definition

The sensor is defined with the fields defined in Table 5-24.

Table 5-24 — Dataltem **Mass** definition

| Field | Value | R/A |
|--|--------------|----------|
| <u>Name</u> | <u>Mass</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>ro</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Mass is default expressed in [kg].

E.3.15.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="Mass"
access="ro">
<description>Mass</description>
</DataltemDescription>
```

E.3.16 Dataltem Name Moisture

This Annex describes the dataltem model of an Moisture sensor.

E.3.16.1 Dataltem Moisture definition

The sensor is defined with the fields defined in **Table 5-25**.

Table 5-25 — Dataltem Moisture definition

| Field | Value | R/A |
|--|-----------------|----------|
| <u>Name</u> | <u>Moisture</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>ro</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Moisture is expressed in percentage of water in the measured substance.

E.3.16.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smg/sdmddid-v1.xsd"
itemname="Moisture"
access="ro">
<description>Moisture</description>
</DataltemDescription>
```

E.3.17 Dataltem Name Percentage

This Annex describes the dataltem model of an Percentage actuator/sensor.

E.3.17.1 Dataltem Percentage definition

The sensor is defined with the fields defined in **Table 5-26**.

Table 5-26 — Dataltem Percentage definition

| Field | Value | R/A |
|--|-------------------|----------|
| <u>Name</u> | <u>Percentage</u> | <u>R</u> |
| <u>Type</u> | uda:int16 | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Percentage is used for specifying an value between [0,100] where 0 is the minimum value and 100 is the maximum value.

E.3.17.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
```

```

xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgt/sdmddid-v1.xsd"
itemname="Percentage"
access="rw">
<description>Percentage</description>
</DataltemDescription>

```

E.3.18 Dataltem Name Position

This Annex describes the dataltem model of an position actuator/sensor.

The generic Dataltem Name is defined as Position.

The current position is defined as Position cur.

The set point (wanted) is defined as Position sp.

E.3.18.1 Dataltem Position definition

The sensor is defined with the fields defined in Table 5-27.

Table 5-27 — Dataltem Position definition

| Field | Value | R/A |
|--|-----------------|----------|
| <u>Name</u> | <u>Position</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Position is default expressed in meters [m].

E.3.18.2 Dataltem description xml

```

<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgt/sdmddid-v1.xsd"
itemname="Position"
access="rw">
<description>The absolute position</description>
</DataltemDescription>

```

E.3.19 Dataltem Name Power

This Annex describes the dataltem model of the Power actuator/sensor.

E.3.19.1 Dataltem Power definition

The sensor is defined with the fields defined in Table 5-28.

Table 5-28 — Dataltem Power definition

| Field | Value | R/A |
|-------|-------|-----|
|-------|-------|-----|

| Field | Value | R/A |
|--|--------------|----------|
| <u>Name</u> | <u>Power</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Power is default expressed in watts [W].

E.3.19.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgt/sdmdid-v1.xsd"
itemname="Power"
access="rw">
<description>The power</description>
</DataltemDescription>
```

E.3.20 Dataltem Name PowerSwitch

This Annex describes the dataltem model of an PowerSwitch actuator/sensor.

E.3.20.1 Dataltem PowerSwitch definition

The sensor is defined with the fields defined in Table 5-29.

Table 5-29 — Dataltem PowerSwitch definition

| Field | Value | R/A |
|--|--------------------|----------|
| <u>Name</u> | <u>PowerSwitch</u> | <u>R</u> |
| <u>Type</u> | uda:string | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The PowerSwitch is expressed as; "on", "off" or "sleep".

E.3.20.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgt/sdmdid-v1.xsd"
itemname="PowerSwitch"
access="rw">
<description>The power switch</description>
</DataltemDescription>
```

E.3.21 Dataltem Name Presence

This Annex describes the dataltem model of an Presence actuator/sensor.

E.3.21.1 Dataltem Presence definition

The sensor is defined with the fields defined in **Table 5-30**.

Table 5-30 — Dataltem Presence definition

| Field | Value | R/A |
|---|-----------------|----------|
| <u>Name</u> | <u>Presence</u> | <u>R</u> |
| <u>Type</u> | uda:string | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Presence is used for specifying presence, and is expressed as "present" and "notpresent".

Note that the value "present" can also be interpreted as available and the value "notpresent" as unavailable.

E.3.21.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="Presence"
access="rw">
<description>The presence indication</description>
</DataltemDescription>
```

E.3.22 Dataltem Name Pressure

This Annex describes the dataltem model of the Pressure actuator/sensor.

The generic Dataltem name is defined as Pressure.

The current pressure is defined as Pressure cur.

The set point (wanted) pressure is defined as Pressure sp.

E.3.22.1 Dataltem Pressure definition

The sensor is defined with the fields defined in **Table 5-31**.

Table 5-31 — Dataltem Pressure definition

| Field | Value | R/A |
|-----------------|-----------------|----------|
| <u>Name</u> | <u>Pressure</u> | <u>R</u> |
| <u>Type</u> | uda:int32 | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |

| Field | Value | R/A |
|--|-------|-----|
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Pressure is default expressed in pascal [Pa].

E.3.22.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="Pressure"
access="rw">
<description>The pressure of a system</description>
</DataltemDescription>
```

E.3.23 Dataltem Name Proximity

This Annex describes the dataltem model of an Proximity actuator/sensor.

E.3.23.1 Dataltem Proximity definition

The sensor is defined with the fields defined in Table 5-32.

Table 5-32 — Dataltem Proximity definition

| Field | Value | R/A |
|--|------------------|----------|
| <u>Name</u> | <u>Proximity</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Proximity is default expressed in meters [m].

E.3.23.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgmt/sdmddid-v1.xsd"
itemname="Proximity"
access="rw">
<description>Distance measurement</description>
</DataltemDescription>
```

E.3.24 Dataltem Name RelPosition

This Annex describes the dataltem model of an relative position actuator/sensor.

The generic Dataltem Name is defined as RelPosition.

The current position is defined as RelPosition_cur.

The set point (wanted) position is defined as RelPosition_sp.

E.3.24.1 Dataltem RelPosition definition

The sensor is defined with the fields defined in Table 5-33.

Table 5-33 — Dataltem RelPosition definition

| Field | Value | R/A |
|---|--------------------|----------|
| <u>Name</u> | <u>RelPosition</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The RelPosition is relative and is expressed in a value between [0,100] where 0 means closed and 100 means fully open.

E.3.24.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmddid.xsd
http://www.upnp.org/schemas/smgtsdmdid-v1.xsd"
itemname="RelPosition"
access="rw">
<description>The relative position</description>
</DataltemDescription>
```

E.3.25 Dataltem Name RelProximity

This Annex describes the dataltem model of an RelProximity actuator/sensor.

E.3.25.1 Dataltem RelProximity definition

The sensor is defined with the fields defined in Table 5-34.

Table 5-34 — Dataltem RelProximity definition

| Field | Value | R/A |
|---|---------------------|----------|
| <u>Name</u> | <u>RelProximity</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The RelProximity (distance) is relative and is expressed in a value between [0,100] where 0 means no distance, and 100 means max distance.

E.3.25.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmddid"
```

```

xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation=".
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgmt/sdmdid-v1.xsd"
itemname="RelProximity"
access="rw">
<description>The Relative Distance</description>
</DataItemDescription>

```

E.3.26 DataItem Name RelSpeed

This Annex describes the dataitem model of an relative speed actuator/sensor.

The generic DataItem name is defined as RelSpeed.

The current speed is defined as RelSpeed_cur.

The set point (wanted) speed is defined as RelSpeed_sp.

E.3.26.1 DataItem RelSpeed definition

The sensor is defined with the fields defined in **Table 5-35**.

Table 5-35 — DataItem RelSpeed definition

| Field | Value | R/A |
|--|-----------------|----------|
| <u>Name</u> | <u>RelSpeed</u> | <u>R</u> |
| <u>Type</u> | uda:float | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The RelSpeed is relative and is expressed in a value between [0,100] where 0 means stationary and 100 means maximum speed.

E.3.26.2 DataItem description xml

```

<DataItemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation=".
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgmt/sdmdid-v1.xsd"
itemname="RelSpeed"
access="rw">
<description>The relative speed</description>
</DataItemDescription>

```

E.3.27 DataItem Name Saturation

This Annex describes the dataitem model of the Saturation actuator/sensor.

E.3.27.1 DataItem Saturation definition

The sensor is defined with the fields defined in **Table 5-36**.

Table 5-36 — Dataltem Saturation definition

| Field | Value | R/A |
|--|-------------------|----------|
| <u>Name</u> | <u>Saturation</u> | <u>R</u> |
| <u>Type</u> | uda:int32 | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Saturation defines a range from gray (0%) to pure color (100%) at constant lightness level. A pure color is fully saturated.

E.3.27.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgt/sdmdid-v1.xsd"
itemname="Saturation"
access="rw">
<description>The color saturation value</description>
</DataltemDescription>
```

E.3.28 Dataltem Name Speed

This Annex describes the dataltem model of the Speed actuator/sensor.

E.3.28.1 Dataltem Speed definition

The sensor is defined with the fields defined in **Table 5-37**.

Table 5-37 — Dataltem Speed definition

| Field | Value | R/A |
|--|--------------|----------|
| <u>Name</u> | <u>Speed</u> | <u>R</u> |
| <u>Type</u> | uda:int32 | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>Access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The Speed is default expressed in meters per second [m/s].

E.3.28.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgt/sdmdid-v1.xsd"
itemname="Speed"
access="rw">
<description>The speed value</description>
</DataltemDescription>
```

E.3.29 Dataltem Name SpeedDirection

This Annex describes the dataltem model of the speed direction actuator/sensor.

The Generic Dataltem name is defined as SpeedDirection.

The current speed direction is defined as SpeedDirection_cur.

The set point (wanted) speed direction is defined as SpeedDirection_sp.

E.3.29.1 Dataltem SpeedDirection definition

The sensor is defined with the fields defined in **Table 5-38**.

Table 5-38 — Dataltem SpeedDirection definition

| Field | Value | R/A |
|--|-----------------------|----------|
| <u>Name</u> | <u>SpeedDirection</u> | <u>R</u> |
| <u>Type</u> | uda:string | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>Access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |

The SpeedDirection (for revolving speeds) is defined as "left" and "right".

E.3.29.2 Dataltem description xml

```
<DataltemDescription
xmlns="urn:schemas-upnp-org:smgt:sdmdid"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="
urn:schemas-upnp-org:smgt:sdmdid.xsd
http://www.upnp.org/schemas/smgt/sdmdid-v1.xsd"
itemname="SpeedDirection"
access="rw">
<description>The Direction of the speed</description>
</DataltemDescription>
```

E.3.30 Dataltem Name Switch

This Annex describes the dataltem model of the Switch sensor.

E.3.30.1 Dataltem Switch definition

The sensor is defined with the fields defined in **Table 5-39**.

Table 5-39 — Dataltem Switch definition

| Field | Value | R/A |
|--|---------------|----------|
| <u>Name</u> | <u>Switch</u> | <u>R</u> |
| <u>Type</u> | uda:boolean | <u>R</u> |
| <u>Encoding</u> | <u>ascii</u> | <u>R</u> |
| <u>access</u> | <u>rw</u> | <u>R</u> |
| ^a For a device this column indicates whether the action shall be implemented or not, where <u>R</u> = required, <u>A</u> = allowed, <u>CR</u> = conditionally required, <u>CA</u> = conditionally allowed, <u>X</u> = Non-standard, add <u>-D</u> when deprecated (e.g., <u>R-D</u> , <u>A-D</u>). | | |