ISO/IEC 29341-6-16

Edition 1.0 2008-11

INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture – Part 6-16: Heating, Ventilation and Air Conditioning Device Control Protocol – Temperature Setpoint Service



ISO/IEC 29341-6-16:2008(E)

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2008 ISO/IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about ISO/IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

ISO/IEC 29341-6-16

Edition 1.0 2008-11

INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture – Part 6-16: Heating, Ventilation and Air Conditioning Device Control Protocol – Temperature Setpoint Service

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE G

ICS 35.200

ISBN 2-8318-1008-2

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

CONTENTS

FOREWORD 4
ORIGINAL UPNP DOCUMENTS (informative) 6
1. Overview and Scope 8
2. Service Modeling Definitions 9
2.1. ServiceType 9
2.2. State Variables 9
2.2.1. Application 10
2.2.2. CurrentSetpoint 10
2.2.3. SetpointAchieved 10
2.2.4. Name 10
2.2.5. Relationships Between State Variables 10
2.3. Eventing and Moderation 11
2.3.1. Event Model 11
2.4. Actions 11
2.4.1. GetApplication 12
2.4.2. SetApplication 12
2.4.3. SetCurrentSetpoint 13
2.4.4. GetCurrentSetpoint 13
2.4.5. GetSetPointAchieved 14
2.4.6. GetName 14
2.4.7. SetName 15
2.4.8. Non-Standard Actions Implemented by a UPnP Vendor 15
2.4.9. Relationships Between Actions 15
2.4.10. Common Error Codes 15
2.5. Theory of Operation 16
3. XML Service Description 18
4. Test 21

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

LIST OF TABLES

Table 1 State Variables 9
Table 2 AllowedValueList for Application....9
Table 3 AllowedValueRange for CurrentSetpoint....10
Table 4 Eventing & Moderation 11
Table 5 Event Model....11
Table 6 Action list 11
Table 7 Arguments for GetApplication....12
Table 8 Arguments for SetApplication 12
Table 9 Arguments for SetCurrentSetpoint 13
Table 10 Arguments for GetCurrentSetpoint....13
Table 11 Arguments for GetSetPointAcheived....14
Table 12 Arguments for GetName 14
Table 13 Arguments for SetName....15
Table 14: Common Error Codes....16

--`,,```,,,,````-`-`,,`,,`,`,,`---
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

INFORMATION TECHNOLOGY – UPNP DEVICE ARCHITECTURE –

Part 6-16: Heating, Ventilation and Air Conditioning Device Control Protocol – Temperature Setpoint Service

FOREWORD

1) ISO (International Organization for Standardization) and IEC (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. Their preparation is entrusted to technical committees; any ISO and IEC member body interested in the subject dealt with may participate in this preparatory work. International governmental and non-governmental organizations liaising with ISO and IEC also participate in this preparation.

2) In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

3) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC and ISO member bodies.

4) IEC, ISO and ISO/IEC publications have the form of recommendations for international use and are accepted by IEC and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

5) In order to promote international uniformity, IEC and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.

6) ISO and IEC provide no marking procedure to indicate their approval and cannot be rendered responsible for any equipment declared to be in conformity with an ISO/IEC publication.

7) All users should ensure that they have the latest edition of this publication.

8) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC or ISO member bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication of, use of, or reliance upon, this ISO/IEC publication or any other IEC, ISO or ISO/IEC publications.

9) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

IEC and ISO 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 the putative patent rights. The holders of the putative patent rights have assured IEC and ISO that they are willing to negotiate free licences or licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of the putative patent rights are registered with IEC and ISO.

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:

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

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

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. IEC and ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 29341-6-16 was prepared by UPnP Implementers Corporation 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 the ISO/IEC 29341 series, under the general title *Universal plug and play (UPnP) architecture*, can be found on the IEC web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

ORIGINAL UPNP DOCUMENTS
(informative)

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. 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
UPnP Basic:1 Device	ISO/IEC 29341-2
UPnP AV Architecture:1	ISO/IEC 29341-3-1
UPnP MediaRenderer:1 Device	ISO/IEC 29341-3-2
UPnP MediaServer:1 Device	ISO/IEC 29341-3-3
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: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
UPnP AVTransport:2 Service	ISO/IEC 29341-4-10
UPnP ConnectionManager:2 Service	ISO/IEC 29341-4-11
UPnP ContentDirectory:2 Service	ISO/IEC 29341-4-12
UPnP RenderingControl:2 Service	ISO/IEC 29341-4-13
UPnP ScheduledRecording:1	ISO/IEC 29341-4-14
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 HVAC_ZoneThermostat:1 Device	ISO/IEC 29341-6-2
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 BinaryLight:1 Device	ISO/IEC 29341-7-1
UPnP DimmableLight:1 Device	ISO/IEC 29341-7-2
UPnP Dimming:1 Service	ISO/IEC 29341-7-10
UPnP SwitchPower:1 Service	ISO/IEC 29341-7-11
UPnP InternetGatewayDevice:1 Device	ISO/IEC 29341-8-1
UPnP LANDevice:1 Device	ISO/IEC 29341-8-2
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 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 WANPPPConnection:1 Service	ISO/IEC 29341-8-20
UPnP WLANConfiguration:1 Service	ISO/IEC 29341-8-21
UPnP Printer:1 Device	ISO/IEC 29341-9-1
UPnP Scanner:1.0 Device	ISO/IEC 29341-9-2
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 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 QOS v2 Schema Files	ISO/IEC 29341-11-2

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

UPnP Document Title	ISO/IEC 29341 Part
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 RemoteUIClientDevice:1 Device	ISO/IEC 29341-12-1
UPnP RemoteUIServerDevice:1 Device	ISO/IEC 29341-12-2
UPnP RemoteUIClient:1 Service	ISO/IEC 29341-12-10
UPnP RemoteUIServer:1 Service	ISO/IEC 29341-12-11
UPnP DeviceSecurity:1 Service	ISO/IEC 29341-13-10
UPnP SecurityConsole:1 Service	ISO/IEC 29341-13-11

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

1. Overview and Scope

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

This service-type enables the following functions:

- The means to set and get a temperature set point for use by a temperature controller.
- The highest and lowest valid temperature values for the set point are defined by the vendor.
- An interface is provided that allows notification when a controlled region has reached the temperature control band per this temperature controller's design.
- A vendor fined application type. This allows re-use of this service for multiple applications.

This service does not include:

- The closed-loop control interface that is part of a temperature controller.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

2. Service Modeling Definitions

2.1. ServiceType

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

urn:schemas-upnp-org:service:TemperatureSetpoint:1

2.2. State Variables

Table 1 State Variables

Variable Name	Req. or Opt.[1]	Data Type	Allowed Value [2]	Default Value[2]	Eng. Units
Application	R	string	see table	(none)	n/a
CurrentSetpoint	R	i4	see table	(none)	.01 degrees Celsius
SetpointAchieved	O	boolean	1, 0	0	none
Name	O	string		Zero length string	N/a
Non-standard state variables implemented by an UPnP vendor go here.	*X*	*TBD*	*TBD*	*TBD*	*TBD*

[1] R = Required, O = Optional, X = Non-standard.

[2] Values listed in this column are required. To specify standard optional values or to delegate assignment of values to the vendor, you must reference a specific instance of an appropriate table below.

Table 2 AllowedValueList for Application

Value	Req. or Opt. [1]
Vendor defined as "none" *R/W -This allows a control point to establish the application type*	*O*
Vendor-defined – Read only *Vendor defined – one value only* *Reserved names are:* *Heating,* *Cooling,* *DualHeatingCooling,* *Dryer,* *WaterHeater,* *Refrigerator,* *Freezer*	*O*

[1] R = Required, O = Optional, X = Non-standard.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table 3 AllowedValueRange for CurrentSetpoint

	Value	Req. or Opt. [1]
minimum	*Vendor-defined*	*R*
maximum	*Vendor-defined*	*R*
step	*Step=1 (i.e. 0.01 Celsius)*	*R*

[1] R = Required, O = Optional, X = Non-standard.

2.2.1. Application

This variable states the intended application of this service.

2.2.2. CurrentSetpoint

This variable exposes the setpoint of a service that is controlling temperature to that setpoint.

2.2.3. SetpointAchieved

This variable changes from false to true when the temperature in the controlled region is within the control band. This variable changes to false when a new setpoint is set or when the temperature is no longer in the control band. The value of this variable is determined from information provided by a temperature controller- typically PID..

2.2.4. Name

This optional variable may be used to capture a friendly name or location for this sensor.

2.2.5. Relationships Between State Variables

SetpointAchieved changes from false to true when the temperature in the controlled region is within the control band determined by the CurrentSetpoint. This variable changes to false when a new CurrentSetpoint is set or when the temperature is no longer in the control band.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

2.3. Eventing and Moderation

Table 4 Eventing & Moderation

Variable Name	Evented	Moderated Event	Max Event Rate[1]	Logical Combination	Min Delta per Event[2]
Name	Yes	No	none	none	On-change
Application	Yes	No	none	none	n/a
CurrentSetpoint	Yes	Yes	none	none	On-change
SetpointAchieved	Yes	Yes	none	none	On-change
Non-standard state variables implemented by an UPnP vendor go here.	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*

[1] Determined by N, where Rate = (Event)/(N secs).
[2] (N) * (allowedValueRange Step).

2.3.1. Event Model

Table 5 Event Model

Variable Name	UI requirements	Async Requirements	Func. Vs max rate tradeoffs	Est of Max rate	Reason not evented
Application	Needed for UI				N/a
CurrentTemperature	Needed for UI			Very low	N/a
Name	Needed for UI			Very low	N/a
SetpointAchieved	Needed for UI			Very low	N/a

2.4. Actions

Table 6 Action list

Name	Req. or Opt. [1]
GetApplication	*R*
SetApplication	*O*
SetCurrentSetpoint	*R*
GetCurrentSetpoint	*R*
GetSetpointAchieved	*O*
GetName	O
SetName	O
Non-standard actions implemented by an UPnP vendor go here.	X

[1] R = Required, O = Optional, X = Non-standard.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

2.4.1. GetApplication

Provides the Application value to a control point or other devices

2.4.1.1. Arguments

Table 7 Arguments for GetApplication

Argument	Direction	relatedStateVariable
CurrentApplication	*Out* [R]	Application

[R] Return Value

2.4.1.2. Dependency on State (if any)

Depends on Application

2.4.1.3. Effect on State (if any)

None

2.4.1.4. Errors

errorCode	errorDescription	Description
none		

2.4.2. SetApplication

If the allowed value for Application is not set to a fixed value this action allows a control point to establish the value for Application

Table 8 Arguments for SetApplication

Argument	Direction	relatedStateVariable
NewApplication	*In*	Application

2.4.2.1. Dependency on State (if any)

None

2.4.2.2. Effect on State (if any)

Changes the value of Application

2.4.2.3. Errors

errorCode	errorDescription	Description
701	Not settable	This implementation of this service does not permit writing of this variable.

--`,,```,,,,````-`-`,,`,,`,`,,`---
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

2.4.3. SetCurrentSetpoint

This action establishes a new setpoint for this service. This directs a temperature controller associated with this service to control to a new temperature

2.4.3.1. Arguments

Table 9 Arguments for SetCurrentSetpoint

Argument	Direction	relatedStateVariable
NewCurrentSetpoint	*In*	CurrentSetpoint

2.4.3.2. Dependency on State (if any)

If this service is for cooling and a heating setpoint service is also provided, the cooling value must be less than the heating setpoint. If this service is for heating and a cooling setpoint service is also provided, the heating value must be greater than the cooling setpoint

2.4.3.3. Effect on State

Changes CurrentSetpoint to = NewCurrentSetpoint

2.4.3.4. Errors

errorCode	errorDescription	Description
700	Invalid Temperature	NewCurrentSetpoint is outside of the specified range
701	Rejected – value inconsistent with other setpoint values	If cooling, the value is less than the heating setpoint. If heating the value is more than the cooling setpoint

2.4.4. GetCurrentSetpoint

The action retrieves the current setpoint value from this service.

2.4.4.1. Arguments

Table 10 Arguments for GetCurrentSetpoint

Argument	Direction	relatedStateVariable
CurrentSP	*Out*[R]	CurrentSetpoint

[R] Return Value

2.4.4.2. Dependency on State (if any)

Depends on CurrentSetpoint

2.4.4.3. Effect on State

None

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

2.4.4.4. Errors

errorCode	errorDescription	Description
none		

2.4.5. GetSetPointAchieved

Provides the SetpointAchieved Value to a control point or other devices

2.4.5.1. Arguments

Table 11 Arguments for GetSetPointAcheived

Argument	Direction	relatedStateVariable
CurrentSPA	*Out*[R]	SetpointAchieved

[R] Return Value

2.4.5.2. Dependency on State (if any)

Depends on whether controller has reached the setpoint and is inside the control proportional band.

2.4.5.3. Effect on State

None

2.4.5.4. Errors

errorCode	errorDescription	Description
none		

2.4.6. GetName

Provides the Name value to a control point or other UPnP device

2.4.6.1. Arguments

Table 12 Arguments for GetName

Argument	Direction	relatedStateVariable
CruuentName	*Out*[R]	Name

[R] Return Value

2.4.6.2. Dependency on State (if any)

Depends on Name

2.4.6.3. Effect on State

None

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

2.4.6.4. Errors

errorCode	errorDescription	Description
none		

2.4.7. SetName

Provides a new Name value for the Name variable.

2.4.7.1. Arguments

Table 13 Arguments for SetName

Argument	Direction	relatedStateVariable
NewName	*In*	Name

2.4.7.2. Dependency on State (if any)

None

2.4.7.3. Effect on State

Changes Name

2.4.7.4. Errors

errorCode	errorDescription	Description
none		

2.4.8. Non-Standard Actions Implemented by a UPnP Vendor

To facilitate certification, non-standard actions implemented by UPnP vendors should be included in this service template. The UPnP Device Architecture lists naming requirements for non-standard actions (see the section on Description).

2.4.9. Relationships Between Actions

None.

2.4.10.Common Error Codes

The following table lists error codes common to actions for this service type. If an action results in multiple errors, the most specific error should be returned.

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Table 14: Common Error Codes

errorCode	errorDescription	Description
401	Invalid Action	See UPnP Device Architecture section on Control.
402	Invalid Args	See UPnP Device Architecture section on Control.
404	Invalid Var	See UPnP Device Architecture section on Control.
501	Action Failed	See UPnP Device Architecture section on Control.
600-699	TBD	Common action errors. Defined by UPnP Forum Technical Committee.
701-799		Common action errors defined by the UPnP Forum working committees.
800-899	*TBD*	*(Specified by UPnP vendor.)*

2.5. Theory of Operation

This service exposes the variables to control and observe a temperature controller that controls the heating or cooling of a region or a space. Examples of these mechanisms are an oven control, a water heater control, a room heater control, or a thermostat for a central heating or cooling system.

To achieve closed-loop control of the temperature, these mechanisms frequently sense the current temperature of the region and compare it with a temperature setpoint and then take the appropriate action to have the current temperature be equal (within a control band) to the setpoint.

To control and observe a temperature controller this service uses the following variables:

- Application
- CurrentTemperature
- SetpointAchieved

CurrentSetpoint allows a ControlPoint or other device to establish a new temperature setpoint.

Manufacturers shall establish the allowable range of temperatures using Maximum and Minimum allowed values. These values are observable via the XML description.

Application allows a manufacturer to designate the intended application for this service. The value is observable by a Get action. The following applications are defined:

- Heating – for use in a HVAC heating system. Both heating and cooling setpoints are used in some systems that both heat and cool.
- Cooling – for use in a HVAC cooling system. Both heating and cooling setpoints are used in some systems that both heat and cool.
- DualHeatingCooling – used in systems that use a single setpoint for both heating and cooling.
- Dryer – used for a clothes dryer.
- WaterHeater – used for a domestic water heater.
- Refrigerator – used for the main fresh food compartment of a refrigerator.
- Freezer – used for a standalone freezer or the frozen food compartment of a refrigerator.

A vendor also has the ability to define the allowed value of Application to be “none” if the vendor wishes to make it writable.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

The optional variable, SetpointAchived, is provided for situations where an event is to be generated when the temperature controller first observes the current temperature has entered the control band. This variable is set to "False" when a new CurrentSetpoint is set or when the temperature is outside the control band.

--`,,```,,,,````-`-`,,`,,`,`,,`---
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

3. XML Service Description

```
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
    <action>
    <name>GetApplication</name>
      <argumentList>
        <argument>
          <name>CurrentApplicationname>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>Application</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
The following action is optional
<action>
    <name>SetApplication</name>
      <argumentList>
        <argument>
          <name>NewApplicationname>
          <direction>in</direction>
          <relatedStateVariable>Application</relatedStateVariable>
        </argument>
      </argumentList>
    </action>


<action>
    <name>SetCurrentSetpoint</name>
      <argumentList>
        <argument>
          <name>NewCurrentSetpoint</name>
          <direction>in</direction>
          <relatedStateVariable>CurrentSetpoint</relatedStateVariable>
        </argument>
      </argumentList>
    </action>

<action>
    <name>GetCurrentSetpoint</name>
      <argumentList>
        <argument>
          <name>CurrentSP</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>CurrentSetpoint</relatedStateVariable>
        </argument>
      </argumentList>
    </action>

<action>
    <name>GetSetpointAchieved</name>
      <argumentList>
        <argument>
          <name>CurrentSPA</name>
          <direction>out</direction>
          <retval />
```

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

```
            <relatedStateVariable>SetpointAchieved</relatedStateVariable>
          </argument>
        </argumentList>
      </action>
The following action is optional
<action>
      <name>GetName</name>
        <argumentList>
          <argument>
            <name>CurrentName</name>
            <direction>out</direction>
            <retval />
            <relatedStateVariable>Name</relatedStateVariable>
          </argument>
        </argumentList>
      </action>
The following action is optional
      <action>
      <name>SetName</name>
        <argumentList>
          <argument>
            <name>NewName</name>
            <direction>in</direction>
           <relatedStateVariable>Name</relatedStateVariable>
          </argument>
        </argumentList>
      </action>
      Declarations for other actions added by UPnP vendor (if any) go here
    </actionList>

    <serviceStateTable>
      <stateVariable sendEvents="yes">
        <name>Application</name>
        <dataType>string</dataType>
        <allowedValueList>
          <allowedValue> vendor defined </allowedValue>
          Other allowed values defined by UPnP Forum working committee (if
          any) go here
        </allowedValueList>
      </stateVariable>

      <stateVariable sendEvents="yes">
        <name>CurrentSetpoint</name>
        <dataType>i4</dataType>
        <allowedValueRange>
          <minimum>manufacturer defined</minimum>
          <maximum>manufacturer defined</maximum>
          <step>1</step>
         </allowedValueRange>
      </stateVariable>

      <stateVariable sendEvents="yes">
        <name>SetpointAchieved</name>
        <dataType>boolean</dataType>
        <defaultValue>0</defaultValue>
        <allowedValueList>
          <allowedValue>0</allowedValue>
          <allowedValue>1</allowedValue>
        </allowedValueList>
      </stateVariable>
The following state variable is optional
        <stateVariable sendEvents="yes">
        <name>Name</name>
        <dataType>string</dataType>
```

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

```
    </stateVariable>

    Declarations for other state variables defined by UPnP Forum working
    committee(if any) go here
    Declarations for other state variables added by UPnP vendor (if any)
    go here
  </serviceStateTable>
</scpd>
```

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

4. Test

Testing of the UPnP functions Addressing, Discovery, Description, Control (Syntax) and Eventing are performed by the UPnP Test Tool v1.1 based on the following documents:

- UPnP Device Architecture v1.0
- The Service Definitions in chapter 2 of this document
- The XML Service Description in chapter 3 of this document
- The UPnP Test Tool service template test file: ***TemperatureSetpoint1.xml***
- The UPnP Test Tool service template test file: ***TemperatureSetpoint1.SyntaxTests.xml***

The test suite does not include tests for Control Semantics, since it is felt that such tests would not provide a higher level of interoperability.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

3, rue de Varembé
PO Box 131
CH-1211 Geneva 20
Switzerland

Tel: + 41 22 919 02 11
Fax: + 41 22 919 03 00
info@iec.ch
www.iec.ch

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale