ISO/IEC 29341-7-10

Edition 1.0 2008-11

INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture – Part 7-10: Lighting Device Control Protocol – Dimming Service



ISO/IEC 29341-7-10:2008(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 It also gives information on projects, withdrawn and replaced publications.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 29341-7-10

Edition 1.0 2008-11

INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture – Part 7-10: Lighting Device Control Protocol – Dimming Service

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE M

ICS 35.200

ISBN 2-8318-1009-0

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. LoadLevelTarget 9
2.2.2. LoadLevelStatus 10
2.2.3. OnEffectLevel 10
2.2.4. OnEffect 10
2.2.5. StepDelta 10
2.2.6. RampRate 10
2.2.7. IsRamping 10
2.2.8. RampPaused 10
2.2.9. RampTime 10
2.2.10. Relationships Between State Variables 10
2.3. Eventing and Moderation 11
2.4. Actions 12
2.4.1. SetLoadLevelTarget 12
2.4.2. GetLoadLevelTarget 13
2.4.3. GetLoadLevelStatus 14
2.4.4. SetOnEffectLevel 14
2.4.5. SetOnEffect 15
2.4.6. GetOnEffectParameters 15
2.4.7. StepUp 16
2.4.8. StepDown 16
2.4.9. StartRampUp 16
2.4.10. StartRampDown 17
2.4.11. StopRamp 18
2.4.12. StartRampToLevel 18
2.4.13. SetStepDelta 19
2.4.14. GetStepDelta 19
2.4.15. SetRampRate 20
2.4.16. GetRampRate 20
2.4.17. PauseRamp 21
2.4.18. ResumeRamp 21
2.4.19. GetRampPaused 22
2.4.20. GetRampTime 22
2.4.21. GetIsRamping 23
2.4.22. Non-Standard Actions Implemented by a UPnP Vendor 23
2.4.23. Relationships Between Actions 23
2.4.24. Common Error Codes 24
2.5. Theory of Operation 25
3. XML Service Description 26
4. Test 31

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 2-1: State Variables 9
Table 2-2: DefaultValue for StepDelta 9
Table 2-3: Event Moderation 11
Table 2-4: Actions 12
Table 2-5: Arguments for SetLoadLevelTarget 12
Table 2-6: Arguments for GetLoadLevelTarget 13
Table 2-7: Arguments for GetLoadLevelStatus 14
Table 2-8: Arguments for SetOnEffectLevel 14
Table 2-9: Arguments for SetOnEffect 15
Table 2-10: Arguments for GetOnEffectParameters 15
Table 2-11: Arguments for StartRampToLevel 18
Table 2-12: Arguments for SetStepDelta 19
Table 2-13: Arguments for GetStepDelta 19
Table 2-14: Arguments for SetRampRate 20
Table 2-15: Arguments for GetRampRate 20
Table 2-16: Arguments for GetRampPaused 22
Table 2-17: Arguments for GetRampTime 22
Table 2-18: Arguments for GetIsRamping 23
Table 2-19: Common Error Codes 25

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 7-10: Lighting Device Control Protocol – Dimming 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 29341-7-10 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 and Version 1.01 of the UPnP Standard Service Template.

This service-type enables the following functions:

1. Enables remote control of a dimmable lighting device,
2. Defines required basic actions for dimming to a value,
3. Defines optional actions for the dimming effect when the dimmable light is turned on,
4. Defines optional actions for stepped dimming,
5. Defines optional actions for ramped dimming (time base ramping or target value ramping).

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

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:*Dimming:1*.

2.2. State Variables

Table 2-1: State Variables

Variable Name	Req. or Opt.[1]	Data Type	Allowed Value[2]	Default Value[2]	Eng. Units
LoadLevelTarget	R	ui1	0-100	0	%
LoadLevelStatus	R	ui1	0-100	0	%
OnEffectLevel	O	ui1	0-100	100	%
OnEffect	O	string	OnEffectLevel, LastSetting, Default	Default	
StepDelta	O	ui1	1-100	See Table 1.1 below	%
RampRate	O	ui1	0-100	0	%/s
IsRamping	O	Boolean		0	
RampPaused	O	Boolean		0	
RampTime	O	ui4	0-4294967295	0	ms
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 these columns 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 2-2: DefaultValue for StepDelta

Value	Req. or Opt.
Vendor-defined within range of 1-100	R

2.2.1. LoadLevelTarget

Value of the desired load level, LoadLevelStatus is actual value of dimmer output. Dimmer may take time to ramp or jump to the target level so LoadLevelTarget may not equal LoadLevelStatus until the dimmer reaches the desired state. Can be any value between 0 (off) and 100 (full on). Also, see SetLoadLevelTarget().

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

2.2.2. LoadLevelStatus

Current dimmer output level. Can be any value between 0 (off) and 100 (full on). This value may change multiple times during the transition from the current state to the LoadLevelTarget value. The dimmer should only send the evented update when LoadLevelStatus is equal to LoadLevelTarget, but a control point may query this value during the time the dimmer is transitioning to LoadLevelTarget.

2.2.3. OnEffectLevel

Defines the level to which LoadLevelTarget is set when the OnEffect variable is set to "OnEffectLevel" and the device is turned on, either logically (e.g. by a PowerSwitch service) or physically.If the OnEffect variable contains any other value than "OnEffectLevel", this value is not used at all. The unit is % of maximum output, like LoadLevelStatus.

2.2.4. OnEffect

Defines which value LoadLevelTarget is set to when power is provided to the device, either logically (e.g. by a PowerSwitch service) or physically. "OnEffectLevel" causes LoadLevelStatus beeing set to the value of OnEffectLevel; "LastSetting" sets LoadLevelTarget to the last value of LoadLevelStatus before a power-down occurred; "Default" defines a manufacturer specific setting for LoadLevelTarget (which includes leaving the value of LoadLevelTarget unchanged).

2.2.5. StepDelta

Incremental amount of change for StepUp and StepDown actions. The values are expressed in % and can range from 0 to 100. This value is used for incrementing or decrementing LoadLevelTarget when calling SetupUp() or StepDown(), respectively.

2.2.6. RampRate

Incremental level change per second. (5 = 5/100 of max level in 1 second) for RampUp and RampDown commands..

2.2.7. IsRamping

Set to 1 when ramping is currently in progress, also if it is paused.

2.2.8. RampPaused

Set to 1 when ramping is currently paused.

2.2.9. RampTime

Time to reach the LoadLevelTarget, applies only when a StartRampToLevel action has been invoked, otherwise it must be 0. The unit is milliseconds.

2.2.10. Relationships Between State Variables

2.2.10.1. OnEffectLevel and OnEffect

OnEffectLevel and OnEffect are both optional, however it is a requirement to implement either none or both together, as they are dependent.

2.2.10.2. RampRate, IsRamping and RampTime

RampRate, IsRamping and RampTime are all optional, however it is a requirement to implement either none or all, as they are dependent.

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

2.2.10.3. RampPaused

RampPaused is optional but can only be implemented when RampRate, IsRamping, and RampTime are implemented.

2.3. Eventing and Moderation

Table 2-3: Event Moderation

Variable Name	Evented	Moderated Event	Max Event Rate[1]	Logical Combination	Min Delta per Event[2]
LoadLevelTarget	No	n/a	n/a		n/a
LoadLevelStatus	Yes	No	None		None
OnEffectLevel	No	n/a	n/a		n/a
OnEffect	No	n/a	n/a		n/a
StepDelta	Yes	No	None		None
RampRate	Yes	No	None		None
IsRamping	Yes	No	None		None
RampPaused	Yes	No	None		None
RampTime	No	n/a	n/a		n/a
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).

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

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. Actions

Immediately following this table is detailed information about these actions, including short descriptions of the actions, the effects of the actions on state variables, and error codes defined by the actions.

Table 2-4: Actions

Name	Req. or Opt. [1]
SetLoadLevelTarget	R
GetLoadLevelTarget	R
GetLoadLevelStatus	R
SetOnEffectLevel	O
SetOnEffect	O
GetOnEffectParameters	O
StepUp	O
StepDown	O
StartRampUp	O
StartRampDown	O
StopRamp	O
StartRampToLevel	O
SetStepDelta	O
GetStepDelta	O
SetRampRate	O
GetRampRate	O
PauseRamp	O
ResumeRamp	O
GetRampPaused	O
GetRampTime	O
GetIsRamping	O
Non-standard actions implemented by an UPnP vendor go here.	X

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

2.4.1. SetLoadLevelTarget

2.4.1.1. Arguments

Table 2-5: Arguments for SetLoadLevelTarget

Argument	Direction	relatedStateVariable
NewLoadLevelTarget	IN	LoadLevelTarget

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

2.4.1.2. Effect on State

Set LoadLevelTarget to newLoadLevelTarget. When LoadLevelTarget changes, the device implementation is supposed to set LoadLevelStatus as soon as possible to LoadLevelTarget, or, in other words, to physically execute the command.

A call to SetLoadLevelTarget() implicitely stops ramping if applicable ("last action wins"), resetting the state variables as defined by StopRamp().

2.4.1.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.2. GetLoadLevelTarget

2.4.2.1. Arguments

Table 2-6: Arguments for GetLoadLevelTarget

Argument	Direction	relatedStateVariable
retLoadLevelTarget	OUT	LoadLevelTarget

2.4.2.2. Effect on State

Returns LoadLevelTarget in retLoadLevelTarget.

2.4.2.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

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. GetLoadLevelStatus

2.4.3.1. Arguments

Table 2-7: Arguments for GetLoadLevelStatus

Argument	Direction	relatedStateVariable
retLoadLevelStatus	OUT	LoadLevelStatus

2.4.3.2. Effect on State

Returns LoadLevelStatus in retLoadLevelStatus.

2.4.3.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.4. SetOnEffectLevel

2.4.4.1. Arguments

Table 2-8: Arguments for SetOnEffectLevel

Argument	Direction	relatedStateVariable
NewOnEffectLevel	IN	OnEffectLevel

2.4.4.2. Effect on State

Set OnEffectLevel to newOnEffectLevel.

2.4.4.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

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

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

2.4.5. SetOnEffect

2.4.5.1. Arguments

Table 2-9: Arguments for SetOnEffect

Argument	Direction	relatedStateVariable
NewOnEffect	IN	OnEffect

2.4.5.2. Effect on State

Set OnEffect to newOnEffect.

2.4.5.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.6. GetOnEffectParameters

2.4.6.1. Arguments

Table 2-10: Arguments for GetOnEffectParameters

Argument	Direction	relatedStateVariable
RetOnEffect	OUT	OnEffect
RetOnEffectLevel	OUT	OnEffectLevel

2.4.6.2. Effect on State

Returns the current values for OnEffect and OnEffectLevel. The function returns both at the same time to provide a consistent state as concurrent access may occur.

2.4.6.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

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

2.4.7. StepUp

2.4.7.1. Arguments

No Arguments.

2.4.7.2. Effect on State

Increments the LoadLevelTarget by StepDelta. If LoadLevelTarget would exceed the maximum of 100%, it is set to 100%.

A call to StepUp() implicitely stops ramping if applicable ("last action wins"), resetting the state variables as defined by StopRamp().

2.4.7.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.8. StepDown

2.4.8.1. Arguments

No Arguments.

2.4.8.2. Effect on State

Decrements the LoadLevelTarget by StepDelta. If LoadLevelTarget would fall below the minimum of 0%, it is set to 0%.

A call to StepDown() implicitely stops ramping if applicable ("last action wins"), resetting the state variables as defined by StopRamp().

2.4.8.3. Errors

errorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.9. StartRampUp

2.4.9.1. Arguments

No Arguments.

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

2.4.9.2. Effect on State

LoadLevelTarget is incremented by the value defined by the RampRate. The update of LoadLevelTarget must occur at least every second (the manufacturer may support faster update, e.g. every half a second). The function stops ramping if LoadLevelTarget reaches the maximum of 100%, StopRamp() is called or another action like SetLoadLevelTarget() stops ramping implicitly ("last action wins").

A call to StartRampUp() implicitly stops current ramping if applicable ("last action wins") before starting the new ramping function.

Set IsRamping to 1.

Set RampPaused to 0.

Start incrementing LoadLevelTarget.

2.4.9.3. Errors

errorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.10. StartRampDown

2.4.10.1. Arguments

No Arguments.

2.4.10.2. Effect on State

LoadLevelTarget is decremented by the value defined by the RampRate. The update of LoadLevelTarget must occur at least every second (the manufacturer may support faster update, e.g. every half a second). The function stops ramping if LoadLevelTarget reaches the minimum of 0%, StopRamp() is called or another action like SetLoadLevelTarget() stops ramping implicitly ("last action wins").

A call to StartRampDown() implicitly stops current ramping if applicable ("last action wins") before starting the new ramping function.

Sets IsRamping to 1.

Sets RampPaused to 0.

Starts decrementing LoadLevelTarget.

2.4.10.3. Errors

errorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

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

2.4.11. StopRamp

2.4.11.1. Arguments

No Arguments.

2.4.11.2. Effect on State

Stops ramping started either by StartRampUp(), StartRampDown() or StartRampToLevel() and resets ramping-related state table variables.

To ease device handling by a user (e.g. "stop all dynamic actions"), a call to StopRamp() issued when no ramping is currently in progress returns with success although no action is performed.

Set IsRamping to 0.

Set RampPaused to 0.

Set RampTime to 0.

2.4.11.3. Errors

errorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.12. StartRampToLevel

2.4.12.1. Arguments

Table 2-11: Arguments for StartRampToLevel

Argument	Direction	relatedStateVariable
NewLoadLevelTarget	IN	LoadLevelTarget
NewRampTime	IN	RampTime

2.4.12.2. Effect on State

Starts ramping from the current value of LoadLevelTarget to the value defined by newLoadLevelTarget over the time provided by newRampTime. Furthermore, RampTime is initally set to newRampTime and decreased until Ramptime reaches 0. The update of LoadLevelTarget and RampTime must occur at least every second (the manufacturer may support faster update, e.g. every half a second).

A call to StartRampToLevel() implicitely stops current ramping if applicable ("last action wins") before starting the new ramping function.

Set IsRamping to 1.

Set RampPaused to 0.

Start LoadLevelTarget approaching the value of newLoadLevelTarget.

Set RampTime to newRampTime.

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

2.4.12.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.13. SetStepDelta

2.4.13.1. Arguments

Table 2-12: Arguments for SetStepDelta

Argument	Direction	relatedStateVariable
NewStepDelta	IN	StepDelta

2.4.13.2. Effect on State

Sets StepDelta to newStepDelta. Variable is used by the StepUp() and SetupDown() actions

2.4.13.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.14. GetStepDelta

Table 2-13: Arguments for GetStepDelta

Argument	Direction	relatedStateVariable
RetStepDelta	OUT	StepDelta

2.4.14.1. Effect on State

Returns StepDelta which is used by the StepUp() and SetupDown() actions.

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

2.4.14.2. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.15. SetRampRate

2.4.15.1. Arguments

Table 2-14: Arguments for SetRampRate

Argument	Direction	relatedStateVariable
NewRampRate	IN	RampRate

2.4.15.2. Effect on State

Sets RampRate to newRampRate. Variable is used by the StartRampUp() and StartRampDown() actions

2.4.15.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.16. GetRampRate

2.4.16.1. Arguments

Table 2-15: Arguments for GetRampRate

Argument	Direction	relatedStateVariable
RetRampRate	OUT	RampRate

2.4.16.2. Effect on State

Returns RampRate which is used by the StartRampUp() and StartRampDown() actions.

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

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

2.4.16.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.17. PauseRamp

2.4.17.1. Arguments

No Arguments.

2.4.17.2. Effect on State

If ramping is in progress, RampPaused is set to 1 and the ramping function is paused until a call to ResumeRamp() occurs.

Set RampPaused to 1.

2.4.17.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.
700	No ramping in progress	The PauseRamp() action has been invoked while no ramping was in progress.

2.4.18. ResumeRamp

2.4.18.1. Arguments

No Arguments.

2.4.18.2. Effect on State

If ramping is in progress but has been paused by a call to PauseRamp(), RampPaused is set to 0 and ramping is continued.

Set RampPaused to 0.

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

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

2.4.18.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.
700	No ramping in pause mode	The ResumeRamp() action has been invoked while no ramping was in progress or ramping was not paused.

2.4.19. GetRampPaused

2.4.19.1. Arguments

Table 2-16: Arguments for GetRampPaused

Argument	Direction	relatedStateVariable
RetRampPaused	OUT	RampPaused

2.4.19.2. Effect on State

Returns RampPaused.

2.4.19.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.20. GetRampTime

2.4.20.1. Arguments

Table 2-17: Arguments for GetRampTime

Argument	Direction	relatedStateVariable
RetRampTime	OUT	RampTime

2.4.20.2. Effect on State

Returns RampTime.

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

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

2.4.20.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.21. GetIsRamping

2.4.21.1. Arguments

Table 2-18: Arguments for GetIsRamping

Argument	Direction	relatedStateVariable
RetIsRamping	OUT	IsRamping

2.4.21.2. Effect on State

Returns IsRamping.

2.4.21.3. Errors

ErrorCode	ErrorDescription	Description
401	Invalid Action	See UPnP Device Architecture Section on Control.
402	Invalid Args	See UPnP Device Architecture Section on Control.
403	Out of Synch	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 the UPnP Forum Technical Committee.

2.4.22. 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).

2.4.23. Relationships Between Actions

In general, the principle is "last action wins". Therefore, the background operations initiated StartRampUp() and StartRampDown() and StartRampToLevel() are canceled by any call to SetLoadLevelTarget(), StepUp() or StepDown(), and by initiating another ramping function. For more details, see "Theory of operation".

The function StopRamp() is used to cancel the background operations initiated by StartRampUp() and StartRampDown() and StartRampToLevel(). Furthermore, the background operation can be paused by using PauseRamp() and continued by ResumeRamp() (when implemented).

Following are the list of implementation packages. If a particular package is chosen all actions in that package have to be implemented.

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

2.4.23.1. Mandatory actions

SetLoadLevelTarget(newLoadLevelTarget)

GetLoadLevelTarget(RetLoadLevelTarget)

GetLoadLevelStatus(retLoadLevelStatus)

2.4.23.2. OnEffect actions (optional)

SetOnEffectLevel (newOnEffectLevel)

SetOnEffect(newOnEffect)

GetOnEffectParameters(retOnEffect, retOnEffectLevel)

2.4.23.3. Stepping actions (optional)

StepUp( )

StepDown( )

SetStepDelta(newStepDelta)

GetStepDelta(retStepDelta)

2.4.23.4. Simple ramping actions (optional)

StartRampUp( )

StartRampDown( )

StopRamp( )

StartRampToLevel(newLoadLevelTarget, newRampTime)

SetRampRate(newRampRate)

GetRampRate(retRampRate)

GetIsRamping(retIsRamping)

GetRampPaused(retRampPaused)

GetRampTime(retRampTime)

2.4.23.5. Additional ramping actions (optional but require Simple ramping implementations)

PauseRamp( )

ResumeRamp( )

2.4.24. 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 must 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 2-19: 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

Instances of Dimming Services are embedded into devices to provide a standard means of programmatic control over dimmable lighting devices.

This service model provides for situations where requested state changes may not cause immediate output state changes, reflected via the *Status* variable, for any number of reasons. For example if there are time delays involved or maybe the requested state can't be achieved because of a hardware failure.

In the simplest of cases the output state (*LoadLevelStatus*) will always follow the requested state changes submitted via *LoadLevelTarget*.

There is also the situation where the *LoadLevelStatus* variable could change state without any programmatic action against this model at all. For example, this could happen if there was a front-panel power control that was changed by a user.

In addition to the explicit setting of *LoadLevelTarget*, several typical but optional functions are defined. The value of *LoadLevelTarget* can therefore be modified by either:

1. Explicit setting of *LoadLevelTarget* by calling SetLoadLevelTarget(),
2. Setting *LoadLevelTarget* by the OnEffect (when power is provided to the device, either logically or physically) (optional)
3. Stepping up or down by calling StepUp() or StepDown() (optional), or
4. Ramping up or down or to a specific value by calling StartRampUp(), StartRampDown() or RampToLevel() (optional)

While support of SetLoadLevelTarget() is mandatory, any combination of OnEffect, stepping, or ramping implementation is valid.

The actions invoking ramping (StartRampUp(), StartRampDown(), StartRampToLevel()) return immediately but start a background operation which modifies the state over time. These operations stop when:

1. LoadLevelTarget reaches the maximum (100%) after a call to StartRampUp()
2. LoadLevelTarget reaches the minimum (0%) after a call to StartRampDown()
3. LoadLevelTarget reaches the targeted level after a call to StartRampToLevel()
4. Ramping is terminated explicitly by invoking StopRamp()
5. Ramping is terminated implicitly by invoking another action affecting the LoadLevelTarget, e.g. SetLoadLevelTarget()

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>SetLoadLevelTarget</name>
      <argumentList>
        <argument>
          <name>newLoadlevelTarget</name>
          <direction>in</direction>
          <relatedStateVariable>LoadLevelTarget</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetLoadLevelTarget</name>
      <argumentList>
        <argument>
          <name>retLoadlevelTarget</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>LoadLevelTarget</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetLoadLevelStatus</name>
      <argumentList>
        <argument>
          <name>retLoadlevelStatus</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>LoadLevelStatus</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>SetOnEffectLevel</name>
      <argumentList>
        <argument>
          <name>newOnEffectLevel</name>
          <direction>in</direction>
          <relatedStateVariable>OnEffectLevel</relatedStateVariable>
        </argument>
      </argumentList>
    </action>

    <action>
      <name>SetOnEffect</name>
      <argumentList>
        <argument>
          <name>newOnEffect</name>
          <direction>in</direction>
          <relatedStateVariable>OnEffect</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
```

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

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

```
      <name>GetOnEffectParameters</name>
      <argumentList>
        <argument>
          <name>retOnEffect</name>
          <direction>out</direction>
          <relatedStateVariable>OnEffect</relatedStateVariable>
        </argument>
        <argument>
          <name>retOnEffectLevel</name>
          <direction>out</direction>
          <relatedStateVariable>OnEffectLevel</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>StepUp</name>
    </action>
    <action>
      <name>StepDown</name>
    </action>
    <action>
      <name>StartRampUp</name>
    </action>
    <action>
      <name>StartRampDown</name>
    </action>
    <action>
      <name>StopRamp</name>
    </action>
    <action>
      <name>StartRampToLevel</name>
      <argumentList>
        <argument>
          <name>newLoadLevelTarget</name>
          <direction>in</direction>
          <relatedStateVariable>LoadLevelTarget</relatedStateVariable>
        </argument>
        <argument>
          <name>newRampTime</name>
          <direction>in</direction>
          <relatedStateVariable>RampTime</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>SetStepDelta</name>
      <argumentList>
        <argument>
          <name>newStepDelta</name>
          <direction>in</direction>
          <relatedStateVariable>StepDelta</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetStepDelta</name>
      <argumentList>
        <argument>
          <name>retStepDelta</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>StepDelta</relatedStateVariable>
        </argument>
      </argumentList>
```

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

```
    </action>
    <action>
      <name>SetRampRate</name>
      <argumentList>
        <argument>
          <name>newRampRate</name>
          <direction>in</direction>
          <relatedStateVariable>RampRate</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetRampRate</name>
      <argumentList>
        <argument>
          <name>retRampRate</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>RampRate</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>PauseRamp</name>
    </action>
    <action>
      <name>ResumeRamp</name>
    </action>
    <action>
      <name>GetIsRamping</name>
      <argumentList>
        <argument>
          <name>retIsRamping</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>IsRamping</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetRampPaused</name>
      <argumentList>
        <argument>
          <name>retRampPaused</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>RampPaused</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetRampTime</name>
      <argumentList>
        <argument>
          <name>retRampTime</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>RampTime</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    Declarations for other actions added by UPnP vendor (if any) go here
  </actionList>
```

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

```
<serviceStateTable>
  <stateVariable sendEvents="no">
    <name>LoadLevelTarget</name>
    <dataType>ui1</dataType>
    <defaultValue>0</defaultValue>
    <allowedValueRange>
      <minimum>0</minimum>
      <maximum>100</maximum>
    </allowedValueRange>
  </stateVariable>
  <stateVariable sendEvents="yes">
    <name>LoadLevelStatus</name>
    <dataType>ui1</dataType>
    <defaultValue>0</defaultValue>
    <allowedValueRange>
      <minimum>0</minimum>
      <maximum>100</maximum>
    </allowedValueRange>
  </stateVariable>

  <stateVariable sendEvents="no">
    <name>OnEffectLevel</name>
    <dataType>ui1</dataType>
    <defaultValue>100</defaultValue>
    <allowedValueRange>
      <minimum>0</minimum>
      <maximum>100</maximum>
    </allowedValueRange>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>OnEffect</name>
    <dataType>string</dataType>
    <defaultValue>Default</defaultValue>
    <allowedValueList>
      <allowedValue>OnEffectLevel</allowedValue>
      <allowedValue>LastSetting</allowedValue>
      <allowedValue>Default</allowedValue>
    </allowedValueList>
  </stateVariable>
  <stateVariable sendEvents="yes">
    <name>StepDelta</name>
    <dataType>ui1</dataType>
    <defaultValue> Manufacturer defined default value </defaultValue>
    <allowedValueRange>
      <minimum>1</minimum>
      <maximum>100</maximum>
    </allowedValueRange>
  </stateVariable>
  <stateVariable sendEvents="yes">
    <name>RampRate</name>
    <dataType>ui1</dataType>
    <defaultValue>0</defaultValue>
    <allowedValueRange>
      <minimum>0</minimum>
      <maximum>100</maximum>
    </allowedValueRange>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>RampTime</name>
    <dataType>ui4</dataType>
    <defaultValue>0</defaultValue>
    <allowedValueRange>
      <minimum>0</minimum>
```

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

```
          <maximum>4294967295</maximum>
        </allowedValueRange>
      </stateVariable>
      <stateVariable sendEvents="yes">
        <name>IsRamping</name>
        <dataType>boolean</dataType>
        <defaultValue>0</defaultValue>
      </stateVariable>
      <stateVariable sendEvents="yes">
        <name>RampPaused</name>
        <dataType>boolean</dataType>
        <defaultValue>0</defaultValue>
      </stateVariable>
    </serviceStateTable>
        Declarations for other state variables added by UPnP vendor (if
any)go here
</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: ***Dimming1.xml***
- The UPnP Test Tool service template test file: ***Dimming1.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