ISO/IEC 29341-7-11

Edition 1.0 2008-11

INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture – Part 7-11: Lighting Device Control Protocol – Switch Power Service



ISO/IEC 29341-7-11:2008(E)

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ISO/IEC 29341-7-11

Edition 1.0 2008-11

INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture – Part 7-11: Lighting Device Control Protocol – Switch Power Service

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE D

ICS 35.200

ISBN 2-8318-1009-1

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Part 7-11: Lighting Device Control Protocol – Switch Power Service

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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.

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ORIGINAL UPNP DOCUMENTS
(informative)

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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

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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

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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:

- basic power switching for embedding devices.

This service template does not address:

- It is assumed that implementations of this service will not disable themselves as a side effect of driving their output load to a disabled state.

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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: SwitchPower: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
Target	R	Boolean		0	
Status	R	Boolean		0	
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.

2.2.1. Target

Set to 0 to request a power-off state or to 1 to request a power-on state.

2.2.2. Status

This reflects the actual state of the power control output state.

This value will typically follow the requested state changes to Target but may be different because of delays within the actual implementation or because of a hard failure.

Simple implementations can implement the constant function: Status = Target.

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2.3. Eventing and Moderation

Table 2-2: Event Moderation

Variable Name	Evented	Moderated Event	Max Event Rate[1]	Logical Combination	Min Delta per Event[2]
Target	No	n/a		n/a	
Status	Yes	No		None	None
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).

2.4. 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 2-3: Actions

Name	Req. or Opt. [1]
SetTarget	R
GetTarget	R
GetStatus	R
Non-standard actions implemented by an UPnP vendor go here.	X

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

2.4.1. SetTarget

2.4.1.1. Arguments

Table 2-4: Arguments for SetTarget

Argument	Direction	relatedStateVariable
NewTargetValue	IN	Target

2.4.1.2. Effect on State (if any)

Requests the Power Switch Service instance output to be driven to the state indicated by *newTargetValue*.

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2.4.1.3. Errors

Table 2-5: Error Codes for SetTarget

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. GetTarget

Provided for testing and debugging purposes.

2.4.2.1. Arguments

Table 2-6: Arguments for GetTarget

Argument	Direction	relatedStateVariable
RetTargetValue	OUT	Target

2.4.2.2. Effect on State (if any)

None.

Requests the Power Switch Service instance to return the value of Target.

2.4.2.3. Errors

Table 2-7: Error Codes for GetTarget

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.

2.4.3. GetStatus

2.4.3.1. Arguments

Table 2-8: Arguments for GetStatus

Argument	Direction	relatedStateVariable
ResultStatus	OUT	Status

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2.4.3.2. Effect on State

None.

Requests the Power Switch Service instance to return the value of Status.

2.4.3.3. Errors

Table 2-9: Error Codes for GetStatus

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. 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).

2.4.5. 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.

Table 2-10: 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 Power Switch Services are embedded into devices to provide a standard means of programmatic control over these embedding devices' powered-on (enabled/disabled) state, this being either on (1) or off (0).

This service model provides for situations where requested state changes may not result in actual one-for-one 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.

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

There is also the situation where the *Status* 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.

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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>SetTarget</name>
      <argumentList>
        <argument>
          <name>newTargetValue</name>
          <relatedStateVariable>Target</relatedStateVariable>
          <direction>in</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetTarget</name>
      <argumentList>
        <argument>
          <name>RetTargetValue</name>
          <relatedStateVariable>Target</relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetStatus</name>
      <argumentList>
        <argument>
          <name>ResultStatus</name>
          <relatedStateVariable>Status</relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
    Declarations for other actions added by UPnP vendor (if any) go here
  </actionList>
  <serviceStateTable>
    <stateVariable sendEvents="no">
      <name>Target</name>
      <dataType>boolean</dataType>
      <defaultValue>0</defaultValue>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>Status</name>
      <dataType>boolean</dataType>
      <defaultValue>0</defaultValue>
    </stateVariable>
    Declarations for other state variables added by UPnP vendor (if any)
    go here
  </serviceStateTable>
</scpd>
```

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4. Test

Syntactical testing is performed by the UPnP test tool based on the XML description as provided in Section 3.

The working committee and the implementers have come to the conclusion that further test descriptions e.g. for semantical testing do not provide a higher level of interoperability.

Thus the XML description is deemed to be sufficient for testing of devices that implement this template and further test descriptions are not provided by this template.

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