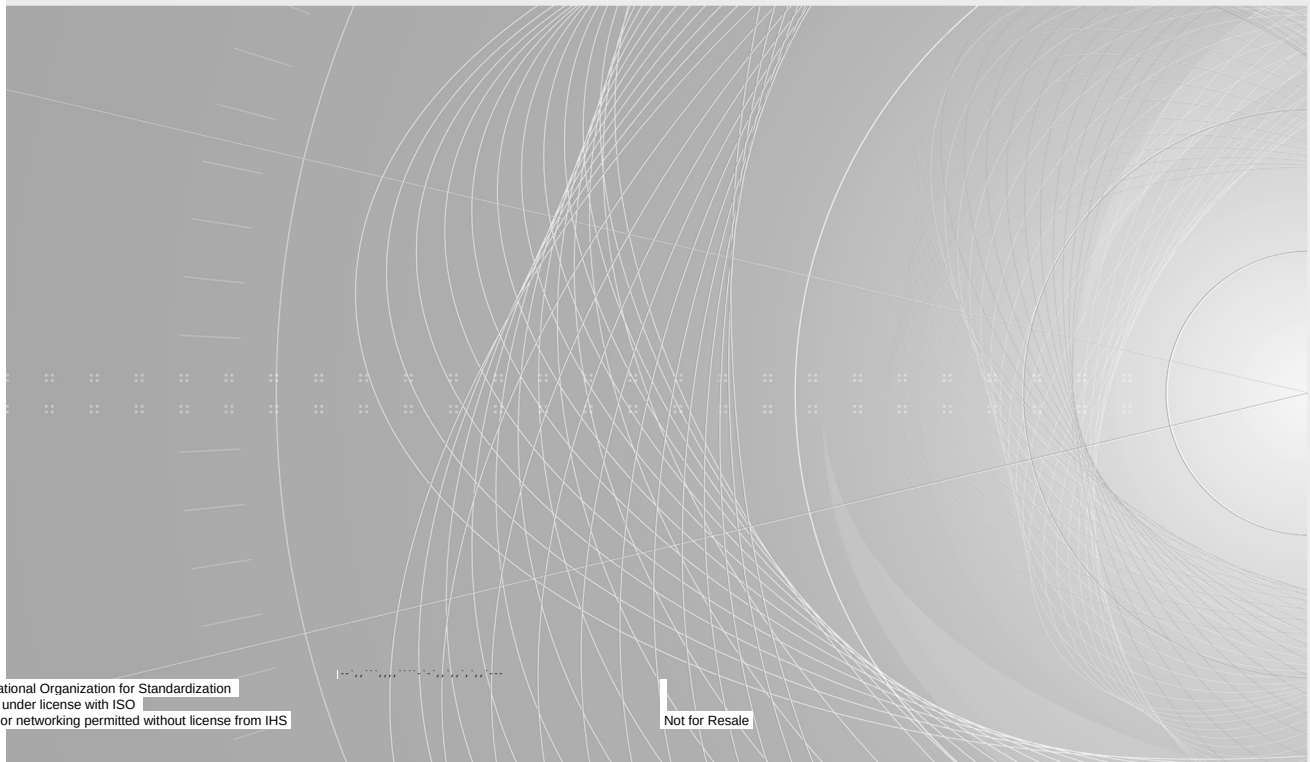
# ISO/IEC 29341-6-14

Edition 1.0 2008-11

# INTERNATIONAL STANDARD

## Information technology – UPnP Device Architecture – Part 6-14: Heating, Ventilation and Air Conditioning Device Control Protocol – Setpoint Schedule Service



ISO/IEC 29341-6-14:2008(E)

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## Information technology – UPnP Device Architecture – Part 6-14: Heating, Ventilation and Air Conditioning Device Control Protocol – Setpoint Schedule Service

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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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| **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*.

This service provides the following variables:

- A_ARG_TYPE_DayOfWeek variable indicating the the day for which a set of timed setpoints is established.
- A_ARG_TYPE_EventName variable indicating the named events for which timed setpoints may be established.
- A_ARG_TYPE_StartTime variable indicating the starting time of a scheduled change in setpoints.
- A_ARG_TYPE_HeatingSetpoint variable to be part of a scheduled change in a heating setpoint.
- A_ARG_TYPE_CoolingSetpoint variable to be part of a scheduled change in a cooling setpoint.
- EventsPerDay a delimited string indicating the scheduled setpoint changes on a given day.

This service provides the following actions:

- SetEventParameters establishes a new or updates an existing event with the appropriate parameters.
- GetEventsPerDay returns a list of the events for the specified day of week.

This service does not provide the following:

- The interface between the schedule table and setpoint objects or services.

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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:HVAC_SETPOINTSCHEDULE:1**

## 2.2. State Variables

**Table 1 State Variables**

| Variable Name | Req. or Opt. | Data Type | Allowed Value[2] | Default Value[2] | Eng. Units |
|---|---|---|---|---|---|
| A_ARG_TYPE_DayOfWeek | R | string | See Table 2 | All | none |
| A_ARG_TYPE_EventName | R | string | See Table 3 | Home | none |
| A_ARG_TYPE_StartTime | R | ui2 | Minimum = 0<br>Maximum <= 1439<br>Step = 1 | 0 | Minutes from mid night |
| A_ARG_TYPE_HeatingSetpoint | R | i4 | Minimum: vendor defined<br>Maximum: vendor defined<br>Step=1 | Vendor defined | .01 degrees Celsius |
| A_ARG_TYPE_CoolingSetpoint | R | i4 | Minimum: vendor defined<br>Maximum: vendor defined<br>Step=1 | Vendor defined | .01 degrees Celsius |
| EventsPerDay | R | string | N/a | Zero length string | none |
| *Non-standard state variables implemented by an UPnP vendor go here.* | *X* | *TBD* | *TBD* | *TBD* | *TBD* |

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

[1] 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.

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**Table 2 AllowedValueList for A_ARG_TYPE_DayOfWeek**

| Value | Req. or Opt. [1] |
|---|---|
| Sun | O |
| Mon | O |
| Tue | O |
| Wed | O |
| Thu | O |
| Fri | O |
| Sat | O |
| All | R |
| Weekdays | O |
| Weekend | O |
| Standby | O |
| * | R |
| *Vendor-defined* | *R/O* |

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

**Table 3 AllowedValueList for A_ARG_TYPE_EventName**

| Value | Req. or Opt. [1] |
|---|---|
| Home | R |
| Wake | R |
| Sleep | R |
| Away | R |
| Sunrise | O |
| Sunset | O |
| *Vendor-defined* | *R/O* |

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

### 2.2.1. A_ARG_TYPE_DayOfWeek

Defined only to provide typing for one or more action arguments. This variable serves as the primary index to the schedule list. DayOfWeek values are in general defined by the manufacturer, however there are two required values:

- "All" – this is for the basic functionality of a one-day schedule i.e. when all days of the week follow the same time schedule.
- "*" (wildcard symbol) – this is a special symbol that used only in the GetEventsPerDay action for retrieving the complete schedule in a single operation.

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### 2.2.2. A_ARG_TYPE_EventName

Defined only to provide typing for one or more action arguments. This variable is the secondary index to the list. EventNames are established by the manufacturer.

### 2.2.3. A_ARG_TYPE_StartTime

Defined only to provide typing for one or more action arguments. This variable provides the time from midnight (in minutes) to the start of an event

### 2.2.4. A_ARG_TYPE_HeatingSetpoint

Defined only to provide typing for one or more action arguments. This variable provides the heating setpoint for this event

### 2.2.5. A_ARG_TYPE_CoolingSetpoint

Defined only to provide typing for one or more action arguments. This variable provides the heating setpoint for this event.

### 2.2.6. EventsPerDay

This string variable is a comma-delimited list of the events, start times, heating setpoints, and cooling setpoints for a specific day, or for a specific event.

### 2.2.7. Relationships Between State Variables

This service generates a list of tuples (StartTime, CoolingSetpoint, HeatingSetpoint) indexed by A_ARG_TYPE_DayOfWeek and by A_ARG_TYPE_EventName

An event is set using the SetEventParameters action. This action uses five arguments: (SubmittedDayOfWeek, SubmittedEventName, NewStartTime, NewHeatingSetpoint, NewCoolingSetpoint).

This allows a Control Point or other devices to set start times and both heating and cooling setpoints for each event in each day of the week.

The tuples for a given DayOfWeek may be read using the GetEventsPerDay action. Here the Control Point submits a DayOfWeek and the service returns all of the scheduled events for the submitted DayOfWeek along with their associated tuples as a delimited string.

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## 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] |
|---|---|---|---|---|---|
| A_ARG_TYPE_DayOfWeek | No | | | | |
| A_ARG_TYPE_EventName | No | | | | |
| A_ARG_TYPE_StartTime | No | | | | |
| A_ARG_TYPE_HeatingSetpoint | No | | | | |
| A_ARG_TYPE_CoolingSetpoint | No | | | | |
| EventsPerDay | Yes | No | | | |
| *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 |
|---|---|---|---|---|---|
| A_ARG_TYPE_DayOfWeek | | | | | Variable used is an argument only |
| A_ARG_TYPE_EventName | | | | | Variable is reported as part of a return value |
| A_ARG_TYPE_StartTime | | | | | Variable is reported as part of a return value |
| A_ARG_TYPE_HeatingSetpoint | | | | | Variable is reported as part of a return value |
| A_ARG_TYPE_CoolingSetpoint | | | | | Variable is reported as part of a return value |
| EventsPerDay | UI needs to know when a scheduled event is added, removed or changed | | | | |

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The service must send event messages for the EventsPerDay state variable whenever a) a new event is added to the setpoint schedule, b) an existing event is modified, or c) an existing event is deleted. Event messages must be sent for EventsPerDay in response to a) changes made via the SetEventParameters action, and b) changes made through another user interface.

EventsPerDay returns a comma-delimited string for a ***single*** event in the form defined in the following table below. NOTE: This differs from the behavior of EventsPerDay under the UPnP Control Action "GetEventsPerDay" (paragraph 2.4.2) where ***zero or more*** events are concatenated.

If a series of individual changes are made in the setpoint schedule, then a corresponding series of event messages must be transmitted.

**Table 6 Values of EventsPerDay String**

| Cause of Event | Value of EventsPerDay |
|---|---|
| New event is added | Day,Event,StartTime,HeatingSetpoint,CoolingSetpoint |
| Existing event is modified | Day,Event,newStartTime,newHeatingSetpoint,newCoolingSetpoint |
| Existing event is deleted | Day,Event,0,0,0 |

## 2.4. Actions

**Table 7 Action list**

| Name | Req. or Opt. [1] |
|---|---|
| SetEventParameters | Req |
| GetEventsPerDay | Req |
| *Non-standard actions implemented by an UPnP vendor go here.* | *X* |

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

### 2.4.1. SetEventParameters

This action establishes a new or overwrites an existing event with the appropriate parameters. It is event and day of week specific.

If NewStartTime is 0, the event is removed from the list.

#### *2.4.1.1. Arguments*

**Table 8 Arguments for SetEventParameters**

| Argument | Direction | relatedStateVariable |
|---|---|---|
| SubmittedDayOfWeek | In | A_ARG_TYPE_DayOfWeek |
| SubmittedEventName | In | A_ARG_TYPE_EventName |
| NewStartTime | In | A_ARG_TYPE_StartTime |
| NewHeatingSetpoint | In | A_ARG_TYPE_HeatingSetpoint |
| NewCoolingSetpoint | In | A_ARG_TYPE_CoolingSetpoint |

#### *2.4.1.2. Dependency on State*

None

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#### *2.4.1.3. Effect on State*

Changes the respective set point schedule entry.

#### *2.4.1.4. Errors*

| errorCode | errorDescription | Description |
|---|---|---|
| 700 | Day of Week not available | Request for invalid DayOfWeek |
| 701 | EventName not available | Request for invalid EventName |

### 2.4.2. GetEventsPerDay

This action returns a comma-delimited string in the form:

Day,Event1,StartTime1,HeatingSetpoint1,CoolingSetpoint1,Day,Event2,StartTime2,HeatingSetpoint2, CoolingSetpoint2, … until all events in the specified DayOf Week have been reported.

In other words, the action returns a concatenation of ***zero or more*** events. NOTE: This differs from the behavior of EventsPerDay under the UPnP Event Model (see paragraph 2.3.1) where a ***single*** event is transmitted.

If there are no events matching the specified DayOfWeek, then the action returns a zero length string.

If SubmittedDayOfWeek is "*" (wildcard symbol), then the action returns a concatenation of ***all*** events in the schedule.

#### *2.4.2.1. Arguments*

**Table 9 Arguments for GetEventsPerDay**

| Argument | Direction | relatedStateVariable |
|---|---|---|
| SubmittedDayOfWeek | In | A_ARG_TYPE_DayOfWeek |
| CurrentEventsPerDay | Out [R] | EventsPerDay |

[R] - Return Value

#### *2.4.2.2. Dependency on State*

CurrentEventsPerDay must return the full comma-delimited list of all the events in the setpoint schedule that match the respective SubmittedDayOfWeek (i.e. zero or more events).

#### *2.4.2.3. Effect on State*

None

#### *2.4.2.4. Errors*

| errorCode | errorDescription | Description |
|---|---|---|
| 700 | Day of Week not available | Request for invalid DayOfWeek |

### 2.4.3. 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).

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### 2.4.4. Relationships Between Actions

None.

### 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 should be returned.

**Table 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.)* |

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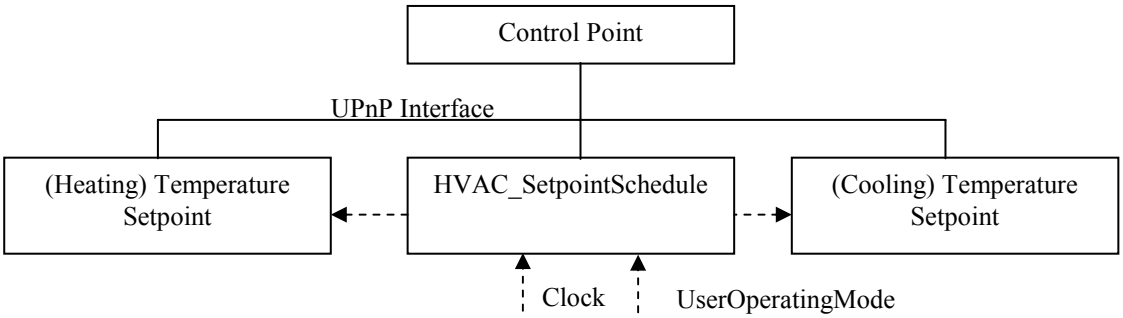
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## 2.5. Theory of Operation

This service provides a means to establish a logical schedule table where each row represents a separate event. Control points may add, remove or modify an event by using the SetEventParameters action. Control points may discover the events established for a given period by using the GetEventPerDay action.

"All" events repeat all days of the week, each day of the week, weekly or on weekends.

The logic or connection to the temperature setpoint controllers is not exposed by this design. It is presumed that internal actions of an implementation of this service will cause the appropriate setpoints to be modified.




Note: Dotted lines indicate internal interfaces and are not necessarily visible from the UPnP interface

The manufacturer establishes the Day of Week list and the EventName list. The list of allowed Day of Week values is a superset of what may be implemented by a particular vendor. The list of EventNames may be extended by a manufacturer. The allowed-value XML description provides the implemented days and event names for Control Points.

This service generates a list or table of tuples (StartTime, CoolingSetpoint, HeatingSetpoint) indexed by A_ARG_TYPE_DayOfWeek and by A_ARG_TYPE_EventName

An event is set using the SetEventParameters action. This action uses five arguments: (SubmittedDayOfWeek, SubmittedEventName, NewStartTime, NewHeatingSetpoint, NewCoolingSetpoint).

This allows a Control Point or other devices to set start times and both heating and cooling setpoints for each event in each day of the week.

The tuples for a given DayOfWeek may be read using the GetEventsPerDay action. Here the Control Point submits a DayOfWeek and the service returns all of the scheduled events for the submitted DayOfWeek along with their associated tuples as a delimited string.

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**Table 11 Example Table**

| DayOfWeek | EventName | StartTime | HeatingSetpoint | CoolingSetpoint |
|---|---|---|---|---|
| Mon | Wake | 440 | 2065 | 2389 |
| Mon | Leave | 540 | 1833 | 2667 |
| Mon | Home | 1020 | 2222 | 2389 |
| Mon | Sleep | 1320 | 1833 | 2389 |
| Tue | Wake | 440 | 2222 | 2389 |
| Tue | Sleep | 1320 | 1833 | 2389 |
| Wed | Wake | 440 | 2222 | 2389 |
| Wed | Leave | 540 | 1833 | 2667 |
| Wed | Home | 1020 | 2222 | 2389 |
| Wed | Sleep | 1320 | 1833 | 2389 |
| Thu | Wake | 440 | 2222 | 2389 |
| Thu | Sleep | 1320 | 1833 | 2389 |
| Fri | Wake | 440 | 2222 | 2389 |
| Fri | Sleep | 1320 | 1833 | 2389 |
| Weekend | Wake | 540 | 2222 | 2389 |
| Weekend | Sleep | 1320 | 1833 | 2389 |

Example response to GetEventsPerDay (Tue)

Tue,Wake,440,2222,2389,Tue,Sleep,1320,1833,2389

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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>SetEventParameters</name>
      <argumentList>
      <argument>
          <name>SubmittedDayOfWeek</name>
          <direction>in</direction>
          <relatedStateVariable>A_ARG_TYPE_DayOfWeek</relatedStateVariable>
        </argument>
        <argument>
          <name>SubmittedEventName</name>
          <direction>in</direction>
          <relatedStateVariable>A_ARG_TYPE_EventName</relatedStateVariable>
        </argument>
          <argument>
            <name>NewStartTime</name>
            <direction>in</direction>
             <relatedStateVariable>A_ARG_TYPE_StartTime</relatedStateVariable>
        </argument>
        <argument>
          <name>NewHeatingSetpoint</name>
          <direction>in</direction>
          <relatedStateVariable>A_ARG_TYPE_HeatingSetpoint</relatedStateVariable>
        </argument>
          <argument>
          <name>NewCoolingSetpoint</name>
          <direction>in</direction>
          <relatedStateVariable>A_ARG_TYPE_CoolingSetpoint</relatedStateVariable>
        </argument>
  </action>
  <action>
    <name>GetEventsPerDay</name>
      <argumentList>
        <argument>
          <name>SubmittedDayOfWeek</name>
          <direction>in</direction>
          <relatedStateVariable>A_ARG_TYPE_DayOfWeek</relatedStateVariable>
        </argument>
        <argument>
          <name>CurrentEventsPerDay</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>EventsPerDay</relatedStateVariable>
        </argument>
      </argumentList>
    </action>

 Declarations for other actions added by UPnP vendor (if any) go here

  </actionList>
  <serviceStateTable>
    <stateVariable sendEvents="no">
      <name>A_ARG_TYPE_DayOfWeek</name>
      <dataType>string</dataType>
      <defaultValue>All</defaultValue>
```

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```
      <allowedValueList>
        <allowedValue>All</allowedValue>
        <allowedValue>*</allowedValue>

      The following allowed values are optional

        <allowedValue>Sun</allowedValue>
        <allowedValue>Mon</allowedValue>
        <allowedValue>Tue</allowedValue>
        <allowedValue>Wed</allowedValue>
        <allowedValue>Thu</allowedValue>
        <allowedValue>Fri</allowedValue>
        <allowedValue>Sat</allowedValue>
        <allowedValue>Weekend</allowedValue>
        <allowedValue>Weekdays</allowedValue>

       Other allowed values defined by UPnP vendors (if any) go here

      </allowedValueList>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>A_ARG_TYPE_EventName</name>
      <dataType>string</dataType>
      <defaultValue>Home</defaultValue>
      <allowedValueList>
        <allowedValue>Home</allowedValue>
        <allowedValue>Wake</allowedValue>
        <allowedValue>Sleep</allowedValue>
        <allowedValue>Away</allowedValue>

      The following allowed values are optional

        <allowedValue>Sunrise</allowedValue>
        <allowedValue>Sunset</allowedValue>

        Other allowed values defined by UPnP vendors (if any) go here

      </allowedValueList>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>A_ARG_TYPE_StartTime</name>
      <dataType>ui2</dataType>
      <defaultValue>0</defaultValue>
      <allowedValueRange>
        <minimum>0</minimum>
        <maximum>1439</maximum>
        <step>1</step>
      </allowedValueRange>
    </stateVariable>
      <stateVariable sendEvents="no">
      <name>A_ARG_TYPE_HeatingSetpoint</name>
      <dataType>i4</dataType>
      <defaultValue>vendor defined</defaultValue>
      <allowedValueRange>
        <minimum>vendor defined</minimum>
        <maximum>vendor defined</maximum>
        <step>1</step>
      </allowedValueRange>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>A_ARG_TYPE_CoolingSetpoint</name>
      <dataType>i4</dataType>
      <defaultValue>vendor defined</defaultValue>
      <allowedValueRange>
```

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```
        <minimum>vendor defined</minimum>
        <maximum>vendor defined</maximum>
        <step>1</step>
      </allowedValueRange>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>EventsPerDay</name>
      <dataType>string</dataType>
      <defaultValue></defaultValue> ; zero length string
    </stateVariable>

Declarations for other state variables added by UPnP vendors (if any)
    go here

  </serviceStateTable>
</scpd>
```

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# 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: ***HVAC_SetpointSchedule1.xml***
- The UPnP Test Tool service template test file: ***HVAC_SetpointSchedule1.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.

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