TemperatureSensor:1 Service Template
For UPnP™ Device Architecture V 1.0

Status: Standardized DCP
Date: May 13th, 2003

This Standardized DCP has been adopted as a Standardized DCP by the Steering Committee of the UPnP Forum, pursuant to Section 2.1(c)(ii) of the UPnP Membership Agreement. UPnP Forum Members have rights and licenses defined by Section 3 of the UPnP Membership Agreement to use and reproduce the Standardized DCP in UPnP Compliant Devices. All such use is subject to all of the provisions of the UPnP Membership Agreement.

THE UPNP FORUM TAKES NO POSITION AS TO WHETHER ANY INTELLECTUAL PROPERTY RIGHTS EXIST IN THE STANDARDIZED DCPS. THE STANDARDIZED DCPS ARE PROVIDED "AS IS" AND "WITH ALL FAULTS". THE UPNP FORUM MAKES NO WARRANTIES, EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE WITH RESPECT TO THE STANDARDIZED DCPS INCLUDING BUT NOT LIMITED TO ALL IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT AND FITNESS FOR A PARTICULAR PURPOSE, OF REASONABLE CARE OR WORKMANLIKE EFFORT, OR RESULTS OR OF LACK OF NEGLIGENCE.

© 2001-2003 Contributing Members of the UPnP™ Forum. All Rights Reserved

<table>
<thead>
<tr>
<th>Authors</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larry Stickler</td>
<td>Honeywell</td>
</tr>
<tr>
<td>Pete Bergstrom</td>
<td>Honeywell</td>
</tr>
<tr>
<td>Andrew Fiddian-Green</td>
<td>Siemens Building Technologies</td>
</tr>
</tbody>
</table>
1. **Overview and Scope**
This service definition is compliant with the UPnP Device Architecture version 1.0.

This service type enables the following functions:

- Reading of the current temperature of a temperature sensor
- Setting and reading of the intended application for this temperature sensor
- Setting and reading of the user name for this sensor

1.1. **Change Log for: TemperatureSensor:1**

7/26 Changes per 7/17 meeting of Home Automation and Security Working Group and conversion to 0.996 template.

8/24/00 Clean-up

8/28 Added XML, removed HighestValid and LowestValid

9/28/00 Changed units to Celsius, moved reserved application values to data type column, corrected XML

10/18/00 Changed event moderation

11/28/00 Moved to Template Design Complete, added min and max allowed values for Current temp, expanded Theory of operation.

2/14/01 Updated for Template Design Complete – Evented Applications, corrected temperature specification, corrected capitalization, improved description.

2/21/01 Moved to Template 1.1, cleaned-up XML

2/26/01 Proof read

4/2/01 Added the ability to write the Application variable.

5/31/02 Revision marks deleted; Moved to 0.9; Test chapter added.

[13 May 2003] v1.0 Converted to Approved Standard.
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:TemperatureSensor:1
```

2.2. State Variables

Table 1 State Variables

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Req. or Opt.</th>
<th>Data Type</th>
<th>Allowed Value</th>
<th>Default Value</th>
<th>Eng. Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>R</td>
<td>string</td>
<td>see table</td>
<td>(none)</td>
<td>n/a</td>
</tr>
<tr>
<td>CurrentTemperature</td>
<td>R</td>
<td>i4</td>
<td>see table</td>
<td>(none)</td>
<td>0.01</td>
</tr>
<tr>
<td>Name</td>
<td>O</td>
<td>string</td>
<td>Zero length</td>
<td>string</td>
<td>N/a</td>
</tr>
</tbody>
</table>

*Non-standard state variables implemented by an UPnP vendor go here.*

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

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

Table 2 AllowedValueList for Application

<table>
<thead>
<tr>
<th>Value</th>
<th>Req. or Opt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor defined as “none”</td>
<td>O</td>
</tr>
<tr>
<td>R/W - This allows a control point to establish the application type</td>
<td>O</td>
</tr>
<tr>
<td>Vendor-defined</td>
<td>O</td>
</tr>
<tr>
<td>One value required. Reserved names are:</td>
<td>O</td>
</tr>
<tr>
<td>Room, Outdoor, Pipe, AirDuct</td>
<td>O</td>
</tr>
<tr>
<td>Vendor-defined</td>
<td>O</td>
</tr>
</tbody>
</table>

1. R = Required, O = Optional, X = Non-standard.
Table 3 AllowedValueRange for CurrentTemperature

<table>
<thead>
<tr>
<th>Value</th>
<th>Req. or Opt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>minimum</td>
<td>Vendor-defined</td>
</tr>
<tr>
<td>maximum</td>
<td>Vendor-defined</td>
</tr>
<tr>
<td>step</td>
<td>Step=1 (i.e. 0.01 Celsius)</td>
</tr>
</tbody>
</table>

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

2.2.1. Application
This variable states the intended application of this service.

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

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

2.2.4. Relationships Between State Variables
None

2.3. Eventing and Moderation

Table 4 Eventing & Moderation

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Evented</th>
<th>Moderated Event</th>
<th>Max Event Rate¹</th>
<th>Logical Combination</th>
<th>Min Delta per Event²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Yes</td>
<td>No</td>
<td>none</td>
<td>none</td>
<td>On-change</td>
</tr>
<tr>
<td>Application</td>
<td>Yes</td>
<td>No</td>
<td>none</td>
<td>none</td>
<td>On-change</td>
</tr>
<tr>
<td>CurrentTemperature</td>
<td>Yes</td>
<td>Yes</td>
<td>10 sec</td>
<td>Per 0.2 degree Celsius change or 20 units</td>
<td></td>
</tr>
</tbody>
</table>

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
### 2.4. Actions

Table 6 Action list

<table>
<thead>
<tr>
<th>Name</th>
<th>Req. or Opt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SetApplication</td>
<td>O</td>
</tr>
<tr>
<td>GetApplication</td>
<td>R</td>
</tr>
<tr>
<td>GetCurrentTemperature</td>
<td>R</td>
</tr>
<tr>
<td>GetName</td>
<td>O</td>
</tr>
<tr>
<td>SetName</td>
<td>O</td>
</tr>
</tbody>
</table>

*Non-standard actions implemented by an UPnP vendor go here.*

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

#### 2.4.1. SetApplication

Provides the Application value to a control point or other devices

#### 2.4.1.1. Arguments

Table 7 Arguments for SetApplication

<table>
<thead>
<tr>
<th>Argument</th>
<th>Direction</th>
<th>relatedStateVariable</th>
</tr>
</thead>
<tbody>
<tr>
<td>NewApplication</td>
<td>IN</td>
<td>Application</td>
</tr>
</tbody>
</table>

#### 2.4.1.2. Dependency on State (if any)

None

#### 2.4.1.3. Effect on State (if any)

Changes the Application.
2.4.1.4. Errors

<table>
<thead>
<tr>
<th>errorCode</th>
<th>errorDescription</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.2. GetApplication

Provides the Application value to a control point or other devices

2.4.2.1. Arguments

Table 8 Arguments for GetApplication

<table>
<thead>
<tr>
<th>Argument</th>
<th>Direction</th>
<th>relatedStateVariable</th>
</tr>
</thead>
<tbody>
<tr>
<td>CurrentApplication</td>
<td>Out♫</td>
<td>Application</td>
</tr>
</tbody>
</table>

♫ Return Value

2.4.2.2. Dependency on State (if any)

Depends on Application

2.4.2.3. Effect on State (if any)

None

2.4.2.4. Errors

<table>
<thead>
<tr>
<th>errorCode</th>
<th>errorDescription</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.3. GetCurrentTemperature

2.4.3.1. Arguments

Table 9 Arguments for GetCurrentTemperature

<table>
<thead>
<tr>
<th>Argument</th>
<th>Direction</th>
<th>relatedStateVariable</th>
</tr>
</thead>
<tbody>
<tr>
<td>CurrentTemp</td>
<td>Out♫</td>
<td>CurrentTemperature</td>
</tr>
</tbody>
</table>

♫ Return Value

2.4.3.2. Dependency on State (if any)

Depends on the temperature.

2.4.3.3. Effect on State

None
2.4.3.4. Errors

<table>
<thead>
<tr>
<th>errorCode</th>
<th>errorDescription</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.4. GetName

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

2.4.4.1. Arguments

Table 10 Arguments for GetName

Table 5: Arguments for GetApplication(CurrentApplication)

<table>
<thead>
<tr>
<th>Argument</th>
<th>Direction</th>
<th>relatedStateVariable</th>
</tr>
</thead>
<tbody>
<tr>
<td>CurrentName</td>
<td>Out(^R)</td>
<td>Name</td>
</tr>
</tbody>
</table>

\(^R\) Return Value

2.4.4.2. Dependency on State (if any)

None

2.4.4.3. Effect on State

None

2.4.4.4. Errors

<table>
<thead>
<tr>
<th>errorCode</th>
<th>errorDescription</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.5. SetName

Provides a new Name value for the Name variable.

2.4.5.1. Arguments

Table 11 Arguments for SetName

<table>
<thead>
<tr>
<th>Argument</th>
<th>Direction</th>
<th>relatedStateVariable</th>
</tr>
</thead>
<tbody>
<tr>
<td>NewName</td>
<td>In</td>
<td>Name</td>
</tr>
</tbody>
</table>

2.4.5.2. Dependency on State (if any)

None
2.4.5.3. Effect on State
Changes Name.

2.4.5.4. Errors

<table>
<thead>
<tr>
<th>errorCode</th>
<th>errorDescription</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.6. 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).

2.4.7. Relationships Between Actions
None.

2.4.8. 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 6: Common Error Codes

<table>
<thead>
<tr>
<th>errorCode</th>
<th>errorDescription</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>Invalid Action</td>
<td>See UPnP Device Architecture section on Control.</td>
</tr>
<tr>
<td>402</td>
<td>Invalid Args</td>
<td>See UPnP Device Architecture section on Control.</td>
</tr>
<tr>
<td>404</td>
<td>Invalid Var</td>
<td>See UPnP Device Architecture section on Control.</td>
</tr>
<tr>
<td>501</td>
<td>Action Failed</td>
<td>See UPnP Device Architecture section on Control.</td>
</tr>
<tr>
<td>701-799</td>
<td>TBD</td>
<td>Common action errors defined by the UPnP Forum working committees.</td>
</tr>
<tr>
<td>800-899</td>
<td>TBD</td>
<td>(Specified by UPnP vendor.)</td>
</tr>
</tbody>
</table>

2.5. Theory of Operation
This service allows a temperature read from a temperature sensor.

Control points or other devices may set and get an application value for this service. The following applications are defined:

- Room – Indoor room temperature
- Outdoor – Outdoor temperature
- AirDuct – Temperature inside an air duct
- Pipe – surface temperature of a pipe.

Manufacturers shall establish the allowable range of temperatures using the maximum and minimum allowed values. A Control Point or other device can find these values in the XML description.

Control points or other devices may optionally establish a Name for this sensor.
3. XML Service Description

```
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
    <action>
      <name>GetApplication</name>
      <argumentList>
        <argument>
          <name>CurrentApplication</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>Application</relatedStateVariable>
        </argument>
      </argumentList>
    </action>

    The following action is optional
    <action>
      <name>SetApplication</name>
      <argumentList>
        <argument>
          <name>NewApplication</name>
          <direction>in</direction>
          <relatedStateVariable>Application</relatedStateVariable>
        </argument>
      </argumentList>
    </action>

    <action>
      <name>GetCurrentTemperature</name>
      <argumentList>
        <argument>
          <name>CurrentTemp</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>CurrentTemperature</relatedStateVariable>
        </argument>
      </argumentList>
    </action>

    The following action is optional
    <action>
      <name>GetName</name>
      <argumentList>
        <argument>
          <name>CurrentName</name>
          <direction>out</direction>
          <retval />
          <relatedStateVariable>Name</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
  </actionList>
</scpd>
```
The following action is optional

```xml
<action>
  <name>SetName</name>
  <argumentList>
    <argument>
      <name>NewName</name>
      <direction>in</direction>
      <relatedStateVariable>Name</relatedStateVariable>
    </argument>
  </argumentList>
</action>
```

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

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

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

The following state variable is optional

```xml
<stateVariable sendEvents="yes">
  <name>Name</name>
  <dataType>string</dataType>
</stateVariable>
```

Declarations for other state variables defined by UPnP Forum working committee (if any) go here
Declarations for other state variables added by UPnP vendor (if any) go here

```xml
</serviceStateTable>
</scpd>
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: \textit{TemperatureSensor1.xml}
- The UPnP Test Tool service template test file: \textit{TemperatureSensor1.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.