Health Thermometer Service (HTS)

Bluetooth® Test Suite

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- **Revision Date:** 2019-12-16
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1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and Test Cases (TC) to test the Bluetooth Health Thermometer Service Specification.

The objective of this test suite is to provide a basis for interoperability for Bluetooth devices giving a high probability of air interface interoperability between different manufacturers’ Bluetooth devices.
2 References, Definitions, and Abbreviations

2.1 References
This Bluetooth document incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter.

[1] Bluetooth Test Strategy and Terminology Overview
[2] Bluetooth Core Specification, Version 4.0 or later
[5] GATT Test Suite, GATT.TS

2.2 Definitions
For the purpose of this Bluetooth document, the definitions from [1] and [2] apply.

2.3 Abbreviations
For the purpose of this Bluetooth document, the definitions from [1] and [2] apply.
3 Test Suite Structure (TSS)

3.1 Overview

The Health Thermometer Service requires the presence of GAP, SM and GATT. This is illustrated in Figure 3.1.

![Diagram of Test Model]

*Figure 3.1: Health Thermometer Service Test Model*

3.2 Test Strategy

The test objectives are to verify functionality of the Health Thermometer Service within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach is to cover mandatory and optional requirements in the service specification and to match these to the support of the IUT as described in the ICS Proforma.

The test equipment shall provide an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in the Health Thermometer Service Test Suite. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, an MMI, or another interface supported by the IUT.

The Thermometer test suite contains Valid Behavior (BV) tests complemented with Invalid Behavior (BI) tests where required. The test coverage mirrored in the test suite structure is the result of a process that started with catalogued specification requirements that were logically grouped and assessed for testability enabling coverage in defined test purposes.

The test suite structure is a tree with the first level representing the protocol groups and is listed in Section 3.3.
3.3 Test Groups

The following test groups have been defined.

3.3.1 Service Definition
Verify the service definition.

3.3.2 Characteristic Declaration
Verify the presence and contents of characteristic declarations.

3.3.3 Characteristic Descriptors
Verify the presence of characteristic descriptors.

3.3.4 Characteristic Read
Verify characteristics which support reading can be read. Verify the format and value of characteristic values.

3.3.5 Characteristic Write
Verify characteristics which support writing can be written.

3.3.6 Configure Indication and Notification
Verify characteristics can be configured for indication or notification.

3.3.7 Characteristic Indication
Verify characteristics which support indication can be indicated.

3.3.8 Service Procedures
Verify the operation of additional procedures defined in the service specification.
4 Test Cases (TC)

4.1 Introduction

4.1.1 Test Case Identification Conventions

Test cases shall be assigned unique identifiers per the conventions in [1]. The convention used here is `<spec abbreviation>/<IUT role>/<class>/<feat>/<func>/<subfunc>/<cap>/<xx>-<nn>-<y>`.

Bolded ID parts shall appear in the order prescribed. Non-bolded ID parts (if applicable) shall appear between the bolded parts. The order of the non-bolded parts may vary from test suite to test suite, but shall be consistent within each individual test suite.

<table>
<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Spec Identifier &lt;spec abbreviation&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS</td>
<td>Health Thermometer Service</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Role Identifier &lt;IUT role&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEN</td>
<td>Sensor Role</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Feature Identifier &lt;feat&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>Characteristic Indication</td>
</tr>
<tr>
<td>CIN</td>
<td>Configure Indication and Notification</td>
</tr>
<tr>
<td>CR</td>
<td>Characteristic Read</td>
</tr>
<tr>
<td>CW</td>
<td>Characteristic Write</td>
</tr>
<tr>
<td>DEC</td>
<td>Characteristic Declaration</td>
</tr>
<tr>
<td>DES</td>
<td>Characteristic Descriptors</td>
</tr>
<tr>
<td>SD</td>
<td>Service Definition</td>
</tr>
<tr>
<td>SP</td>
<td>Service Procedures</td>
</tr>
</tbody>
</table>

*Table 4.1: Health Thermometer Service TC Class Naming Convention*

4.1.2 Conformance

When conformance is claimed, all capabilities indicated as mandatory for this Specification shall be supported in the specified manner (process-mandatory). This also applies for all optional and conditional capabilities for which support is indicated. All mandatory capabilities, and optional and conditional capabilities for which support is indicated, are subject to verification as part of the Bluetooth Qualification Program.

The Bluetooth Qualification Program may employ tests to verify implementation robustness. The level of implementation robustness that is verified varies from one Specification to another and may be revised for cause based on interoperability issues found in the market.
Such tests may verify:

- That claimed capabilities may be used in any order and any number of repetitions that is not excluded by the Specification, OR
- That capabilities enabled by the implementations are sustained over durations expected by the use case, OR
- That the implementation gracefully handles any quantity of data expected by the use case, OR
- That in cases where more than one valid interpretation of the Specification exist, the implementation complies with at least one interpretation and gracefully handles other interpretations OR
- That the implementation is immune to attempted security exploits.

A single execution of each of the required tests is required in order to constitute a pass verdict. However, it is noted that in order to provide a foundation for interoperability, it is necessary that a qualified implementation consistently and repeatedly pass any of the applicable tests.

In any case, where a member finds an issue with the Test Plan Generator, the Test Case as described in the Test Suite, or with the Test System utilized, the Member is required to notify the responsible party via an errata request such that the issue may be addressed.

4.1.3 Pass/Fail Verdict Conventions

Each test case has an Expected Outcome section, which outlines all the detailed pass criteria conditions that shall be met by the IUT to merit a Pass Verdict.

The convention in this test suite is that, unless there are a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon as one of the pass criteria conditions cannot be met. If this occurs the outcome of the test shall be the Fail Verdict.

4.2 Setup Preambles

The procedures defined in this section are provided for information, as they are used by test equipment in achieving the initial conditions in certain tests.

4.2.1 ATT Bearer on LE Transport

Follow the preamble procedure described in [5] Section 3.2.1.2 with the IUT operating in the Peripheral role.

4.3 Service Definition

Verify the service definition.

4.3.1 HTS/SEN/SD/BV-01-C [Service Definition]

- Test Purpose
  
  Verify that the IUT has one instantiation of the Health Thermometer Service as a primary service.

- Reference
  
  [3] 2
• Initial Condition
Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

• Test Procedure
1. Discover primary services by service UUID by executing the test procedure of GATT test case GATT/SR/GAD/BV-02-C in [5] with the service UUID set to «Health Thermometer Service».
2. Verify one attribute handle range is returned, containing the starting handle and the ending handle of the service definition.

• Expected Outcome
Pass verdict
One attribute handle range is returned, containing the starting handle and the ending handle of the service definition.

4.4 Characteristic Declaration
• Test Purpose
This test group contains test cases to verify that the characteristic property field of the characteristic declaration meets the requirements of the service. The verification is performed one property at a time, as enumerated in the test cases in Table 4.2 below, using this generic test procedure.

• Reference
[3] 3

• Initial Condition
The handle range of the service has been previously discovered by the Lower Tester in test case HTS/SEN/SD/BV-01-C [Service Definition].

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

• Test Procedure
The following test procedure applies to the test cases listed in the table below:

1. Discover all characteristics of the service by executing the test procedure of GATT test case GATT/SR/GAD/BV-04-C, Discover All Characteristics of a Service, in [5].
2. For a discovered characteristic that is listed in the table below, verify the characteristic properties field of the characteristic declaration meets the requirements of the service.

• Expected Outcome
The following pass and fail verdicts apply to the test cases listed in the table below:
Pass verdict

The characteristic is discovered and the characteristic properties field of the characteristic declaration meets the requirements of the service.

Characteristic Declaration Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4.1 HTS/SEN/DEC/BV-02-C [Characteristic Declaration – Temperature Measurement]</td>
<td>[3] Table 3-1</td>
</tr>
<tr>
<td>4.4.2 HTS/SEN/DEC/BV-03-C [Characteristic Declaration – Temperature Type]</td>
<td>[3] Table 3-1</td>
</tr>
<tr>
<td>4.4.3 HTS/SEN/DEC/BV-04-C [Characteristic Declaration – Intermediate Temperature]</td>
<td>[3] Table 3-1</td>
</tr>
<tr>
<td>4.4.4 HTS/SEN/DEC/BV-05-C [Characteristic Declaration – Measurement Interval]</td>
<td>[3] Table 3-1</td>
</tr>
</tbody>
</table>

Table 4.2: Characteristic Declaration Test Cases

4.5 Characteristic Descriptors

• Test Purpose
  This test group contains test cases to verify that the characteristic descriptors meet the requirements of the service. The verification is done one descriptor at the time, as enumerated in the test cases in Table 4.3 below, using this generic test procedure.

• Reference
  [3] 3.1.2, 3.3.2, 3.4.2

• Initial Condition
  The handle range of each characteristic referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

  Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

• Test Procedure
  The following test procedure applies to the test cases listed in the table below:

  For each characteristic referenced in a test case below:

  1. Discover all characteristic descriptors of the characteristic by executing the test procedure of GATT test case GATT/SR/GAD/BV-06-C, Discover All Characteristic Descriptors – from Server, in [5] using the handle range of the characteristic. The IUT returns one or more handle-UUID pairs.
2. If the UUID in a handle-UUID pair is for a characteristic descriptor referenced in a test case below, read the characteristic descriptor by executing the test procedure of GATT test case GATT/SR/GAR/BV-06-C, Read Characteristic Descriptors – from Server, in [5].

3. Verify the value of the characteristic descriptor meets the requirements of the service.

   • Expected Outcome

   The following pass and fail verdicts apply to the test cases listed in Table 4.3:

   **Pass verdict**

   The characteristic descriptor is discovered, the characteristic descriptor is read, and the value of the characteristic descriptor meets the requirements of the service.

### Characteristic Descriptors Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5.1</td>
<td>[3] 3.1.2.1</td>
</tr>
<tr>
<td>4.5.2</td>
<td>[3] 3.3.2.1</td>
</tr>
<tr>
<td>4.5.3</td>
<td>[3] 3.4.2.1</td>
</tr>
<tr>
<td>4.5.4</td>
<td>[3] 3.4.2.2</td>
</tr>
</tbody>
</table>

*Table 4.3: Characteristic Descriptors Test Cases*

### 4.6 Characteristic Read

**Test Purpose**

This test group contains test cases to read and verify that the characteristic values required by the service are compliant. The verification is done one value at the time, as enumerated in the test cases in Table 4.4, using this generic test procedure.

**Reference**

[3] 3.2, 3.4

**Initial Condition**

The handle of the characteristic value referenced in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.
If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- **Test Procedure**
  
  The following test procedure applies to the test cases listed in the table below for each characteristic referenced in a test case below:

  1. Read the characteristic value by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C, Read Characteristic Value - from Server, in [5].
  2. Verify the characteristic value meets the requirements of the service.

- **Expected Outcome**
  
  The following pass and fail verdicts apply to the test cases listed in the table below:

  **Pass verdict**
  
  The characteristic is successfully read and the characteristic value meets the requirements of the service.

**Characteristic Read Value Test Cases**

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Value (Requirements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6.1 HTS/SEN/CR/BV-01-C [Characteristic Read – Temperature Type]</td>
<td>[3] 3.2.1</td>
</tr>
<tr>
<td>4.6.2 HTS/SEN/CR/BV-02-C [Characteristic Read – Measurement Interval]</td>
<td>[3] 3.4.1</td>
</tr>
</tbody>
</table>

*Table 4.4: Characteristic Read Value Test Cases*

**4.7 Characteristic Write**

- **Test Purpose**
  
  This test group contains test cases to write and verify that the characteristic values required by the service are compliant. The verification is done one value at a time, as enumerated in the test cases in Table 4.5, using this generic test procedure.

- **Reference**
  
  [3] 3.4

- **Initial Condition**
  
  The handle of the characteristic value referenced in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

  Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.
• Test Procedure

The following test procedure applies to the test cases listed in the table below:

1. The Tester and IUT perform an authentication procedure and encryption is enabled.

2. Select a value that is valid for the characteristic. Write the characteristic value by executing the test procedure of GATT test case GATT/SR/GAW/BV-03-C, Write Characteristic Value - to Server, in [5].

3. Verify the characteristic value is successfully written and that the value returned when read is consistent with the value written.

• Expected Outcome

The following pass and fail verdicts apply to the test cases listed in Table 4.5:

Pass verdict

The authentication procedure is successful and encryption is enabled.

The characteristic value is successfully written and the value returned when read is consistent with the value written.

**Characteristic Write Value Test Cases**

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.7.1 HTS/SEN/CW/BV-02-C [Characteristic Write – Measurement Interval]</td>
<td>[3] 3.4.1</td>
</tr>
</tbody>
</table>

*Table 4.5: Characteristic Write Value Test Cases*

### 4.8 Configure Indication and Notification

• Test Purpose

This test group contains test cases to verify compliant operation in response to enable and disable characteristic indication or notification. The verification is done one value at a time, as enumerated in the test cases in Table 4.6, using this generic test procedure.

• Reference

[3] 3.1.2.1, 3.3.2.1, 3.4.2.1

• Initial Condition

The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

The handle of the client characteristic configuration descriptor of each characteristic referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.5 or is known to the Lower Tester by other means.

If the IUT requires a bonding procedure then perform a bonding procedure.
Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.

• Test Procedure

The following test procedure applies to the test cases listed in the table below.

1. Disable indication or notification by writing value 0x0000 to the client characteristic configuration descriptor of the characteristic using the test procedure of GATT test case GATT/SR/GAW/BV-08-C, Write Characteristic Descriptors – from Server, in [5].

2. If the test case is for notification, enable notification by writing value 0x0001 to the client characteristic configuration descriptor of the characteristic.

3. Otherwise if the test case is for indication, enable indication by writing value 0x0002 to the client characteristic configuration descriptor of the characteristic.

• Expected Outcome

The following pass and fail verdicts apply to the test cases listed in Table 4.6.

Pass verdict

The characteristic descriptor is successfully written and the value returned when read is consistent with the value written.

Configure Indication and Notification Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.8.1 HTS/SEN/CIN/BV-01-C [Configure Indication – Temperature Measurement]</td>
<td>[3] 3.1.2.1</td>
</tr>
<tr>
<td>4.8.2 HTS/SEN/CIN/BV-02-C [Configure Notification – Intermediate Temperature]</td>
<td>[3] 3.3.2.1</td>
</tr>
<tr>
<td>4.8.3 HTS/SEN/CIN/BV-03-C [Configure Indication – Measurement Interval]</td>
<td>[3] 3.4.2.1</td>
</tr>
</tbody>
</table>

Table 4.6: Configure Indication and Notification Test Cases

4.9 Characteristic Indication

• Test Purpose

This test group contains test cases to verify compliant operation when the IUT sends indications of characteristic values. The verification is done one value at a time, as enumerated in the test cases in Table 4.7, using this generic test procedure.

Verify the IUT sends indications of characteristic values.
• Reference

[3] 3.1.1, 3.4.1

• Initial Condition

The handle of the characteristic value referenced in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

The characteristic is configured for indication.

If the IUT requires a bonding procedure then perform a bonding procedure.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.

• Test Procedure

The following test procedure applies to the test cases listed in the table below:

1. Perform an action on the IUT that will induce it to send an indication of the characteristic.
2. A connection is established between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

• Expected Outcome

The following pass and fail verdicts apply to the test cases listed in Table 4.7:

Pass verdict

The characteristic is successfully indicated and the characteristic value meets the requirements of the service.

## Characteristic Indication Value Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Value (Requirements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.9.1 HTS/SEN/CI/BV-01-C [Characteristic Indication – Temperature Measurement]</td>
<td>[3] 3.1.1</td>
</tr>
<tr>
<td>4.9.2 HTS/SEN/CI/BV-02-C [Characteristic Indication – Measurement Interval]</td>
<td>[3] 3.4.1</td>
</tr>
</tbody>
</table>

*Table 4.7: Characteristic Indication Value Test Cases*
4.10 Service Procedures

This test group contains test cases to verify the operation of additional procedures defined in the service specification.

4.10.1 HTS/SEN/SP/BV-01-C [Periodic Temperature Measurements]

- Test Purpose
  Verify the IUT can perform periodic temperature measurements using the Measurement Interval characteristic.

- Reference
  [3] 3.4

- Initial Condition
  The Temperature Measurement characteristic is configured for indication.

  If the IUT requires a bonding procedure then perform a bonding procedure.

  If desired, establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

  If IUT permissions require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure
  1. Set the value of the Measurement Interval characteristic to a value supported by the IUT greater than zero. This is done from the Lower Tester by establishing a connection and writing the value to the Measurement Interval characteristic, if the IUT supports writing to this characteristic. Otherwise it is done by other action on the IUT.
  2. A connection is established between the Lower Tester and IUT meeting the security requirements of the IUT, if not already established.
  3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Temperature Measurement characteristic handle and value.
  4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT before the next ATT_Handle_Value_Indication is due as specified in the Measurement Interval characteristic.
  5. Repeat steps 2–4 until two or more measurements are received. Note that the IUT may terminate the connection after each indication.
  6. Verify the time between indications is consistent with the value of the Measurement Interval characteristic. Note that the time between indications will be affected by the LE connection interval and the connection establishment time.
  7. Set the value of the Measurement Interval characteristic to zero.
  8. The IUT stops sending periodic indications of the temperature measurement characteristic.
• Expected Outcome

Pass verdict

The IUT sends two or more indications of the Temperature Measurement characteristic.

The time between indications is consistent with the value of the Measurement Interval characteristic.

The IUT stops sending periodic indications of the temperature measurement characteristic when the value of the Measurement Interval characteristic is set to zero.

4.10.2 HTS/SEN/SP/BV-02-C [Stored Temperature Measurements]

• Test Purpose

Verify the IUT can send indications of stored temperature measurements.

• Reference

[3] 3.1.1, 3.5

• Initial Condition

The Temperature Measurement characteristic is configured for indication.

If the IUT requires a bonding procedure then perform a bonding procedure.

If desired, establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

• Test Procedure

1. Perform an action on the IUT that will induce it to store temperature measurements.

2. Perform an action on the IUT that will induce it to send stored temperature measurements to the Lower Tester.

3. A connection is established between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.

4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Temperature Measurement characteristic handle and value.

5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.

6. Repeat steps 4–5 until all stored measurements are received or the IUT terminates the connection.

7. Verify the characteristic value in each indication contains the time stamp field.

8. Verify the indications are received in order, so that the time stamp with the oldest measurement is received first.

• Expected Outcome

Pass verdict

The IUT sends one or more indications of the Temperature Measurement characteristic.
The Temperature Measurement characteristic contains the time stamp field.

The indications are received in order, so that the time stamp with the oldest measurement is received first.

4.10.3 HTS/SEN/SP/BV-03-C [Intermediate Temperature Notifications]

• Test Purpose
  Verify the IUT can send notifications of intermediate temperature values followed by the temperature measurement.

• Reference
  [3] 3.3

• Initial Condition
  The Intermediate Temperature characteristic is configured for notification.
  The Temperature Measurement characteristic is configured for indication.
  If the IUT requires a bonding procedure then perform a bonding procedure.
  If desired, establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.
  If IUT permissions for the Intermediate Temperature characteristic require a specific security mode or security level, establish a connection meeting those requirements.

• Test Procedure
  1. Perform an action on the IUT that will induce it to send notifications of the Intermediate Temperature characteristic.
  2. A connection is established between the Lower Tester and IUT meeting the security requirements of the IUT, if not already established.
  3. The Lower Tester receives an ATT_Handle_Value_Notification from the IUT containing the Intermediate Temperature characteristic handle and value.
  4. Verify the characteristic value meets the requirements of the service.
  5. Repeat steps 2–4 for each received notification until the IUT stops sending notifications. Note that the IUT may terminate the connection after each notification.
  6. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Temperature Measurement characteristic handle and value.
  7. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
  8. Verify the characteristic value meets the requirements of the service.

• Expected Outcome
  **Pass verdict**

  The IUT sends one or more notifications of the Intermediate Temperature characteristic.
The value of the Intermediate Temperature characteristic meets the requirements of the service.

The IUT stops sending notifications of the Intermediate Temperature characteristic after the temperature measurement is available.

The IUT sends an indication of the Temperature Measurement characteristic.

The value of the Temperature Measurement characteristic meets the requirements of the service.

4.10.4 HTS/SEN/SP/BI-01-C [Periodic Temperature Measurements – Out of Range]

- **Test Purpose**
  Verify the IUT that supports periodic temperature measurements using the Measurement Interval characteristic responds with an 'out of range' error code if a Client attempts to write an invalid value.

- **Reference**
  [3] 3.4.1

- **Initial Condition**
  The Lower Tester has read the valid range of the Measurement Interval characteristic by executing test case HTS/SEN/DES/BV-05-C [Measurement Interval – Valid Range Descriptor].

  Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.

- **Test Procedure**
  1. The Lower Tester and IUT perform an authentication procedure and encryption is enabled.
  2. Select a measurement interval value that is non-zero and not supported by the IUT. Write the value to the Measurement Interval characteristic by executing the test procedure of GATT test case GATT/SR/GAW/BV-03-C, Write Characteristic Value - to Server, in [5].
  3. Verify the characteristic write fails with error code 'out of range'.

- **Expected Outcome**
  **Pass verdict**

  The characteristic write fails with error code 'out of range'.

  The test cannot be executed because the valid range is 1 to 65535.
5 Test Case Mapping

The Test Case Mapping Table (TCMT) maps test cases to specific capabilities in the ICS.

The columns for the TCMT are defined as follows:

**Item:** contains an y/x reference, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS Proforma for Health Thermometer Service (HTS) [4]. If the item is defined with Protocol, Profile or Service abbreviation before y/x, the table and feature number referenced are defined in the abbreviated ICS proforma document.

**Feature:** recommended to be the primary feature defined in the ICS being tested or may be the test case name.

**Test Case(s):** the applicable test case identifiers required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported.

For purpose and structure of the ICS/IXIT proforma and instructions for completing the ICS/IXIT proforma refer to the Bluetooth ICS and IXIT proforma document.

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<tr>
<th>Item</th>
<th>Feature</th>
<th>Test Case(s)</th>
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<td>Health Thermometer Service</td>
<td>HTS/SEN/SD/BV-01-C</td>
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<tr>
<td>HTS 2/2</td>
<td>Temperature Measurement Characteristic</td>
<td>HTS/SEN/DEC/BV-02-C</td>
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<tr>
<td></td>
<td></td>
<td>HTS/SEN/DES/BV-01-C</td>
</tr>
<tr>
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<td>HTS/SEN/CW/BV-02-C</td>
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<td>HTS/SEN/SP/BV-02-C</td>
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*Table 5.1: Test Case Mapping*
6  Revision History and Contributors

**Revision History**

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<thead>
<tr>
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<th>Comments</th>
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<tr>
<td>1.0.0</td>
<td>2011-05-24</td>
<td>Prepare for publication.</td>
</tr>
<tr>
<td>1.0.1r00</td>
<td>2016-05-24</td>
<td>Converted to new Test Case ID conventions as defined in TSTO v4.1.</td>
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<tr>
<td>1.0.1r01</td>
<td>2016-06-04</td>
<td>Converted to current test specification template</td>
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<td>1.0.1</td>
<td>2016-07-14</td>
<td>Prepared for TCRL 2016-1 publication.</td>
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<tr>
<td>1.0.1 edition 2r00</td>
<td>2018-11-29</td>
<td>Editorial changes only. Template updated. Revision History and contributors moved to the end of the document.</td>
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<tr>
<td>1.0.1 edition 2</td>
<td>2019-12-16</td>
<td>Updated copyright page and confidentiality markings to support new Documentation Marking Requirements, performed minor formatting updates, and accepted all tracked changes to prepare for edition 2 publication.</td>
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**Contributors**

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe Decuir</td>
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</tr>
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