Health Thermometer Profile (HTP)

*Bluetooth® Test Specification*

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- **Group Prepared by**: BTI
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- **Abstract**: This document defines test structures and procedures for conformance test of products implementing the Health Thermometer Profile Specification.
Revision History

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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 Profile Specification.

The objective of this test specification is to provide a basis for interoperability tests 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] Test Strategy and Terminology Overview
[2] Bluetooth Core Specification, v4.0 or later
[3] Health Thermometer Profile Specification v1.0
[4] ICS Proforma for Health Thermometer Profile, HTP.ICS
[8] Health Thermometer Service v1.0
[9] Device Information Service v1.1

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

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

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

![Health Thermometer Profile](image)

Figure 3.1: Health Thermometer Test Model

3.2 Test Strategy
The test objectives are to verify functionality of the Health Thermometer Profile 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 profile specification and to match these to the support of the IUT as described in the ICS Proforma.

The basis for the test approach is the general concepts and conformance testing principles defined in ISO/IEC 9646-1 and ISO/IEC 9646-2; both are part of the OSI Conformance Testing Methodology and Framework (CTMF).

The conformance 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 Test...
Specification. 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 Health 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.

- Discovery of Services and Characteristics
- Features

### 3.3 Test Groups

The following test groups have been defined.

#### 3.3.1 Discovery of Services and Characteristics

This group tests IUT discovery of the Health Thermometer Service and characteristics and Device Information Service and characteristics.

#### 3.3.2 Features

This group tests IUT implementation of Health Thermometer Profile Features.
# 4 Test Cases

## 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>/<xx>-<nn>-<y>`. Test group abbreviations for “class”, “feature”, “function”, “sub-function” or “capability” (as applicable to this test specification) are defined in Table 4.1.

<table>
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<th>Identifier Abbreviation</th>
<th>Class identifier <code>&lt;class&gt;</code></th>
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<tr>
<td>HTP</td>
<td>Health Thermometer Profile</td>
</tr>
<tr>
<td>THS</td>
<td>Discovery of Services and Characteristics</td>
</tr>
<tr>
<td>THF</td>
<td>Features</td>
</tr>
<tr>
<td>COL</td>
<td>Collector Role</td>
</tr>
<tr>
<td>SEN</td>
<td>Sensor (Thermometer) Role</td>
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<tr>
<td>SPS</td>
<td>Service Procedure – Set Cumulative Value</td>
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<td>SPC</td>
<td>Service Procedure – Start Sensor Calibration</td>
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<td>SPU</td>
<td>Service Procedure – Update Sensor Location</td>
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<td>SPL</td>
<td>Service Procedure – Request Supported Sensor Locations</td>
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<tr>
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**Table 4.1: Health Thermometer Profile 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 certification 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 are 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 the implementation gracefully rejects any attempt to exercise capabilities which were declared as not supported. Graceful rejection means that the implementation demonstrates uninterrupted conformance to the specification immediately after rejecting such attempts without any need to be externally reset or adjusted, OR

that in cases where more than one valid interpretation of the Specification exists, 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 specification, 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 specification is that, unless there is 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 Set up LE Transport

Use GATT.TS[7] Preamble [Set up ATT Bearer over LE].

#### 4.2.2 Set up BR/EDR Transport

This procedure is used for negative tests only (see Section 4.3.12).

Use GATT.TS[7] Preamble [Set up ATT Bearer over BR/EDR].

#### 4.2.3 Thermometer: initiate Undirected Connectable mode before Indication

This is a setup procedure for the Thermometer to enter the Undirected Connectable mode and accept connection from a Collector.
5.1.3

GAP 9.3.3, 9.3.4

• Initial Condition

A preamble procedure defined in Section 4.2.1 is used to setup the LE transport and L2CAP channel. The Thermometer and the Lower Tester (Collector) may have bonded following GAP procedures.

The Thermometer is disconnected.

ALT A: The Thermometer has been configured to accept commands from the Upper Tester to generate temperature measurements.

ALT B: The Thermometer has been configured by the Lower Tester (as Collector) to generate temperature measurements, see HTP/COL/THF/BV-01-I [Temperature Measurement Configuration]. The Thermometer is configured to generate a measurement indication within a time predictable by the Lower Tester.

• Preamble Procedure

1. The Lower Tester waits for the IUT to send ADV_IND packets (GAP Undirected Connectable Mode).

2. After receipt of either advertising packet, the Lower Tester sends CONNECT REQ and an empty packet to the Thermometer IUT.

3. The Thermometer IUT generates ADV_IND packets.
4.2.4 Collector: Initiate Connection when ready for Indications or Notifications

This is a setup procedure for the Collector to initiate connection to a Thermometer.

- Reference

[3] 5.2.2
[2] GAP 9.3.3, 9.3.4

- Initial Condition

A preamble procedure defined in Section 4.2.1 is used to setup the LE transport and L2CAP channel. The Collector and the Lower Tester (Thermometer) may have bonded following GAP procedures.

The Collector is disconnected.

The Collector has been configured to accept commands from the Upper Tester to request and receive temperature measurements.

- Preamble Procedure

1. The Upper Tester commands the Collector IUT to initiate a connection.
2. The Lower Tester sends ADV_IND packets (GAP Undirected Connectable Mode) to the Collector IUT:
3. The Lower Tester waits for responses from the Collector IUT.
4. The Collector IUT sends a CONNECT_REQ and an empty packet to the Lower Tester.
4.3 Discover Services and Characteristics

The procedures defined in this test group verify Thermometer IUT discovery of the Services defined in the Health Thermometer Service [8] and to those defined in the Device Information Service [9] by a Thermometer IUT, by a Collector IUT.

4.3.1 HTP/COL/THS/BV-01-I [Discover Health Thermometer Service]

- Test Purpose

  Verify that the Health Thermometer Service can be detected by the Collector IUT.

- Reference

  [3] 4.2.1

- Initial Condition

  Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup preamble procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.

  The Lower Tester includes one instantiation of the Health Thermometer Service [8].

- Test Procedure

  The Upper Tester issues a command to the IUT to discover primary services. There are two alternatives:

  1. Execute the procedure included in GATT.TS [7] Discover All Primary Services, GATT/CL/GAD/BV-01-C.

  2. Execute the procedure included in GATT.TS [7] Discover Primary Services by Service UUID, GATT/CL/GAD/BV-02-C, with the service UUID set to «Health Thermometer Service».

- Expected Outcome

  Pass verdict

  One and only one attribute handle is returned containing the handle of the instantiation of a Health Thermometer Service definition.

4.3.2 HTP/COL/THS/BV-02-I [Discover Device Information Service]

- Test Purpose

  Verify that the Device Information Service can be detected by the Collector IUT.

- Reference
[3] 4.2.2

• Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup preamble procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.

The Lower Tester includes one instantiation of the Device Information Service [9].

• Test Procedure

The Upper Tester issues a command to the IUT to discover primary services. There are two alternatives:

1. The IUT executes the procedure included in GATT.TS [7] Discover All Primary Services, GATT/CL/GAD/BV-01-C.

2. The IUT executes the procedure included in GATT.TS [7] Discover Primary Services by Service UUID, GATT/CL/GAD/BV-02-C, with the service UUID set to «Device Information Service».

• Expected Outcome

   Pass verdict

   One and only one attribute handle is returned containing the handle of the instantiation of the Device Information Service definition.

4.3.3  HTP/COL/THS/BV-04-I [Discover Temperature Measurement Characteristic]

• Test Purpose

   Verify that the Temperature Measurement characteristic can be detected by the Collector IUT.

• Reference

   [3] 4.3.1.1

• Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup preamble procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.

The Lower Tester includes one instantiation of the Health Thermometer Service [8] including all defined characteristics. This instantiation also contains two «future» characteristics:

- One inserted between the last mandatory characteristic and the first optional characteristic.
One appended after the last optional characteristic.

- The «future» characteristic is a 16-bit UUID randomly selected from unassigned UUIDs at the time of the test.

The IUT has executed the procedure included in HTP/COL/THS/BV-01-I [Discover Health Thermometer Service], and has saved the handle range for an instantiation of the Health Thermometer Service. That instantiation contains an instantiation of the Temperature Measurement characteristic.

• Test Procedure

The Upper Tester issues a command to the IUT to Discover All Characteristics of a Service, using the handle range returned after executing the procedure in test HTP/COL/THS/BV-01-I [Discover Health Thermometer Service].


• Expected Outcome

Pass verdict

One attribute handle/UUID pair is returned with UUID = «Temperature Measurement characteristic».

4.3.4 HTP/COL/THS/BV-05-I [Discover Temperature Measurement – Client Characteristic Configuration Descriptor]

• Test Purpose

Verify that the Collector IUT can discover the Client Characteristic Configuration descriptor of the Temperature Measurement characteristic.

• Reference

[3] 4.3.1.1

• Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.

The Lower Tester includes one instantiation of the Health Thermometer Service [8] and an associated Client Characteristic Configuration descriptor.

The IUT has discovered the handle range of the Temperature Measurement characteristic either by executing HTP/COL/THS/BV-04-I [Discover Temperature Measurement Characteristic] or by other means.
• Test Procedure

The Upper Tester issues a command to the IUT to Discover All Characteristic Descriptors using the handle range of the characteristic.


• Expected Outcome

Pass verdict
One attribute handle/UUID pair is returned with UUID = «Client Characteristic Descriptor».

4.3.5 HTP/COL/THS/BV-07-I [Discover Temperature Type Characteristic]

• Test Purpose

Verify that a Temperature Type characteristic can be detected by the Collector IUT.

• Reference

[3] 4.3.1.2

• Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.

The Lower Tester includes one instantiation of the Health Thermometer Service [8] including all defined characteristics. This instantiation also contains two «future» characteristics:

- One inserted between the last mandatory characteristic and the first optional characteristic.
- One appended after the last optional characteristic.
- The «future» characteristic is a 16-bit UUID randomly selected from unassigned UUIDs at the time of the test.

The IUT has executed the procedure included in HTP/COL/THS/BV-01-I [Discover Health Thermometer Service], and has saved the handle range for an instantiation of the Health Thermometer Service.

• Test Procedure

The Upper Tester issues a command to the IUT to Discover All Characteristics of a Service with the handle range set to the range returned after executing the procedure in test HTP/COL/THS/BV-01-I [Discover Health Thermometer Service].

• Expected Outcome

Pass verdict
One attribute handle and UUID is returned with UUID = «Temperature Type characteristic».

4.3.6 HTP/CL/THS/BV-08-I [Discover Intermediate Temperature Characteristic]

• Test Purpose

Verify that an Intermediate Temperature characteristic can be detected by the Collector IUT.

• Reference

[3] 4.3.1.3

• Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.

The Lower Tester includes one instantiation of the Health Thermometer Service [8] including all defined characteristics. This instantiation also contains two «future» characteristics:
- One inserted between the last mandatory characteristic and the first optional characteristic.
- One appended after the last optional characteristic.
- The «future» characteristic is a 16-bit UUID randomly selected from unassigned UUIDs at the time of the test.

The IUT has executed the procedure included in HTP/CL/THS/BV-01-I [Discover Health Thermometer Service], and has saved the handle range for an instantiation of the Health Thermometer Service. That instantiation contains an instantiation of the Intermediate Temperature characteristic.

• Test Procedure

The Upper Tester issues a command to the IUT to Discover All Characteristics of a Service, using the handle range returned after executing the procedure in test HTP/CL/THS/BV-01-I [Discover Health Thermometer Service].


• Expected Outcome
Pass verdict
One attribute handle/UUID pair is returned with UUID = «Intermediate Temperature characteristic».

4.3.7 HTP/COL/THS/BV-09-I [Discover Intermediate Temperature – Client Characteristic Configuration Descriptor]

• Test Purpose
Verify that the Collector IUT can discover the Client Characteristic Configuration descriptor of the Intermediate Temperature characteristic.

• Reference
[3] 4.3.1.3

• Initial Condition
Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.
The Lower Tester includes one instantiation of the Health Thermometer Service [8] and an associated Client Characteristic Configuration descriptor.
The IUT has discovered the handle range of the Intermediate Temperature characteristic either by executing HTP/COL/THS/BV-08-I [Discover Intermediate Temperature Characteristic] or by other means.

• Test Procedure
The Upper Tester issues a command to the IUT to Discover All Characteristics of a Service, using the handle range returned after executing the procedure in test HTP/COL/THS/BV-01-I [Discover Health Thermometer Service].

• Expected Outcome
Pass verdict
One attribute handle/UUID pair is returned with UUID = «Intermediate Temperature characteristic».

4.3.8 HTP/COL/THS/BV-10-I [Discover Measurement Interval Characteristic]

• Test Purpose
Verify that a Measurement Interval characteristic can be detected by the Collector IUT.

- **Reference**

  [3] 4.3.1.4

- **Initial Condition**

  Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4. The Lower Tester includes one instantiation of the Health Thermometer Service [8] including all defined characteristics. This instantiation also contains two «future» characteristics:
  - One inserted between the last mandatory characteristic and the first optional characteristic.
  - One appended after the last optional characteristic.
  - The «future» characteristic is a 16-bit UUID randomly selected from unassigned UUIDs at the time of the test.

  The IUT has executed the procedure included in HTP/COL/THS/BV-01-I [Discover Health Thermometer Service], and has saved the handle range for an instantiation of the Health Thermometer Service.

- **Test Procedure**

  The Upper Tester issues a command to the IUT to Discover All Characteristics of a Service, using the handle range returned after executing the procedure in test HTP/COL/THS/BV-01-I [Discover Health Thermometer Service].

  The IUT executes the procedure included in GATT.TS [7] Discover Characteristics by UUID, GATT/CL/GAD/BV-05-C, with the specified handle range.

- **Expected Outcome**

  **Pass verdict**

  One attribute handle and UUID is returned with UUID = «Measurement Interval characteristic».

4.3.9  HTP/COL/THS/BV-11-I [Discover Measurement Interval – Client Characteristic Configuration Descriptor]

- **Test Purpose**

  Verify that the Collector IUT can discover the Client Characteristic Configuration descriptor of the Measurement Interval characteristic.
• Reference

[3] 4.3.1.4

• Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4. The Lower Tester includes one instantiation of the Health Thermometer Service [8] and an associated Client Characteristic Configuration descriptor.

The IUT has discovered the handle range of the Measurement Interval characteristic either by executing HTP/COL/THS/BV-10-I [Discover Measurement Interval Characteristic] or by other means.

• Test Procedure

The Upper Tester issues a command to the IUT to Discover All Characteristic Descriptors using the handle range of the characteristic.

The IUT executes the procedure included in GATT.TS [7] Discover all Characteristic Descriptors, GATT/CL/GAD/BV-06-C using the specified handle range.

• Expected Outcome

Pass verdict
One attribute handle/UUID pair is returned with UUID = «Client Characteristic Descriptor».

4.3.10 HTP/COL/THS/BV-12-I [Discover Measurement Interval – Valid Range Descriptor]

• Test Purpose

Verify that the Collector IUT can discover the Valid Range descriptor of the Measurement Interval characteristic.

• Reference

[3] 4.3.1.4

• Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4. The Lower Tester includes one instantiation of the Health Thermometer Service [8] and an associated Valid Range descriptor.
The IUT has discovered the handle range of the Measurement Interval characteristic either by executing `HTP/COL/THS/BV-10-I [Discover Measurement Interval Characteristic]` or by other means.

- **Test Procedure**

  The Upper Tester issues a command to the IUT to Discover All Characteristic Descriptors using the handle range of the characteristic.

  The IUT executes the procedure included in GATT.TS [7] Discover all Characteristic Descriptors, GATT/CL/GAD/BV-06-C using the specified handle range.

- **Expected Outcome**

  **Pass verdict**
  
  One attribute handle/UUID pair is returned with UUID = «Valid Range Descriptor».

### 4.3.11 HTP/COL/THS/BV-13-I [Discover Device Information Service Characteristics]

- **Test Purpose**

  Verify that the Collector IUT can discover all characteristics of a Device Information Service supported by the IUT.

- **Reference**

  [3] 4.3.2

- **Initial Condition**

  Via IXIT the IUT manufacturer specifies all characteristics of the Device Information Service supported by the IUT.

  Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.

  The Lower Tester includes one instantiation of the Device Information Service [9] including all defined characteristics. This instantiation also contains two «future» characteristics:

  - One inserted before the first characteristic defined in [9].
  - One appended after the last characteristic defined in [9].
  - The «future» characteristic is a 16-bit UUID randomly selected from unassigned UUIDs at the time of the test.

  For alternative 1 below, the IUT has executed the procedure included in `HTP/COL/THS/BV-02-I [Discover Device Information Service]`, and has saved the handle range for the instantiation of the Device Information Service contained in the Lower Tester.
• **Test Procedure**
  
  The Upper Tester issues a command to the IUT to discover all characteristics of the Device Information Service supported by the IUT. There are two alternatives:

  1. **Using the handle range returned after executing the procedure in test**
     
        HTP/COL/THS/BV-02-I [Discover Device Information Service], the IUT executes the procedure included in GATT.TS [7] Discover All Characteristics of a Service, GATT/CL/GAD/BV-03-C, using the specified handle range.

  2. The IUT executes the procedure included in GATT.TS [7] Discover All Characteristics by UUID, GATT/CL/GAD/BV-05-C several times, using each of the UUID for the characteristics of the Device Information Service supported by the IUT.

• **Expected Outcome**

  **Pass verdict**

  For each characteristic supported by the IUT contained in the Lower Tester’s instantiation of the Device Information Service, the IUT shall report attribute handle/UUID pair(s) for all characteristics specified in the IXIT to the Upper Tester.

4.3.12 HTP/COL/THS/BV-14-I [Read Device Information Service Characteristics]

• **Test Purpose**

  Verify that the Collector IUT can read all characteristics of a Device Information Service supported by the IUT.

• **Reference**

  [3] 4.3.2

• **Initial Condition**

  Via IXIT the IUT manufacturer specifies all characteristics of the Device Information Service supported by the IUT.

  Establish an ATT Bearer connection between the Lower Tester and IUT and run the setup procedure for the Collector to initiate connection to a Thermometer using preamble 4.2.4.

  The Lower Tester includes one instantiation of the Device Information Service [9] including all defined characteristics.

  The IUT has previously executed the procedure included in HTP/COL/THS/BV-13-I [Discover Device Information Service Characteristics], so it has the handle/value pairs for all characteristics of the Device Information Services supported by the IUT.

• **Test Procedure**
The Upper Tester issues a command to the IUT to read all characteristics of the Device Information Service supported by the IUT.

For each characteristic of the Device Information Service supported by the IUT, the IUT shall execute the procedure included in GATT.TS [7] GATT/CL/GAR/BV-01-C [Read Characteristic Value – by client].

- Expected Outcome
Pass verdict

For each characteristic contained in the Lower Tester’s instantiation of the Device Information Service supported by the IUT, the IUT shall report the attribute UUID and the characteristic value for all characteristics specified in the IXIT to the Upper Tester.

4.3.13 HTP/SEN/THS/BV-01-I [Health Thermometer Service not discoverable over BR/EDR]

- Test Purpose
Verify that the Health Thermometer Service on a BR/EDR/LE (i.e, dual mode) Thermometer cannot be used by the Collector when using a BR/EDR based ATT Bearer.

- Reference
[3] 2.5

- Initial Condition
The IUT includes one instantiation of the Health Thermometer Service [8].

- Test Procedure
1. Establish a BR/EDR ATT Bearer connection between the Lower Tester and IUT (see 4.2.2).
2. If step 1 succeeds, execute the procedure included in test HTS/SEN/SD/BV-01-C of [10] over the BR/EDR ATT Bearer to discover the Health Thermometer service.
3. If no instances of Health Thermometer Service as a primary service are found over BE/EDR, the Lower Tester sends an ATT_Find_By_Type_Value_Request (0x0001, 0xFFFF) to the IUT, with type set to «Secondary Service» and value set to the UUID for «Health Thermometer Service».

- Expected Outcome
Pass verdict

A BR/EDR ATT Bearer cannot be established, or the Health Thermometer Service is not discovered over BR/EDR.
4.4 Health Thermometer Features

The procedures defined in this test group verify Thermometer IUT implementation of the Features defined in the Health Thermometer Profile Specification [3] by a Thermometer IUT, and usage of the same features by a Collector IUT.

4.4.1 HTP/SEN/THF/BV-01-I [Health Thermometer Service UUID in AD]

- Test Purpose
  Verify that the Health Thermometer Service UUID is included in AD (Advertising Data) from the Thermometer IUT when in GAP Discoverable Mode.

- Reference
  [3] 3.1.1

- Initial Condition
  The IUT is powered on in GAP Discoverable Mode.
  The IUT is induced to generate Advertising Packets using preamble 4.2.3.

- Test Procedure
  The Lower Tester listens for Advertising Packets from the IUT.

- Expected Outcome
  Pass verdict
  At least one received Advertising Packet contains the defined Service UUID for «Health Thermometer Service».

4.4.2 HTP/SEN/THF/BV-02-I [Local Name included in AD or Scan Response]

- Test Purpose
  Verify that the Local Name is included in AD (Advertising Data) or Scan Response data from the Thermometer IUT.

- Reference
  [3] 3.1.2

- Initial Condition
  The IUT is powered on.
  The IUT is induced to generate Advertising Packets using preamble 4.2.3.

- Test Procedure
The Lower Tester listens for Advertising Packets from the IUT. When the Lower Tester receives an Advertising Packet from IUT, it sends a Scan Request to the IUT. Then the Lower Tester listens for a Scan Response from the IUT.

- Expected Outcome

**Pass verdict**

The IUT sends an Advertising packet and a Scan Response packet. The IUT includes the Local Name in either the Advertising packet or Scan Response packet.

### 4.4.3 HTP/COL/THF/BV-01-I [Temperature Measurement Configuration]

- Test Purpose

Verify that the Collector IUT can configure a Thermometer (Lower Tester) to Indicate Temperature measurements.

- Reference

[3] 4.4

- Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the LE transport and L2CAP channel and initiate connection to a Thermometer.

The IUT has executed the procedure included in HTP/COL/THS/BV-05-I [Discover Temperature Measurement – Client Characteristic Configuration Descriptor], which returns
the handle of a Client Configuration Descriptor for a Temperature Measurement characteristic contained in the Lower Tester.

- **Test Procedure**

The Upper Tester sends a command to the IUT to configure to receive temperature measurements.

```
[Diagram showing L2CAP Connection Established over selected channel. HTP/COL/THS/BV-05-I has been executed.]
```

```
ATT_Write_Request (Code = 0x12, handle of Client Configuration descriptor, <<indication>>)  
ATT_Write_Response (Code = 0x13)  
```

```
HTP_Enable_Temp_Reception (handle of temp measurement characteristic)  
```

```
HTP_Reception_confirmation  
```

- **Expected Outcome**

**Pass verdict**

IUT sends a correctly formatted ATT_Write_Request (0x12) to the Lower Tester, with the handle set to that of the Client Configuration Descriptor for a Temperature Measurement characteristic, and the value set to «indication».

### 4.4.4 HTP/COL/THF/BV-02-I [Temperature Measurement Configuration]

- **Test Purpose**

Verify that the Collector IUT can receive indication of the Temperature Measurement Characteristic value from a Thermometer for various field configurations.

- **Reference**

[3] 4.4

- **Initial Condition**
A preamble procedure defined in Section 4.2.4 is used to setup the LE transport and L2CAP channel and initiate connection to a Thermometer.

The IUT is configured to expect Temperature Measurement Indication, after executing the procedure included in HTP/COL/THF/BV-01-I [Temperature Measurement Configuration].

The IUT knows the handle of the Temperature Measurement characteristic.

- **Test Procedure**

The Lower Tester sends an ATT_Handle_Value_Indication containing a Temperature Measurement characteristic value to the IUT.

This test shall be run for each value of each bit shown in the following table:

<table>
<thead>
<tr>
<th>Flag Field</th>
<th>Value</th>
<th>Pass Criteria (Reported in Temperature Measurement characteristic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>bit 0</td>
<td>0</td>
<td>Temperature is In units of Celsius</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Temperature is in units of Fahrenheit</td>
</tr>
<tr>
<td>bit 1</td>
<td>0</td>
<td>Time Stamp field is not present</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Time Stamp field is present</td>
</tr>
<tr>
<td>bit 2</td>
<td>0</td>
<td>Temperature Type field not present</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Temperature Type field present</td>
</tr>
</tbody>
</table>

**ATT_Handle_Value_Indication**
(Code = 0x1D, temp handle, valid Temperature Measurement)

**ATT_Handle_Value_Confirmation**
(Code = 0x1E)

**GATT_Indication**
(temperature value (C or F), Time stamp if included, Temperature type if included)
• Expected Outcome

   Pass verdict

   IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

   IUT reports the received Temperature measurement values in expected combinations to the Upper Tester using the pass criteria in the table above. The reported temperature value matches the one sent by the Lower Tester.

4.4.5  HTP/COL/THF/BI-01-I [Receive Temperature Measurement Indications with reserved flags]

• Test Purpose

   Verify that the Collector IUT can receive indication of the Temperature Measurement Characteristic value from a Thermometer in the presence of reserved flags.

• Reference

   [3] 4.4

• Initial Condition

   A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

   The IUT is configured to expect Temperature Measurement Indication, after executing the procedure included in HTP/COL/THF/BV-01-I [Temperature Measurement Configuration].

   The IUT knows the handle of the Temperature Measurement characteristic.

• Test Procedure

   The Lower Tester sends an ATT_Handle_Value_Indication containing a Temperature Measurement characteristic value to the IUT. There are many combinations of reserved flag settings. For this test use Flags = 0xFF (all 1s). Also include valid uses of the other flags: temperature in Fahrenheit, time stamp and Temperature Type. Any valid values for time stamp and for temperature type may be sent by the Lower Tester.
• Expected Outcome

Pass verdict
IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.
IUT reports the received Temperature measurement to the Upper Tester, e.g., GATT_Indication(Fahrenheit temperature value, time stamp, Temperature Type).
The reported temperature value matches the one sent by the Lower Tester.

4.4.6 HTP/COL/THF/BI-02-I [Receive Temperature Measurement Indications with reserved temperature type]

• Test Purpose

Verify that the Collector IUT can receive indication of the Temperature Measurement Characteristic value from a Thermometer including a reserved temperature type.

• Reference

[3] 4.4

• Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.
The IUT is configured to expect Temperature Measurement Indication, after executing the procedure included in HTP/COL/THF/BV-01-I [Temperature Measurement Configuration].

The IUT knows the handle of the Temperature Measurement characteristic.

- **Test Procedure**

  The Lower Tester sends an ATT_Handle_Value_Indication containing a Temperature Measurement characteristic value to the IUT. That value shall contain: flags = 0x06, valid Celsius temperature, valid time stamp, reserved temperature type (e.g., 0xFF).

  ![Diagram of L2CAP Connection Established over LE transport (4.2.1)](image)

  IUT configured to expect Temperature Measurement Characteristic Indication.

- **Expected Outcome**

  **Pass verdict**

  IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

  IUT reports the received Temperature measurement to the Upper Tester, e.g.,
  
  `GATT_Indication(Celsius temperature value, time stamp, <no temperature type>)`.  

  The reported temperature value matches the one sent by the Lower Tester.

4.4.7 HTP/COL/THF/BV-03-I [Receive Temperature Measurement Indications with additional octets not represented in the flags field]

- **Test Purpose**

  Verify that the Collector IUT can receive indication of the Temperature Measurement Characteristic value from a Thermometer including additional octets not represented in the flags field.
• **Reference**

[3] 4.4

• **Initial Condition**

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

The IUT is configured to expect Temperature Measurement Indication, after executing the procedure included in HTP/COL/THF/BV-01-I [Temperature Measurement Configuration]. The IUT knows the handle of the Temperature Measurement characteristic.

• **Test Procedure**

The Lower Tester sends an ATT_Handle_Value_Indication containing a Temperature Measurement characteristic value to the IUT. That value shall contain: flags = 0x06, valid Celsius temperature, valid time stamp, valid temperature type, and at least two additional octets not represented in the flags field. The total number of octets shall not exceed the maximum MTU size.

ATT_Handle_Value_Indication
(Code = 0x1D, temp handle, Celsius temperature, time stamp, temperature type, additional octets)

IUT configured to expect Temperature Measurement Characteristic Indication.

GATT_Indication
(temperature value: C, Time stamp, temperature type)

ATT_Handle_Value_Confirmation
(Code = 0x1E)

• **Expected Outcome**

**Pass verdict**

IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.
IUT reports the received Temperature measurement to the Upper Tester, e.g.,
GATT_Indication(Celsius temperature value, time stamp, temperature type, <no additional
octets>).

The reported temperature value matches the one sent by the Lower Tester.

4.4.8 HTP/COL/THF/BV-03-I [Receive multiple Temperature Measurement Indications]

- Test Purpose

Verify that the Collector IUT can receive a series of Temperature Measurement indications.

- Reference

[3] 4.4

- Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP
channel and initiate connection to a Thermometer.

The IUT is configured to expect Temperature Measurement Indication, after executing the
procedure included in HTP/COL/THF/BV-01-I [Temperature Measurement Configuration].

The IUT knows the handle of the Temperature Measurement characteristic.

The IUT manufacturer has reported the maximum number of temperature measurements
that the IUT can receive and store via IXIT.

- Test Procedure

The Lower Tester sends multiple ATT_Handle_Value_Indications to the IUT; each contains
a Temperature Measurement characteristic value in Celsius with a time stamp and a
Temperature Type. The number of Temperature measurements sent shall not exceed the
value supported by the IUT reported in the IXIT.
• Expected Outcome

Pass verdict

For each ATT_Handle_Value_Indication sent to the IUT:
- The IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.
- The IUT reports all of the received Celsius Temperature values to the Upper Tester, e.g., GATT_Indication (temperature value, time stamp, Temperature Type) as specified in the flags field. The reported temperature measurements match those sent by the Lower Tester.

4.4.9 HTP/COL/THF/BV-04-I [Configure Intermediate Temperature for Notification]

• Test Purpose

Verify that the Collector IUT can configure a Thermometer (Lower Tester) to Notify Intermediate Temperature characteristics.

• Reference

[3] 4.5

• Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.
The IUT has executed the procedure included in HTP/COL/THS/BV-09-I [Discover Intermediate Temperature – Client Characteristic Configuration Descriptor], which returns the handle of a Client Configuration Descriptor for an Intermediate Temperature characteristic contained in the Lower Tester.

- **Test Procedure**

The Upper Tester sends a command to the IUT to configure to receive intermediate temperature characteristics [ALT 1] or to receive both intermediate temperature characteristics AND temperature measurement characteristics [ALT 2].

Note: if the IUT had already executed the procedure included in HTP/COL/THF/BV-01-I [Temperature Measurement Configuration] to enable indications, it may then enable both Temperature Measurement indications AND Intermediate Temperature notifications.

4.4.10 HTP/COL/THF/BV-05-I [Receive Intermediate Temperature Notifications]

- **Test Purpose**

Verify that the Collector IUT can receive notifications of the Intermediate Temperature characteristic for various field configurations.
• **Reference**

  [3] 4.5

• **Initial Condition**

  A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

  The IUT has executed the procedure included in HTP/COL/THF/BV-04-I [Configure Intermediate Temperature for Notification], which configures it to expect Intermediate Temperature Notification.

  The IUT has executed the procedure included in HTP/COL/THS/BV-09-I [Discover Intermediate Temperature – Client Characteristic Configuration Descriptor], which returns the handle of a Client Configuration Descriptor for an Intermediate Temperature characteristic contained in the Lower Tester.

  The IUT knows the handle of the Intermediate Temperature characteristic.

• **Test Procedure**

  The Lower Tester sends an ATT_Handle_Value_Notification containing an Intermediate Temperature characteristic value in Celsius to the IUT.

  This test shall be run for each value of each bit shown in the following table:

<table>
<thead>
<tr>
<th>Flag Field</th>
<th>Value</th>
<th>Pass Criteria (Reported in Intermediate Temperature Measurement characteristic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>bit 0</td>
<td>0</td>
<td>Temperature is In units of Celsius</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Temperature is in units of Fahrenheit</td>
</tr>
<tr>
<td>bit 1</td>
<td>0</td>
<td>Time Stamp field is not present</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Time Stamp field is present</td>
</tr>
<tr>
<td>bit 2</td>
<td>0</td>
<td>Temperature Type field not present</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Temperature Type field present</td>
</tr>
</tbody>
</table>
• Expected Outcome

Pass verdict
IUT reports the received Intermediate Temperature values in expected combinations to the Upper Tester using the pass criteria in the table above. The reported field values match the ones sent by the Lower Tester.

4.4.11 HTP/COL/THF/BI-04-I [Receive Intermediate Temperature Notifications with reserved flags]

• Test Purpose

Verify that the Collector IUT can receive notifications of the Intermediate Temperature characteristic from a Thermometer including reserved flags.

• Reference

[3] 4.5

• Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.
The IUT has executed the procedure included in HTP/COL/THF/BV-04-I [Configure Intermediate Temperature for Notification], which configures it to expect Intermediate Temperature Notification.

The IUT knows the handle of the Intermediate Temperature characteristic.

- **Test Procedure**

  The Lower Tester sends an ATT_Handle_Value_Notification containing an Intermediate Temperature characteristic value to the IUT. There are many combinations of reserved flag settings. For this test use Flags = 0xFF (all 1s). Also include valid uses of the other flags: temperature in Fahrenheit, time stamp and Temperature Type. Any valid values for time stamp and for temperature type may be sent by the Lower Tester.

  ![Diagram](image_url)

- **Expected Outcome**

  **Pass verdict**

  IUT reports the received Celsius Temperature value to the Upper Tester, e.g., GATT_Notification (intermediate temperature). The reported intermediate temperature value matches the one sent by the Lower Tester.

  **4.4.12 HTP/COL/THF/BI-05-I [Receive Intermediate Temperature Notifications with reserved temperature type]**

- **Test Purpose**

  Verify that the Collector IUT can receive notifications of the Intermediate Temperature Characteristic from a Thermometer including a reserved temperature type.
• Reference

[3] 4.5

• Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

The IUT has executed the procedure included in HTP/COL/THF/BV-04-I [Configure Intermediate Temperature for Notification], which configures it to expect Intermediate Temperature Notification.

The IUT knows the handle of the Intermediate Temperature characteristic.

• Test Procedure

The Lower Tester sends an ATT_Handle_Value_Notification containing an Intermediate Temperature characteristic value to the IUT. That value shall contain: flags = 0x06, valid Celsius temperature, valid time stamp, reserved temperature type (e.g., 0xFF).

• Expected Outcome

Pass verdict

IUT reports the received Celsius Temperature value to the Upper Tester, e.g., GATT_Notification (intermediate temperature, valid time stamp, <no temperature type>). The reported intermediate temperature value matches the one sent by the Lower Tester.
4.4.13 HTP/COL/THF/BI-06-I [Receive Intermediate Temperature Notifications with additional octets not represented in the flags field]

- Test Purpose
  
  Verify that the Collector IUT can receive notifications of the Intermediate Temperature Characteristic from a Thermometer including additional octets not represented in the flags field.

- Reference
  
  [3] 4.5

- Initial Condition

  A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

  The IUT has executed the procedure included in HTP/COL/THF/BV-04-I [Configure Intermediate Temperature for Notification], which configures it to expect Intermediate Temperature Notification.

  The IUT knows the handle of the Intermediate Temperature characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Notification containing an Intermediate Temperature characteristic value to the IUT. That value shall contain: flags = 0x06, valid Celsius temperature, valid time stamp, valid temperature type, and at least two additional octets not represented in the flags field. The total number of octets shall not exceed the maximum MTU size.
L2CAP Connection Established over LE transport (4.2.1)
IUT configured to expect Intermediate Temperature Characteristic Notification.

ATT_Handle_Value_Notification
(Code = 0x1B, temp handle, Celsius temperature, time stamp, temperature type, additional octets)

GATT_Notification
(valid temperature: C, time stamp, temperature type)

• Expected Outcome

Pass verdict
IUT reports the received Temperature value to the Upper Tester, e.g., GATT_Notification
(intermediate temperature, valid time stamp, temperature type, <no additional octets>). The reported intermediate temperature value matches the one sent by the Lower Tester.

4.4.14 HTP/COL/THF/BV-07-I [Receive multiple Intermediate Temperature Notifications]

• Test Purpose

Verify that the Collector IUT can receive notifications of the Intermediate Temperature Notifications followed by a Temperature Measurement indication.

• Reference

[3] 4.4, 4.5

• Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

The Lower Tester is configured to enable Temperature Measurement Indication, by executing the procedure included in HTP/COL/THF/BV-01-I [Temperature Measurement Configuration].
The Lower Tester is configured to enable Intermediate Temperature Notification, by executing the procedure included in HTP/COL/THF/BV-04-I [Configure Intermediate Temperature for Notification].

The IUT knows the handle of the Temperature Measurement characteristic.

The IUT knows the handle of the Intermediate Temperature characteristic.

**Test Procedure**

The Lower Tester sends two or more ATT_Handle_Value_Notifications to the IUT; each contains the Intermediate Temperature characteristic value in Celsius.

The Lower Tester sends an ATT_Handle_Value_Indication to the IUT; containing a Temperature Measurement characteristic value in Celsius with a time stamp and a Temperature Type.

**Expected Outcome**

Pass verdict

For each ATT_Handle_Value_Notification sent to the IUT:
- The IUT reports the received Celsius Temperature value to the Upper Tester. The reported temperature value matches that sent by the Lower Tester.

For the ATT_Handle_Value_Indication sent to the IUT:
- The IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.
- The IUT reports the received Celsius Temperature values to the Upper Tester, e.g., GATT_Indication (temperature value, time stamp, Temperature Type) as specified in the flags field. The reported temperature value matches that sent by the Lower Tester.

### 4.4.15 HTP/COL/THF/BV-08-I [Configure Measurement Interval for Indication]

**Test Purpose**

Verify that the Collector IUT can configure a Thermometer (Lower Tester) to Indicate Measurement Interval characteristics.

**Reference**

[3] 4.6

**Initial Condition**

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.
The IUT has executed the procedure included in HTP/COL/THS/BV-11-I [Discover Measurement Interval – Client Characteristic Configuration Descriptor], which returns the handle of a Client Configuration Descriptor for a Measurement Interval characteristic contained in the Lower Tester.

**Test Procedure**

The Upper Tester sends a command to the IUT to configure to receive measurement interval indications.

**Expected Outcome**

Pass verdict

IUT sends a correctly formatted ATT_Write_Request (0x12) to the Lower Tester, with the handle set to that of the Client Configuration Descriptor for a Measurement Interval characteristic, and the value set to «indication».

### 4.4.16 HTP/COL/THF/BV-09-I [Receive Measurement Interval Indications]

**Test Purpose**

Verify that the Collector IUT can receive Measurement Interval characteristic value indications from a Thermometer.

**Reference**

[3] 4.6
• Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

The IUT is configured to expect Measurement Interval Indication.

The IUT knows the handle of the Measurement Interval characteristic.

• Test Procedure

The Lower Tester sends an ATT_Handle_Value_Indication containing a Measurement Interval characteristic value to the IUT.

• Expected Outcome

Pass verdict

IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester. The reported measurement interval value matches the one sent by the Lower Tester.

4.4.17 HTP/COL/THF/BV-10-I [Read Measurement Interval characteristic]

• Test Purpose

Verify that the Collector IUT can read Measurement Interval characteristic values from a Thermometer.

• Reference
• Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

The Upper Tester knows the handle of a Measurement Interval characteristic contained in the Lower Tester.

• Test Procedure

Send a command from the Upper Tester to request IUT to read a Measurement Interval Characteristic from the Lower Tester e.g., GATT_ReadRequest (handle, value).

After receipt of the expected result by the Lower Tester, send an ATT_Read_Response (0x0B) from the Lower Tester to the IUT.

• Expected Outcome

Pass verdict

The IUT sends a correctly formatted ATT_Read_Request (0x0A) to the Lower Tester, containing the handle specified by the Upper Tester, and with the time and date value specified by the Upper Tester.

The IUT receives the response from the Lower Tester and sends the GATT_ReadResponse containing the correct Measurement Interval value to the Upper Tester.

4.4.18 HTP/COL/THF/BV-11-I [Write Measurement Interval characteristic]

• Test Purpose

Verify that the Collector IUT can write the Measurement Interval characteristic value to a Thermometer.
• Reference

[3] 4.6

• Initial Condition

A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

The Upper Tester has the handle of a writeable Measurement Interval characteristic contained in the Lower Tester.

• Test Procedure

Send a command from the Upper Tester to request IUT to write a valid Measurement Interval Characteristic value to handle in the Lower Tester e.g., GATT_WriteRequest (handle, value).

After receipt of the expected result by the Lower Tester, send an ATT_Write_Response from the Lower Tester to the IUT.

• Expected Outcome

Pass verdict

The IUT sends a correctly formatted ATT_Write_Request (0x12) to the Lower Tester, containing the handle specified by the Upper Tester, and with the Measurement Interval value specified by the Upper Tester.
The IUT may receive the response from the Lower Tester and sends the GATT_WriteResponse to the Upper Tester.

### 4.4.19 HTP/COL/THF/BV-12-I [Read Measurement Interval – Valid Range Descriptor]

- **Test Purpose**
  
  Verify that the Collector IUT can read the Measurement Interval characteristic from a Thermometer.

- **Reference**
  
  [3] 4.6.1

- **Initial Condition**
  
  A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

  The Upper Tester knows the handle of a Measurement Interval Valid Range Descriptor contained in the Lower Tester.

- **Test Procedure**
  
  Send a command from the Upper Tester to request IUT to read a Measurement Interval Valid Range Descriptor from the Lower Tester e.g., GATT_ReadRequest (handle, value).

  After receipt of the expected result by the Lower Tester, send an ATT_Read_Response (0x0B) from the Lower Tester to the IUT.

- **Expected Outcome**
  
  Pass verdict
The IUT sends a correctly formatted ATT_Read_Request (0x0A) to the Lower Tester, containing the handle specified by the Upper Tester.

The IUT receives the response from the Lower Tester and sends the GATT_ReadResponse containing the correct Measurement Interval Valid Range Descriptor value to the Upper Tester.

4.4.20 HTP/COL/THF/BV-13-I [Read Temperature Type characteristic]

- **Test Purpose**
  
  Verify that the Collector IUT can read the Temperature Type characteristic from a Thermometer.

- **Reference**
  
  [3] 4.7

- **Initial Condition**
  
  A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

  The Upper Tester knows the handle of a Temperature Type characteristic contained in the Lower Tester.

- **Test Procedure**
  
  Send a command from the Upper Tester to request IUT to read a Temperature Type Characteristic from the Lower Tester e.g., GATT_ReadRequest (handle, value).

  After receipt of the expected result by the Lower Tester, send an ATT_Read_Response (0x0B) from the Lower Tester to the IUT.

- **Expected Outcome**

```
<table>
<thead>
<tr>
<th>Lower Tester</th>
<th>IUT</th>
<th>Upper Tester</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2CAP Connection Established over LE transport (4.2.1).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ATT_Read_Request
(Code = 0x0A, handle of Temperature Type)

GATT_ReadReq
(handle of Temperature Type)

ATT_Read_Response
(Code = 0x0B, Temperature Type value)

GATT_ReadRes
(value)
```
Pass verdict
The IUT sends a correctly formatted ATT_Read_Request (0x0A) to the Lower Tester, containing the handle specified by the Upper Tester.

The IUT receives the response from the Lower Tester and sends the GATT_ReadResponse containing the correct Temperature Type value to the Upper Tester.

4.4.21 HTP/COL/THF/BI-07-I [Read Temperature Type characteristic with reserved value]

- Test Purpose
  Verify that the Collector IUT can read the Temperature Type characteristic from a Thermometer and discard reserved values.

- Reference
  [3] 4.7

- Initial Condition
  A preamble procedure defined in Section 4.2.4 is used to setup the transport and L2CAP channel and initiate connection to a Thermometer.

  The Upper Tester knows the handle of a Temperature Type characteristic contained in the Lower Tester.

- Test Procedure
  Send a command from the Upper Tester to request IUT to read a Temperature Type Characteristic from the Lower Tester e.g., GATT_ReadRequest (handle, value).

  After receipt of the expected result by the Lower Tester, send an ATT_Read_Response (0x0B) from the Lower Tester to the IUT containing a reserved value.
• Expected Outcome

Pass verdict
The IUT sends a correctly formatted ATT_Read_Request (0x0A) to the Lower Tester, containing the handle specified by the Upper Tester.
The IUT receives the response from the Lower Tester and discards it. It shall not report the received value to the Upper Tester.

4.4.22 HTP/COL/THF/BV-14-I [Verify Bond Status on Reconnection]

• Test Purpose
Verify that the Collector IUT starts encryption with a previously bonded Thermometer on reconnection.

• Reference
[3] 5.2.3

• Initial Condition
The IUT and the Lower Tester are bonded.
The IUT has configured the Lower Tester to enable indications or notifications on one or more of the characteristics of the Lower Tester’s Health Thermometer Service.
No connection is established between the IUT and Lower Tester.

• Test Procedure
1. The Lower Tester begins advertising using GAP undirected connectable mode.
2. The IUT establishes a connection to the Lower Tester.
3. The Lower Tester does not send any indications or notifications to the IUT.
4. The IUT starts encryption when the connection is established.

• Expected Outcome
Pass verdict
The IUT starts encryption when the connection is established.
5 Test Case Mapping

The Test Case Mapping Table (TCMT) maps test cases to specific capabilities in the ICS. Profiles, protocols and services may define multiple roles, and it is possible that a product may implement more than one role. The product shall be tested in all roles for which support is declared in the ICS document.

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 Profile (HTP) [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.

**Test Case Applicable:** may be used to note if a test is required based on the supported features.

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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Feature</th>
<th>Test case(s)</th>
<th>Test Case Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTP 3/1 AND GAP 0/3 AND GATT 2/1</td>
<td>Health Thermometer Service not discovered over BR/EDR</td>
<td>HTP/SEN/THS/BV-01-I</td>
<td></td>
</tr>
<tr>
<td>HTP 3/2</td>
<td>Include Health Thermometer Service UUID in AD in GAP Discoverable Mode</td>
<td>HTP/SEN/THF/BV-01-I</td>
<td></td>
</tr>
<tr>
<td>HTP 3/3</td>
<td>Include Local Name in AD or Scan Response</td>
<td>HTP/SEN/THF/BV-02-I</td>
<td></td>
</tr>
<tr>
<td>HTP 8/1</td>
<td>Discover Health Thermometer Service</td>
<td>HTP/COL/THS/BV-01-I</td>
<td></td>
</tr>
<tr>
<td>HTP 8/2</td>
<td>Discover Temperature Measurement characteristic</td>
<td>HTP/COL/THS/BV-04-I</td>
<td></td>
</tr>
<tr>
<td>HTP 8/3</td>
<td>Discover Temperature Measurement – Client Characteristic Configuration Descriptor</td>
<td>HTP/COL/THS/BV-05-I</td>
<td></td>
</tr>
<tr>
<td>HTP 8/4</td>
<td>Discover Temperature Type characteristic</td>
<td>HTP/COL/THS/BV-07-I</td>
<td></td>
</tr>
<tr>
<td>HTP 8/5</td>
<td>Discover Intermediate Temperature characteristic</td>
<td>HTP/COL/THS/BV-08-I</td>
<td></td>
</tr>
<tr>
<td>HTP 8/6</td>
<td>Discover Intermediate Temperature – Client Characteristic Configuration Descriptor</td>
<td>HTP/COL/THS/BV-09-I</td>
<td></td>
</tr>
<tr>
<td>HTP 8/7</td>
<td>Discover Measurement Interval characteristic</td>
<td>HTP/COL/THS/BV-10-I</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Feature</td>
<td>Test case(s)</td>
<td>Test Case Applicable</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>HTP 8/8</td>
<td>Discover Measurement Interval – Client Characteristic Configuration Descriptor</td>
<td>HTP/COL/THS/BV-11-I</td>
<td></td>
</tr>
<tr>
<td>HTP 8/9</td>
<td>Discover: Measurement Interval – Valid Range Descriptor</td>
<td>HTP/COL/THS/BV-12-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/1</td>
<td>Configure Temperature Measurement characteristic for Indications</td>
<td>HTP/COL/THF/BV-01-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/2 AND HTP 9/4 AND HTP 9/5</td>
<td>Receive Temperature Measurement characteristic Indications</td>
<td>HTP/COL/THF/BV-02-I, HTP/COL/THF/BI-01-I, HTP/COL/THF/BI-02-I, HTP/COL/THF/BI-03-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/3</td>
<td>Receive multiple Temperature Measurement characteristic Indications</td>
<td>HTP/COL/THF/CO/BV-03-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/6</td>
<td>Configure Intermediate Temperature characteristic for Notifications</td>
<td>HTP/COL/THF/BV-04-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/8</td>
<td>Configure Measurement Interval characteristic for Indications</td>
<td>HTP/COL/THF/BV-08-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/9</td>
<td>Receive Measurement Interval characteristic Indications</td>
<td>HTP/COL/THF/BV-09-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/10</td>
<td>Read Measurement Interval characteristic</td>
<td>HTP/COL/THF/BV-10-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/11</td>
<td>Write Measurement Interval characteristic</td>
<td>HTP/COL/THF/BV-11-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/12</td>
<td>Read Measurement Interval – Valid Range Descriptor</td>
<td>HTP/COL/THF/BV-12-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/13</td>
<td>Read Temperature Type characteristic</td>
<td>HTP/COL/THF/BV-13-I, HTP/COL/THF/BI-07-I</td>
<td></td>
</tr>
<tr>
<td>HTP 9/14</td>
<td>Verify Bond Status on Reconnection</td>
<td>HTP/COL/THF/BV-14-I</td>
<td></td>
</tr>
<tr>
<td>HTP 10/1</td>
<td>Discover Device Information Service</td>
<td>HTP/COL/THS/BV-02-I</td>
<td></td>
</tr>
<tr>
<td>HTP 10/2 OR HTP 10/3 OR HTP 10/4</td>
<td>Device Information Service Characteristics</td>
<td>HTP/COL/THS/BV-13-I, HTP/COL/THS/BV-14-I</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.1: Test Case Mapping