HID Service (HIDS)

Bluetooth® Test Suite

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- Revision Date: 2019-12-12
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<td>HIDS/HD/DR/BV-04-C [Client Characteristic Configuration Descriptor of Boot Keyboard Input Report Characteristic]</td>
</tr>
<tr>
<td>4.12.5</td>
<td>HIDS/HD/DR/BV-05-C [Client Characteristic Configuration Descriptor of Boot Mouse Input Report Characteristic]</td>
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<td>HIDS/HD/DW/BV-01-C [Client Characteristic Configuration Descriptor of Report Characteristic]</td>
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<td>4.13.2</td>
<td>HIDS/HD/DW/BV-02-C [Client Characteristic Configuration Descriptor of Boot Keyboard Input Report Characteristic]</td>
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<tr>
<td>4.13.3</td>
<td>HIDS/HD/DW/BV-03-C [Client Characteristic Configuration Descriptor of Boot Mouse Input Report Characteristic]</td>
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1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and Test Cases (TC) to test the Bluetooth HID 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. Specification of the Bluetooth System, version 4.0 or later
3. HID Service Specification 1.0
4. ICS Proforma for HID Service 1.0
5. GATT Test Suite GATT.TS
6. GAP Test Suite GAP.TS
7. Characteristic and Descriptor descriptions are accessible via the Bluetooth SIG GATT characteristic web pages.

### 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 HID Service requires the presence of GAP, SM, and GATT. This is illustrated in Figure 3.1.

![Figure 3.1: HID Service Test Model]

3.2 Test Strategy

The test objectives are to verify functionality of the HID 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 HID 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 HID Service 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 cases.

The test suite structure is a tree with the first level representing the protocol groups.

- Service definition
- Characteristic declaration
- Characteristic descriptors
- Characteristic read
• Long Characteristic Read
• Characteristic write
• Configure notification
• Characteristic notification
• Descriptors Read
• Descriptors Write
• Service procedures

The interface between the IUT and the Upper Tester may be:
• A man-machine interface
• Provided by the IUT manufacturer

3.3 Test Groups
The following test groups have been defined.

3.3.1 Service Definition
Verify the existence of defined service.

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

3.3.3 Characteristic Descriptors
Verify the presence and contents of characteristic descriptors.

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

3.3.5 Long Characteristic Read
Verify that characteristics that support long characteristic reading can be read. Verify the formatting and value of characteristic values.

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

3.3.7 Configure Notification
Verify characteristics can be configured for notification.

3.3.8 Characteristic Notification
Verify characteristics which support notification can be notified.

3.3.9 Descriptor Read
Verify values descriptors can be read.
3.3.10 Descriptor Write
Verify descriptors values can be written.

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

4.1 Introduction

4.1.1 TC Naming Conventions

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

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>HIDS</td>
<td>HID 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>HD</td>
<td>HID Device role</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Feature Identifier &lt;feat&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN</td>
<td>Characteristic Notification</td>
</tr>
<tr>
<td>CON</td>
<td>Configure 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>DR</td>
<td>Descriptors Read</td>
</tr>
<tr>
<td>DW</td>
<td>Descriptors Write</td>
</tr>
<tr>
<td>LCR</td>
<td>Long Characteristic Read</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: HID Service TC Feature 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 is a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon 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 [Section 4.2.1.2.](#)

### 4.3 Service Definition

Verify the service definition.

#### 4.3.1.1 HIDS/HD/SD/BV-01-C [Service Definition]

- Test Purpose
  
  Verify the IUT has one or more instantiations of the HID service as a primary service.
• Reference

[3] 2.1

• 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 service-by-service UUID by executing the test procedure of GATT test case GATT/SR/GAD/BV-01-C [Discover All Primary Services] or GATT/SR/GAD/BV-02-C [Discover Primary Services by Service UUID - from server] in [5] with the service UUID set to “HID Service”.

2. Verify at least one attribute handle range is returned, containing the starting handle and the ending handle of each HID service definition.

• Expected Outcome

Pass verdict

At least one attribute handle range is returned, containing the starting handle and the ending handle of each HID service definition.

4.4 Characteristic Declaration

• Test Purpose

This test group contains test cases to verify that the characteristic properties bit field of the Attribute Value 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, using this generic test procedure.

• Reference

[3] 2.2

• Initial Condition

The handle range of each instance of the HID service has been previously discovered by the Lower Tester in test case HIDS/HD/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 Table 4.2:


2. For a discovered characteristic that is listed in Table 4.2, verify the characteristic properties bit field of the Attribute Value field of the characteristic declaration meets the requirements of the service.
3. Repeat steps 1–2 for each instance of the service.

- Expected Outcome

The following pass and fail verdicts apply to the test cases listed in Table 4.2:

**Pass verdict**

The characteristic is discovered and the characteristic properties bit field of the *Attribute Value* 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 HIDS/HD/DEC/BV-01-C [Characteristic Declaration – Report Map Characteristic]</td>
<td>[3] Table 2-1, 2.5.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.4.2 HIDS/HD/DEC/BV-02-C [Characteristic Declaration – Report Characteristic]</td>
<td>[3] Table 2-1, 2.6.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.4.3 HIDS/HD/DEC/BV-03-C [Characteristic Declaration – HID Control Point Characteristic]</td>
<td>[3] Table 2-1, 2.8.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.4.4 HIDS/HD/DEC/BV-04-C [Characteristic Declaration – HID Information Characteristic]</td>
<td>[3] Table 2-1, 2.7.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.4.5 HIDS/HD/DEC/BV-05-C [Characteristic Declaration – Protocol Mode Characteristic]</td>
<td>[3] Table 2-1, 2.3.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.4.6 HIDS/HD/DEC/BV-06-C [Characteristic Declaration – Boot Keyboard Input Report]</td>
<td>[3] Table 2-1, 2.7.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.4.8 HIDS/HD/DEC/BV-08-C [Characteristic Declaration – Boot Mouse Input Report]</td>
<td>[3] Table 2-1, 2.9.1 [7] Human Interface Device service</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 a time, as enumerated in the test cases in Table 4.3.

- **Reference**
  [3] 2.5.3, 2.6.3, 2.7.3, 2.9.3

- **Initial Condition**
  The handle range of each characteristic referenced in the test cases that follow 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 Table 4.3:

  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. Verify that the value of the characteristic descriptor meets the requirements of the service.
  3. Repeat steps 1–2 for each handle-UUID pair.
  4. Repeat steps 1–3 for each instance of the characteristic and 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.

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.5.1</strong> HIDS/HD/DES/BV-01-C [Client Characteristic Configuration Descriptor of Report Characteristic]</td>
<td>[3] 2.5.3.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td><strong>4.5.2</strong> HIDS/HD/DES/BV-02-C [Report Reference Characteristic Descriptor]</td>
<td>[3] 2.5.3.2 [7] Human Interface Device service</td>
</tr>
</tbody>
</table>
Test Case | Requirements
--- | ---
4.5.3 HIDS/HD/DES/BV-03-C [External Report Reference Characteristic Descriptor] | [3] 2.6.3.1
 | [7] Human Interface Device service
4.5.4 HIDS/HD/DES/BV-04-C [Client Characteristic Configuration Descriptor of Boot Keyboard Input Report Characteristic] | [3] 2.7.3.1
 | [7] Human Interface Device service
4.5.5 HIDS/HD/DES/BV-05-C [Client Characteristic Configuration Descriptor of Boot Mouse Input Report Characteristic] | [3] 2.9.3.1
 | [7] Human Interface Device service

Table 4.3: Characteristic Descriptor 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 with the specification. The verification is done one value at a time, as enumerated in the test cases in Table 4.4, using this generic test procedure.

- **Reference**

  [3] 2.5.3, 2.6.3, 2.7.3, 2.9.3

- **Initial Condition**

  The handle of each characteristic value referenced in the test cases that follow 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 Table 4.4:

  1. For Protocol Mode, Boot Keyboard Input Report Characteristic, Boot Mouse Input Report Characteristic and Boot Keyboard Output Report Characteristic, read the characteristic value by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C [Read Characteristic Value] or GATT/SR/GAR/BV-03-C [Read using Characteristic UUID]

  2. Verify that the characteristic value meets the requirements of the service.

  3. For the rest of the characteristics, 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].
4. Verify that the characteristic value meets the requirements of the service.
5. Repeat steps 1–2 for each instance of the characteristic and service.

• **Expected Outcome**

The following pass and fail verdicts apply to the test cases listed in Table 4.4:

**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>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6.3 HIDS/HD/CR/BV-03-C [Characteristic Read – HID Information]</td>
<td>[3] Table 2-1, 2.8.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.6.4 HIDS/HD/CR/BV-04-C [Characteristic Read – Protocol Mode]</td>
<td>[3] Table 2-1, 2.4.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.6.6 HIDS/HD/CR/BV-06-C [Characteristic Read – Boot Keyboard Input Report Characteristic]</td>
<td>[3] Table 2-1, 2.7.1 [7] Human Interface Device service</td>
</tr>
<tr>
<td>4.6.8 HIDS/HD/CR/BV-08-C [Characteristic Read – Boot Mouse Input Report Characteristic]</td>
<td>[3] Table 2-1, 2.9.1 [7] Human Interface Device service</td>
</tr>
</tbody>
</table>

*Table 4.4: Characteristic Read Value Test Cases*
4.7 Long Characteristic Read

- **Test Purpose**
  This test group contains test cases to read and verify that the long characteristic values required by the service are compliant with the specification. 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] 2.5, 2.6

- **Initial Condition**
  The handle of each characteristic value referenced in the test cases that follow 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 Table 4.6:

  1. Read the characteristic value by executing the test procedure of GATT test case GATT/SR/GAR/BV-04-C [Read Long Characteristic Value - from server] in [5].
  2. Verify that the characteristic value meets the requirements of the service.
  3. Repeat steps 1-2 for each instance of the characteristic and service.

- **Expected Outcome**
  The following pass and fail verdicts apply to the test cases listed in Table 4.6:

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

- **Notes**
  The ATT_Error_Responses “Request Not Supported” or “Attribute Not Long” is acceptable outcomes in response to step 1.

**Long Characteristic Read Value Test Cases**

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
</table>
### 4.7.2 HIDS/HD/LCR/BV-02-C [Characteristic Read – Report Characteristic (Input)]

[3] 2.5.1

[7] Human Interface Device service

### 4.7.3 HIDS/HD/LCR/BV-03-C [Characteristic Read – Report Characteristic (Output)]

[3] 2.5.1

[7] Human Interface Device service

### 4.7.4 HIDS/HD/LCR/BV-04-C [Characteristic Read – Report Characteristic (Feature)]

[3] 2.5.1

[7] Human Interface Device service

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| 4.7.2 HIDS/HD/LCR/BV-02-C [Characteristic Read – Report Characteristic (Input)] | [3] 2.5.1  
[7] Human Interface Device service |
| 4.7.3 HIDS/HD/LCR/BV-03-C [Characteristic Read – Report Characteristic (Output)] | [3] 2.5.1  
[7] Human Interface Device service |
| 4.7.4 HIDS/HD/LCR/BV-04-C [Characteristic Read – Report Characteristic (Feature)] | [3] 2.5.1  
[7] Human Interface Device service |

*Table 4.5: Long Characteristic Read Value Test Cases*

### 4.8 Configure Notification

- **Test Purpose**

  This test group contains test cases to verify responses to enabling and/or disabling characteristic notifications. 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] 2.5.3, 2.6.3, 2.7.3, 2.9.3

- **Initial Condition**

  The handle of each characteristic value referenced in the test cases that follow 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 descriptor require a specific security mode or security level, establish a connection meeting those requirements.

  For Test Cases involving the Boot Keyboard Input Report, and/or the Boot Mouse Input Report characteristics, the Lower Tester shall write the value 0x00 to the Protocol Mode characteristic to configure the HID Device in Boot Protocol Mode.
• Test Procedure

The following test procedure applies to the test cases listed in Table 4.6:

1. Disable 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. Enable notification by writing value 0x0001 to the client characteristic configuration descriptor of the characteristic.

3. Repeat steps 1-2 for each instance of the characteristic and service.

• Expected Outcome

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

**Pass verdict**

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

### Configure Notification Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
</table>

*Table 4.6: Configure Notification Test Cases*

### 4.9 Characteristic Notification

• Test Purpose

This test group contains test cases to verify compliant operation when the IUT sends notifications 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 that the IUT sends notifications of characteristic values.

• Reference

[3] 2.5.3, 2.6.3, 2.7.3, 2.9.3
• Initial Condition

The handle of each characteristic value referenced in the test cases that follow 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 notification.

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 characteristic descriptor require a specific security mode or security level, establish a connection meeting those requirements.

For Test Cases involving the Boot Keyboard Input Report, and/or the Boot Mouse Input Report characteristics, the Lower Tester shall write the value 0x00 to the Protocol Mode characteristic to configure the HID Device in Boot Protocol Mode.

• Test Procedure

The following test procedure applies to the test cases listed in Table 4.7:

1. Disable notification by writing value 0x0000 to the client characteristic configuration. Perform an action on the IUT that will induce it to send a notification 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_Notification from the IUT containing the characteristic handle and value.

4. Verify that 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 notified and the characteristic value meets the requirements of the service.

Characteristic Notification Value Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
</table>
4.10 Characteristic Write

- **Test Purpose**
  
  This test group contains test cases to write to characteristic values and verify that the values written by the service are compliant with specification. The verification is done one value at a time, as enumerated in the test cases in Table 4.8, using this generic test procedure.

- **Reference**
  
  [3] 2.5, 2.6, 2.7, 2.9

- **Initial Condition**
  
  The handle of each characteristic value referenced in the test cases that follow 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.

  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 descriptor require a specific security mode or security level, establish a connection meeting those requirements.

  For Test Cases involving the Boot Keyboard Input Report, and/or the Boot Mouse Input Report characteristics, the Lower Tester shall write the value 0x00 to the Protocol Mode characteristic to configure the HID Device in Boot Protocol Mode.

- **Test Procedure**
  
  The following test procedure applies to the test cases listed in Table 4.8:

  1. 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].
  2. Verify that the characteristic value is successfully written.

- **Expected Outcome**
  
  The following pass and fail verdicts apply to the test cases listed in Table 4.8:

  **Pass verdict**
  
  The characteristic value is successfully written.
### Characteristic Write Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.10.2</strong> HIDS/HD/CW/BV-02-C [Characteristic Write – Report (Output)]</td>
<td>[3] Table 2-1, 2.5.1  &lt;br&gt; [7] Human Interface Device service</td>
</tr>
<tr>
<td><strong>4.10.3</strong> HIDS/HD/CW/BV-03-C [Characteristic Write – Report (Feature)]</td>
<td>[3] Table 2-1, 2.5.1  &lt;br&gt; [7] Human Interface Device service</td>
</tr>
<tr>
<td><strong>4.10.4</strong> HIDS/HD/CW/BV-04-C [Characteristic Write – Boot Keyboard Input Report Characteristic]</td>
<td>[3] Table 2-1, 2.7.1  &lt;br&gt; [7] Human Interface Device service</td>
</tr>
<tr>
<td><strong>4.10.5</strong> HIDS/HD/CW/BV-05-C [Characteristic Write – Boot Keyboard Output Report Characteristic]</td>
<td>[3] Table 2-1, 2.7.1  &lt;br&gt; [7] Human Interface Device service</td>
</tr>
<tr>
<td><strong>4.10.6</strong> HIDS/HD/CW/BV-06-C [Characteristic Write – Boot Mouse Input Report Characteristic]</td>
<td>[3] Table 2-1, 2.7.1  &lt;br&gt; [7] Human Interface Device service</td>
</tr>
</tbody>
</table>

*Table 4.8: Characteristic Write Test Cases*

### 4.11 Characteristic Write Without Response

- **Test Purpose**

  This test group contains test cases to write without response to characteristic values and verify that the values written by the service are compliant with specification. The verification is done one value at a time, as enumerated in the test cases in *Table 4.10*, using this generic test procedure.

- **Reference**

  [3] 2.10, 2.11

- **Initial Condition**

  The handle of each characteristic value referenced in the test cases that follow 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.

  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 descriptor require a specific security mode or security level, establish a connection meeting those requirements.

For Test Cases involving the Boot Keyboard Input Report, and/or the Boot Mouse Input Report characteristics, the Lower Tester shall write the value 0x00 to the Protocol Mode characteristic to configure the HID Device in Boot Protocol Mode.

• Test Procedure

The following test procedure applies to the test cases listed in Table 4.10:

1. 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-01-C [Write Without Response - to server] in [5].
2. Verify that the characteristic value is successfully written.

• Expected Outcome

The following pass and fail verdicts apply to the test cases listed in Table 4.10:

Pass verdict

The characteristic value is successfully written.

**Characteristic Write Without Response Test Cases**

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| 4.11.1 HIDS/HD/CW/BV-07-C [Characteristic Write – Report (Output)] | [3] Table 2-1, 2.5.1  
[7] Human Interface Device service |
| 4.11.2 HIDS/HD/CW/BV-08-C [Characteristic Write – Protocol Mode (Boot Mode)] | [3] Table 2-1, 2.4.1  
[7] Human Interface Device service |
| 4.11.3 HIDS/HD/CW/BV-09-C [Characteristic Write – Protocol Mode (Report Mode)] | [3] Table 2-1, 2.4.1  
[7] Human Interface Device service |
| 4.11.4 HIDS/HD/CW/BV-10-C [Characteristic Write – HID Control Point (Suspend)] | [3] Table 2-1, 2.9.1  
[7] Human Interface Device service |
| 4.11.5 HIDS/HD/CW/BV-11-C [Characteristic Write – HID Control Point (Exit Suspend)] | [3] Table 2-1, 2.9.1  
[7] Human Interface Device service |
4.12 Descriptors Read

**Test Purpose**

This test group contains test cases to read and verify that the descriptor values required by the service are compliant with the specification. The verification is done one value at a time, as enumerated in the test cases in Table 4.10, using this generic test procedure.

**Reference**

[3] 2.5.3, 2.6.3, 2.7.3, 2.9.3

**Initial Condition**

The handle of each descriptor 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.

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

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

For Test Cases involving the Boot Keyboard Input Report, and/or the Boot Mouse Input Report characteristics, the Lower Tester shall write the value 0x00 to the Protocol Mode characteristic to configure the HID Device in Boot Protocol Mode.

**Test Procedure**

The following test procedure applies to the test cases listed in Table 4.10:

1. Read the descriptor value by executing the test procedure of GATT test case GATT/SR/GAR/BV-06-C [Read Characteristic Descriptors – from server] in [5].

2. Verify that the descriptor value meets the requirements of the service.

3. Repeat steps 1-2 for each instance of the descriptor.

**Expected Outcome**

The following pass and fail verdicts apply to the test cases listed in Table 4.10:

**Pass verdict**

The descriptor is successfully read and the descriptor value meets the requirements of the service.
### Descriptor Read Value Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| 4.12.1 HIDS/HD/DR/BV-01-C [Client Characteristic Configuration Descriptor of Report Characteristic] | [3] 2.5.3.1  
[7] Human Interface Device service |
| 4.12.2 HIDS/HD/DR/BV-02-C [Report Reference Characteristic Descriptor] | [3] 2.5.3.2  
[7] Human Interface Device service |
| 4.12.3 HIDS/HD/DR/BV-03-C [External Report Reference Characteristic Descriptor] | [3] 2.6.3.1  
[7] Human Interface Device service |
| 4.12.4 HIDS/HD/DR/BV-04-C [Client Characteristic Configuration Descriptor of Boot Keyboard Input Report Characteristic] | [3] 2.7.3.1  
[7] Human Interface Device service |
| 4.12.5 HIDS/HD/DR/BV-05-C [Client Characteristic Configuration Descriptor of Boot Mouse Input Report Characteristic] | [3] 2.9.3.1  
[7] Human Interface Device service |

Table 4.10: Descriptor Read Value Test Cases

### 4.13 Descriptors Write

- **Test Purpose**
  
  This test group contains test cases to write and verify that the descriptors behavior required by the service is compliant with the specification. The verification is done one value at a time, as enumerated in the test cases in Table 4.11, using this generic test procedure.

- **Reference**
  
  [3] 2.5.3, 2.6.3, 2.7.3, 2.9.3

- **Initial Condition**
  
  The handle of each descriptor 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.

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

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

  For Test Cases involving the Boot Keyboard Input Report, and/or the Boot Mouse Input Report characteristics, the Lower Tester shall write the value 0x00 to the Protocol Mode characteristic to configure the HID Device in Boot Protocol Mode.
• **Test Procedure**

The following test procedure applies to the test cases listed in Table 4.11:

1. Write the descriptor value by executing the test procedure of GATT test case GATT/SR/GAW/BV-08-C [Write Characteristic Descriptors – from server] in [5].
2. Verify that the descriptor behavior meets the requirements of the service.
3. Repeat steps 1-2 for each instance of the descriptor.

• **Expected Outcome**

The following pass and fail verdicts apply to the test cases listed in Table 4.11:

**Pass verdict**

The descriptor value is successfully written and the descriptor behavior meets the requirements of the service.

### Descriptor Write Value Test Cases

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Requirements</th>
</tr>
</thead>
</table>

*Table 4.11: Descriptor Write Value Test Cases*

### 4.14 Service Procedures

This test group contains test cases to verify all expected features and behavior of the service and to ensure it is compliant with specification.

#### 4.14.1.1 HIDS/HD/SP/BV-01-C [Notification Behavior of multiple Input reports]

• **Test Purpose**

Verify that the IUT can send input reports once it has been configured to do so.

• **Reference**

[3] 2.5.1

• **Initial Condition**

The Report Characteristic is configured for notification.
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 Report 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 Report Characteristic of type Input Report.
  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_Notification from the IUT containing the Report Characteristic handle and value.
  4. Verify that the characteristic value meets the requirements of the service.
  5. Repeat steps 3-4 for each received notification until the IUT stops sending notifications.
  6. The Lower Tester configures the Report characteristic to disable notifications.
  7. Repeat steps 1-2 with notifications disabled.
  8. Verify that the Tester does not receive an ATT_Handle_Value_Notification from the IUT containing the Report Characteristic.

• Expected Outcome
  Pass verdict
  The IUT sends a notification of the correct Input Report characteristic, upon reconnection.
  The value of the Input Report characteristic meets the requirements of the service.
  The IUT sends one or more notifications of the Report characteristic when the appropriate Reports have been set for notification.
  The value of the characteristic meets the requirements of the service.
  The IUT stops sending notifications of the Report characteristic after the Lower Tester configures the characteristic to disable notifications.
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 HID Service [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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Feature</th>
<th>Test Case(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIDS 2/1</td>
<td>Service Discovery - HID Service</td>
<td>HIDS/HD/SD/BV-01-C</td>
</tr>
<tr>
<td>HIDS 2/2 AND HIDS 2/6 AND HIDS 2/7</td>
<td>Boot Keyboard Input Report Characteristic - Write</td>
<td>HIDS/HD/CW/BV-04-C</td>
</tr>
<tr>
<td>Item</td>
<td>Feature</td>
<td>Test Case(s)</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| HIDS 2/3 AND HIDS 2/9 | Boot Mouse Input Report Characteristic | HIDS/HD/DEC/BV-08-C  
| | | HIDS/HD/DES/BV-05-C  
| | | HIDS/HD/CR/BV-08-C  
| | | HIDS/HD/CON/BV-03-C  
| | | HIDS/HD/CN/BV-03-C  
| | | HIDS/HD/DR/BV-05-C  
| | | HIDS/HD/DW/BV-03-C |
| HIDS 2/3 AND HIDS 2/9 AND HIDS 2/10 | Boot Mouse Input Report Characteristic – Write | HIDS/HD/CW/BV-06-C |
| HIDS 2/12 | Report Characteristic | HIDS/HD/DEC/BV-02-C  
| | | HIDS/HD/DES/BV-02-C  
| | | HIDS/HD/DR/BV-02-C |
| | | HIDS/HD/LCR/BV-02-C  
| | | HIDS/HD/CON/BV-01-C  
| | | HIDS/HD/CN/BV-01-C  
| | | HIDS/HD/DES/BV-01-C  
| | | HIDS/HD/DR/BV-01-C  
| | | HIDS/HD/DW/BV-01-C  
| | | HIDS/HD/SP/BV-01-C |
| | | HIDS/HD/CW/BV-02-C  
| | | HIDS/HD/CW/BV-07-C |
| | | HIDS/HD/LCR/BV-04-C  
| | | HIDS/HD/CW/BV-03-C |
| HIDS 2/17 | HID Control Point Characteristic | HIDS/HD/DEC/BV-03-C  
| | | HIDS/HD/CW/BV-10-C  
| | | HIDS/HD/CW/BV-11-C |
| HIDS 2/18 | HID Information Characteristic | HIDS/HD/DEC/BV-04-C  
| | | HIDS/HD/CR/BV-03-C |

*Table 5.1: Test Case Mapping*
# Revision History

<table>
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<tr>
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<td>1.0.0</td>
<td>2011-12-27</td>
<td>Adopted by the Bluetooth SIG Board of Directors</td>
</tr>
<tr>
<td>1.0.1r0</td>
<td>2012-05-18</td>
<td>TSE 4788: HIDS/HD/DES/BV-03-C (legacy ID: TP/DES/BV-03-C): Remove from TCMT</td>
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<tr>
<td>1.0.1</td>
<td>2012-07-24</td>
<td>Prepare for publication.</td>
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<td>1.0.2</td>
<td>2013-07-02</td>
<td>Prepare for Publication</td>
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<tr>
<td>1.0.3r00</td>
<td>2016-02-16</td>
<td>TSE 6839: Test case reference corrected. Changed &quot;TP/GAW/SR/BV-01-C&quot; to &quot;TP/GAW/SR/BV-03-C.&quot; .(GATT/SR/GAW/BV-03-C after ID conversion)</td>
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<td>1.0.3r01</td>
<td>2016-04-13</td>
<td>Converted to new Test Case ID conventions as defined in TSTO v4.1. Deleted Fail verdicts with no content other than &quot;Otherwise.&quot;</td>
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<tr>
<td>1.0.3r02</td>
<td>2016-04-14</td>
<td>Reviewed by Alicia Courtney. Converted to current document template. Additional editorial changes.</td>
</tr>
<tr>
<td>1.0.3r03</td>
<td>2016-06-24</td>
<td>Corrected role abbreviations to match the roles declared in the ICS.</td>
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<tr>
<td>1.0.3</td>
<td>2016-07-13</td>
<td>Prepared for TCRL 2016-1 publication.</td>
</tr>
<tr>
<td>1.0.3 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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Revision History

<table>
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<tr>
<td>1.0.3 edition 2</td>
<td>2019-12-12</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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<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
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</thead>
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<tr>
<td>Chris Church</td>
<td>CSR</td>
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<td>Krishnan Nair</td>
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<td>Manish Tiwari</td>
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