Binary Sensor Profile (BSP)

***Bluetooth*® Test Suite**

- **Revision:** BSP.TS.p1
- **Revision Date:** 2024-07-01
- **Prepared By:** Personal User Interface Device User Group
- **Published during TCRL:** TCRL.2024-1

Contents

1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and test cases to test the implementation of the Bluetooth Binary Sensor Profile (BSP) Specification with the objective to provide a high probability of air interface interoperability between the tested implementation and other manufacturers' Bluetooth devices.

2 References, definitions, and abbreviations

2.1 References

This document incorporates provisions from other publications by dated or undated reference. These references are cited at the appropriate places in the text, and the publications are listed hereinafter. Additional definitions and abbreviations can be found in [1] and [2].

[1] Bluetooth Core Specification, Version 4.2 or later

[2] Test Strategy and Terminology Overview

[3] Binary Sensor Profile (BSP) Specification

[4] Binary Sensor Service (BSS) Specification

[5] Generic Attribute Profile (GATT) Bluetooth Test Suite

[6] Characteristic and Descriptor descriptions are accessible via the Bluetooth SIG Assigned Numbers

[7] Binary Sensor Profile ICS, BSP.ICS

2.2 Definitions

In this Bluetooth document, the definitions from [1] and [2] apply.

2.3 Acronyms and abbreviations

In this Bluetooth document, the definitions, acronyms, and abbreviations from [1] and [2] apply.

3 Test Suite Structure (TSS)

3.1 Overview

The Binary Sensor Profile (BSP) requires the presence of Binary Sensor Service (BSS) in the Sensor Role and ATT, GAP, SM, and GATT in both the Sensor and the Collector roles. This is illustrated in Figure 3.1.

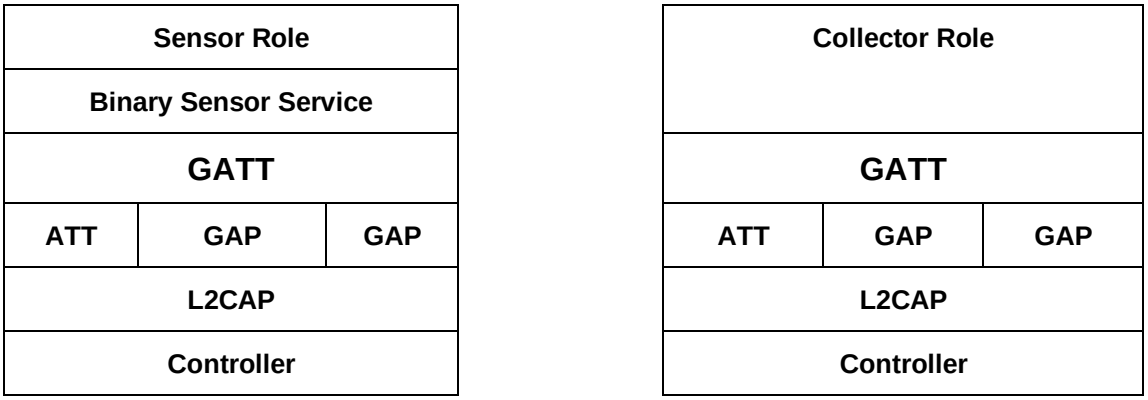

Figure 3.1: Binary Sensor Profile test model

3.2 Test Strategy

The test objectives are to verify the functionality of the Binary Sensor Profile (BSP) within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach covers mandatory and optional requirements in the specification and matches these to the support of the IUT as described in the ICS. Any defined test herein is applicable to the IUT if the ICS logical expression defined in the Test Case Mapping Table (TCMT) evaluates to true.

The test equipment provides an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in this Test Suite. A Lower Tester acts as the IUT's peer device and interacts with the IUT over-the-air interface. The configuration, including the IUT, needs to implement similar capabilities to communicate with the test equipment. 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, a Man Machine Interface (MMI), or another interface supported by the IUT.

This 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.

3.3 Test groups

The following test groups have been defined:

- Advertising data
- Service discovery
- Characteristic discovery
- Characteristic descriptors
- Configure indication
- Binary Sensor Service Control Point procedures and parameters

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

Test cases are assigned unique identifiers per the conventions in [2]. The convention used here is:
<spec abbreviation>/<IUT role>/<class>/**<feat>**/<func>/<subfunc>**/**<cap>**/<xx>-<nn>-<y>**.

Additionally, testing of this specification includes tests from the GATT Test Suite [5] referred to as Generic GATT Integrated Tests (GGIT); when used, the test cases in GGIT are referred to through a TCID string using the following convention:
<spec abbreviation>/<IUT role>/<GGIT test group>/< GGIT class >/<xx>-<nn>-<y>.

Identifier Abbreviation	**Spec Identifier <spec abbreviation>**
BSP	Binary Sensor Profile
Identifier Abbreviation	**Role Identifier <IUT role>**
COL	Collector
SEN	Sensor
Identifier Abbreviation	**Feature Identifier <GGIT test group>**
CGGIT	Client Generic GATT Integrated Tests
Identifier Abbreviation	**Feature Identifier <GGIT class>**
CHA	Characteristic
DES	Descriptor
SER	Service
Identifier Abbreviation	**Feature Identifier <feat>**
AD	Advertising Data
CON	Configuration of Indication
CPP	Control Point Procedures

Table 4.1: BSP TC feature naming conventions

4.1.2 Conformance

When conformance is claimed for a particular specification, all capabilities are to be supported in the specified manner. The mandated tests from this Test Suite depend on the capabilities to which conformance is claimed.

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 not excluded by the specification
- That capabilities enabled by the implementations are sustained over durations expected by the use case
- That the implementation gracefully handles any quantity of data expected by the use case

- 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
- That the implementation is immune to attempted security exploits

A single execution of each of the required tests is required to constitute a Pass verdict. However, it is noted that 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 generated by the Bluetooth SIG qualification tool, with 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 erratum request such that the issue may be addressed.

4.1.3 Pass/Fail verdict conventions

Each test case has an Expected Outcome section. The IUT is granted the Pass verdict when all the detailed pass criteria conditions within the Expected Outcome section are met.

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 as one of the pass criteria conditions cannot be met. If this occurs, then the outcome of the test is a Fail verdict.

4.2 Setup preambles

The procedures defined in this section are provided for reference in achieving the initial conditions in certain tests.

4.2.1 ATT Bearer on LE transport

Preamble procedure:

1. Establish an LE transport connection between the IUT and the Lower Tester.
2. Establish an L2CAP channel 0x0004 between the IUT and the Lower Tester over that LE transport.

4.2.2 Control Point and Response Configuration Preamble

Follow this procedure as preamble for the IUT to enable it to execute control procedures on the Binary Sensor(s) emulated on the Lower Tester.

1. The Lower Tester contains an instance of the Binary Sensor Service with the following sensors emulated concurrently:
   a. Opening and Closing Sensor with no support for Named Sensor
   b. Human Detection Sensor with support for Named Sensors
   c. Multiple Vibration Sensor with three sensor elements and support for Named Sensors

   Note: The Lower Tester may emulate only one of these sensors at the time if required by implementation restrictions, but that requires that the emulation is adapted to the sensor type required for every test case.
2. The Report Status of the Binary Sensor(s) emulated by the Lower Tester is set to Off.
   Note: This can be accomplished by disconnection.
3. Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.
4. If the Lower Tester and IUT require bonding, perform a bonding procedure. If previously bonded, reenable encryption.
5. The handles of the BSS Control Point and BSS Response Characteristic have been previously discovered by the IUT.

Note: This can be accomplished using the test procedures in Section 4.4.1.

6. The handle of the Client Characteristic Configuration descriptor of the BSS Response characteristic has been previously discovered by the IUT.
   Note: This can be accomplished using the test procedures in Section 4.4.1.
7. The BSS Response characteristic is configured for indication.
   Note: This can be accomplished using the test procedure in Section 4.4.2.

4.3 Sensor role requirements

The tests in this test group verify implementation of the Sensor role requirements.

BSP/SEN/AD/BV-01-C [Service UUID in advertising data]

- Test Purpose

  Verify that Binary Sensor Service UUID is included in AD (advertising data) from the IUT.

- Reference

  [3] 3.1.1.1

- Initial Condition

  The IUT and Lower Tester do not have a connection.

- Test Procedure

  1. The Upper Tester instructs the IUT to enter a GAP discoverable mode.
  2. The Lower Tester listens for Advertising Packets from the IUT.

- Expected Outcome

  Pass verdict

  The Advertising Packets contain the define Service UUID for «Binary Sensor Service».

BSP/SEN/AD/BV-02-C [Local Name in advertising data]

- Test Purpose

  Verify that the Local Name is included in AD (advertising data) or Scan Response data from the IUT.

- Reference

  [3] 3.1.1.2

- Initial Condition

  The IUT and Lower Tester do not have a connection.

- Test Procedure

  1. The Upper Tester instructs the IUT to enter a GAP discoverable mode.
  2. In response to the Advertising packet from the IUT, the Lower Tester sends a Scan Request to the IUT.
  3. The Lower Tester listens for a Scan Response from the IUT.

- Expected Outcome

  Pass verdict

  The IUT includes the Local Name in either the Advertising packet or Scan Response packet, but not in both.

4.4 Collector role requirements

The tests in this test group verify implementation of the Collector role requirements.

4.4.1 Generic GATT Integrated Tests

This test group verifies basic compliance of Service, Characteristic, and Descriptor defined in [4] using the test procedures defined in the ANNEX to the GATT Test Suite [5] by means of the entries supplied in Table 4.2.

TCID	Service/ Characteristic/ Descriptor	Reference	Properties	Value Length (Octets)
BSP/COL/CGGIT/SER/BV-01-C [Service GGIT – Binary Sensor]	Binary Sensor Service	[3] 4.2.1	-	-
BSP/COL/CGGIT/CHA/BV-01-C [Characteristic GGIT – BSS Control Point]	BSS Control Point Characteristic	[3] 4.3.1.1	0x08 (Write)	1-20
BSP/COL/CGGIT/CHA/BV-02-C [Characteristic GGIT – BSS Response]	BSS Response Characteristic	[3] 4.3.1.2	0x10 (Indication)	1-20
BSP/COL/CGGIT/DES/BV-01-C [Descriptor CGGIT – BSS Response Client Characteristic Configuration Descriptor]	BSS Response CCCD	[3] 4.3.1.2	-	2

Table 4.2: Input for the GGIT Client test procedure

BSP/COL/CON/BV-01-C [BSS Response configure indication]

- Test Purpose

  Verify that the IUT can configure the BSS Response characteristic for indications.

- Reference

  [3] 4.4

- Initial Condition

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

  The Lower Tester includes one instantiation of the Binary Sensor Service [4] including all defined characteristics and descriptors.

- Test Procedure

  1. The Upper Tester instructs the IUT to configure the BSS Response characteristic for indication.
  2. The Lower Tester verifies that the IUT writes the correct value to the Client Characteristic Configuration descriptor of the BSS Response characteristic.

- Expected Outcome

  Pass verdict

  The indication bit in the Client Characteristic Configuration descriptor sent by the IUT was set to 1.

4.4.2 BSS Control Point Procedures and Parameters

This test group contains test cases to verify the IUT's ability to perform compliant operation and interpret values of the BSS Control Point characteristic or the handling of errors specific to the procedure or control point.

4.4.2.1 Get Sensor Status Command Procedure Single Sensor

- Test Purpose

  This generic use test group contains several test cases to verify that the IUT can execute the *Get Sensor Status Command* procedure for a Single Sensor. The verification is performed for several values of the Sensor Status Parameter, as enumerated in the test cases in Table 4.3 below, using this generic test procedure.

- Test Case Configuration

Test Case	Reference	Values (state, count)
BSP/COL/CPP/BV-01-C [GSSCP Single Sensor – Closed, count 0]	[4] 4.3.3.5	0, 0
BSP/COL/CPP/BV-02-C [GSSCP Single Sensor – Open, count 1000]	[4] 4.3.3.5	1, 1000

Table 4.3: Get Sensor Status Command Procedure Single Sensor test cases

- Reference

  [3] 5 and [4] 4.1.1, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to send a Get Sensor Status Command Message, with the Sensor Type Parameter set to Opening and Closing Sensor.
  2. The Lower Tester receives the Get Sensor Status Command Message and verifies that it is correct and sends a Set Sensor Status Response Message to the IUT, using the Sensor Status values (state, count) from Table 4.3.
  3. The IUT receives the Set Sensor Status Response Message and reports the Sensor Status (state and count) to the Upper Tester.
  4. The Upper Tester verifies that the state and count are the same as sent by the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT successfully sends the Get Sensor Status Command Message with one Sensor Type Parameter, with the value set to Opening and Closing Sensor (0x00) and no other Parameters to the Lower Tester. The IUT successfully receives the Get Sensor Status Response Message and decodes the Sensor Status as required in Table 4.3.

4.4.2.2 Get Sensor Status Command Procedure Multiple Sensor

- Test Purpose

  This generic use test group contains several test cases to verify that the IUT can execute the *Get Sensor Status Command* procedure for a Multiple Sensor. The verification is performed for several values of the Multiple Sensor Status Parameter, as enumerated in the test cases in Table 4.4 below, using this generic test procedure.

- Test Case Configuration

Test Case	Reference	Values (state, count)
BSP/COL/CPP/BV-03-C [GSSCP Multiple Sensor – Not Detected, count 0]	[3] 4.3.3.6	0, 0
BSP/COL/CPP/BV-04-C [GSSCP Multiple Sensor – Detected, count 1000]	[3] 4.3.3.6	1, 1000

Table 4.4: Get Sensor Status Command Procedure Multiple Sensor test cases

- Reference

  [3] 5 and [4] 4.1.1, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to send a Get Sensor Status Command Message, with the Sensor Type Parameter set to Multiple Vibration Sensor.
  2. The Lower Tester receives the Get Sensor Status Command Message and verifies that it is correct and sends a Set Sensor Status Response Message to the IUT, using the Multiple Sensor Status values (state, count) from Table 4.4 for each of the four sensor elements.
  3. The IUT receives the Set Sensor Status Response Message and reports the Multiple Sensor Status (number of elements and state and count for each element) to the Upper Tester.
  4. The Upper Tester verifies that the states and counts are the same as sent by the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT successfully sends the Get Sensor Status Command Message with one Sensor Type Parameter, with the value set to Multiple Vibration Sensor (0x82) to the Lower Tester. The IUT successfully receives the Get Sensor Status Response Message and decodes the Multiple Sensor Status as required in Table 4.4 for three sensor elements.

BSP/COL/CPP/BV-05-C [Get Sensor Status Command Procedure All Sensor Types]

- Test Purpose

  Verify that the IUT can send correctly all sensor types and correctly detect both Success (sensor type present in Lower Tester) and Failure (sensor type not present in Lower Tester).

- Reference

  [3] 5 and [4] 4.1.1, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. Repeat steps 2–4 for each of the six sensor types defined by the Binary Sensor Service specification (Table 4.11 in [4]).
  2. Instructed by the Upper Tester, the IUT performs the Get Sensor Status Command Procedure for the current Sensor Type parameter.
  3. The Lower Tester responds with a Get Sensor Response Message. The Lower Tester responds with Result Code set to Success for the sensor types emulated by the Lower Tester (see Section 4.2.2) and to Failure for all other sensor types.
  4. The IUT reports the Success/Failure for all sensor types to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT successfully sends one Sensor Status Command Message for each of the six sensor types defined by the Binary Sensor Service specification. The IUT correctly decodes the Result Code as Success (0) for the sensor types emulated by the Lower Tester (see Section 4.2.2) and Failure (1) for all other sensor types.

BSP/COL/CPP/BV-06-C [Setting Sensor Command Procedure Single Sensor]

- Test Purpose

  Verify that the IUT can execute the Setting Sensor Command Procedure for Single Sensor both for Report Status On and Report Status Off.

- Reference

  [3] 5 and [4] 4.1.3, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Opening and Closing Sensor and Report Status Parameter set to On and no other Parameters.
  2. The Lower Tester receives the Setting Sensor Command Message and verifies that the Report Status Parameter is set to On and responds with a Setting Sensor Response Message with Result Code set to Success and no other Parameters.
  3. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Opening and Closing Sensor and Report Status Parameter set to Off and no other Parameters.
  4. The Lower Tester receives the Setting Sensor Command Message and verifies that the Report Status Parameter is set to Off and responds with a Setting Sensor Response Message with Result Code set to Success and no other Parameters.

- Expected Outcome

  Pass verdict

  The IUT successfully sends one Setting Sensor Command Message with Sensor Type set to Opening and Closing Sensor for both cases of Report Status Parameter set to On and Report Status Parameter set to Off to the Lower Tester.

BSP/COL/CPP/BV-07-C [Sensor Status Event Procedure Single Sensor]

- Test Purpose

  Verify that the IUT can perform Sensor Status Event Parameters for Single Sensor for Report Status On.

- Reference

  [3] 5 and [4] 4.1.3, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Opening and Closing Sensor and Report Status Parameter set to On and no other Parameters.
  2. The Lower Tester receives the Setting Sensor Command Message and verifies that the Report Status Parameter is set to On and responds with a Setting Sensor Response Message with Result Code set to Success and no other Parameters.
  3. The Lower Tester sends a Sensor Status Event Message with Sensor Status Parameter set to State = 1, Count = 2.
  4. The IUT receives the Sensor Status Event Message and reports to the Upper Tester the values for the Sensor Type Parameter and the State and Count decoded from the Sensor Status Parameter.

- Expected Outcome

  Pass verdict

  The IUT successfully receives the Sensor Status Event Message in step 4. The IUT correctly decodes the State and Count from the Sensor Status Parameter.

BSP/COL/CPP/BV-08-C [Setting Sensor Command Procedure Multiple Sensor]

- Test Purpose

  Verify that the IUT can execute the Setting Sensor Command Procedure for Multiple Sensor both for Report Status On and Report Status Off.

- Reference

  [3] 5 and [4] 4.1.2, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Multiple Vibration Sensor and Report Status Parameter set to On and no other Parameters.
  2. The Lower Tester receives the Setting Sensor Command Message and verifies that the Report Status Parameter is set to On and responds with a Setting Sensor Response Message with Result Code set to Success and optionally three Name Parameters.
  3. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Multiple Vibration Sensor and Report Status Parameter set to Off and no other Parameters.
  4. The Lower Tester receives the Setting Sensor Command Message and verifies that the Report Status Parameter is set to Off and responds with a Setting Sensor Response Message with Result Code set to Success and optionally three Name Parameters.

- Expected Outcome

  Pass verdict

  The IUT successfully sends one Setting Sensor Command Message with Sensor Type set to Multiple Vibration Sensor for both cases of Report Status Parameter set to On and Report Status Parameter set to Off to the Lower Tester.

BSP/COL/CPP/BV-09-C [Sensor Status Event Procedure Multiple Sensor]

- Test Purpose

  Verify that the IUT can execute Sensor Status Event Procedure for Multiple Sensor for Report Status On.

- Reference

  [3] 5 and [4] 4.1.3, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Multiple Vibration Sensor and Report Status Parameter set to On and no other Parameters.
  2. The Lower Tester receives the Setting Sensor Command Message and verifies that the Report Status Parameter is set to On and responds with a Setting Sensor Response Message with Result Code set to Success.
  3. The Lower Tester sends a Sensor Status Event Message with Multiple Sensor Status Parameter set to State = 1, Count = 2 for all sensor elements in the sensor.
  4. The IUT receives the Sensor Status Event Message and reports to the Upper Tester the values for the Sensor Type Parameter and the States and Counts decoded from the Multiple Sensor Status Parameter.

- Expected Outcome

  Pass verdict

  The IUT successfully receives the Sensor Status Event Message in step 4. The IUT correctly decodes the State and Count from the Multiple Sensor Status Parameter for all three sensor elements.

BSP/COL/CPP/BV-10-C [Sensor Status Event Procedure Cancel]

- Test Purpose

  Verify that the IUT can handle a Sensor Status Event procedure where the response includes the Cancel parameter.

- Reference

  [3] 5 and [4] 4.1.3, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Multiple Vibration Sensor and Report Status Parameter set to On and no other Parameters.
  2. The Lower Tester receives the Setting Sensor Command Message and verifies that the Report Status Parameter is set to On and responds with a Setting Sensor Response Message with Result Code set to Success.
  3. The Lower Tester sends a Sensor Status Event with one Cancel parameter with the value set to Cancel (0) and no other Parameters.
  4. The IUT receives the Sensor Status Event Message and reports to the Upper Tester the value of the Cancel Parameter.

- Expected Outcome

  Pass verdict

  The IUT successfully receives the Sensor Status Event Message and decodes the value of the Cancel Parameter as Cancel (0).

BSP/COL/CPP/BV-11-C [Setting Sensor Command Procedure with Name Parameter Single Sensor]

- Test Purpose

  Verify that the IUT can execute the Setting Sensor Command Procedure with Name Parameter for Single Sensor.

- Reference

  [3] 5 and [4] 4.1.2, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Human Detection Sensor and Report Status Parameter set to Off and Name Parameter set to “A very long sensor name” and no other Parameters.
  2. The Lower Tester receives the Setting Sensor Command Message and verifies that it contains a Report Status Parameter and a Name Parameter and no other Parameters.
  3. The Lower Tester responds with a Setting Sensor Response Message with Result Code Parameter set to Success and Name Parameter set to the same value as received in the command.
  4. The IUT receives the Setting Sensor Response Message and reports to the Upper Tester the values of the Name Parameter received.
  5. The Upper Tester verifies the value of the Name Parameters reported by the IUT.

- Expected Outcome

  Pass verdict

  The IUT successfully sends a Setting Sensor Command Message with one Name Parameter with the value set to “A very long sensor name”. The IUT successfully receives the Setting Sensor Response Message and decodes “A very long sensor name” as the value of the Name Parameter.

BSP/COL/CPP/BI-01-C [Setting Sensor Command Procedure – Single Sensor Illegal Packet Sequence]

- Test Purpose

  Verify that the IUT can reassemble packets correctly and ignore illegal packet sequences.

- Reference

  [3] 5.1.2

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Human Detection Sensor and Report Status Parameter set to Off and Name Parameter set to “A very long sensor name” and no other Parameters.
  2. The Lower Tester receives the Setting Sensor Command Message.
  3. The Lower Tester responds with TWO Setting Sensor Response Messages with Result Code Parameter set to Success. In the first message, the sequence numbers are set to 0 and 2 (instead of 0 and 1) and the Name Parameter is set to “XXXXXXXXXXXXXXXXXXXXXX”. In the second message, the sequence numbers are correct, and the Name Parameter is set to the same value as received in the command.
  4. The IUT receives the Setting Sensor Response Message and reports to the Upper Tester the values of the Name Parameter received.
  5. The Upper Tester verifies the value of the Name Parameters reported by the IUT.

- Expected Outcome

  Pass verdict

  The IUT successfully sends a Setting Sensor Command Message with one Name Parameter with the value set to “A very long sensor name”. The IUT successfully receives the Setting Sensor Response Message and decodes “A very long sensor name” as the value of the Name Parameter.

BSP/COL/CPP/BV-12-C [Setting Sensor Command Procedure with Name Parameter Multiple Sensor]

- Test Purpose

  Verify that the IUT can execute the Setting Sensor Command Procedure with Name Parameters for Multiple Sensor.

- Reference

  [3] 5 and [4] 4.1.2, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Multiple Vibration and Report Status Parameter set to Off and Name Parameters set to “Sensor no 1”, “Sensor no 2”, and “Sensor no 3”.
  2. The Lower Tester receives the Setting Sensor Command Message and verifies that it contains a Report Status Parameter and one Name Parameter for each sensor element and no other Parameters.
  3. The Lower Tester verifies the Name Parameters and responds with a Setting Sensor Response Message with Result Code Parameter set to Success and Name Parameters set to the same value as received in the command.
  4. The IUT receives the Setting Sensor Response Message and reports to the Upper Tester the value of the Name Parameters received.
  5. The Upper Tester verifies the value of the Name Parameters reported by the IUT.

- Expected Outcome

  Pass verdict

  The IUT successfully sends one Setting Sensor Command Message with three Name Parameters with the values set to “Sensor no 1”, “Sensor no 2”, and “Sensor no 3”. The IUT successfully receives the Setting Sensor Response Message and decodes “Sensor no 1”, “Sensor no 2”, and “Sensor no 3” as the values of the Name Parameters.

BSP/COL/CPP/BI-02-C [Setting Sensor Command Procedure – Multiple Sensor Illegal Packet Sequence]

- Test Purpose

  Verify that the IUT can reassemble packets correctly and ignore illegal packet sequences.

- Reference

  [3] 5.1.2

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to perform one Setting Sensor Command Procedure with Sensor Type set to Multiple Vibration and Report Status Parameter set to Off and Name Parameters set to “Sensor no 1”, “Sensor no 2”, and “Sensor no 3”.
  2. The Lower Tester receives the Setting Sensor Command Message.
  3. The Lower Tester responds with TWO Setting Sensor Response Messages with Result Code Parameter set to Success. In the first message, the sequence numbers are set to 0, 2, and 3 (instead of 0, 1, and 2) and Name Parameters are set to “XXXXXXXXXX”, “YYYYYYYYYY” and “ZZZZZZZZZZ”. In the second message, the sequence numbers are correct, and the Name Parameters are set to the same value as received in the command.
  4. The IUT receives the Setting Sensor Response Message and reports to the Upper Tester the value of the Name Parameters received.
  5. The Upper Tester verifies the value of the Name Parameters reported by the IUT.

- Expected Outcome

  Pass verdict

  The IUT successfully sends one Setting Sensor Command Message with three Name Parameters with the values set to “Sensor no 1”, “Sensor no 2”, and “Sensor no 3”. The IUT successfully receives the Setting Sensor Response Message and decodes “Sensor no 1”, “Sensor no 2”, and “Sensor no 3” as the values of the Name Parameters.

BSP/COL/CPP/BV-13-C [Setting Sensor Command Procedure Error]

- Test Purpose

  Verify that the IUT can handle a Setting Sensor Command Procedure response with Result Code Failure.

- Reference

  [3] 5 and [4] 4.1.2, 4.2, and 4.3

- Initial Condition

  The preamble described in Section 4.2.2 has been executed.

- Test Procedure

  1. The Upper Tester instructs the IUT to send a Setting Sensor Command Message with the Sensor Type Parameter set to Multiple Opening and Closing Sensor and the Report Status Parameter set to Off.
  2. The Lower Tester receives the Setting Sensor Command Message and responds with a Setting Sensor Response Message with the Result Code Parameter set to Failure (1) and no other parameters.
  3. The IUT receives the Setting Sensor Response Message and reports the value of the received Result Code to the Upper Tester.
  4. The Upper Tester verifies the value of the Result Code Parameter reported by the IUT.

- Expected Outcome

  Pass verdict

  The IUT successfully receives the Setting Sensor Response Message and decodes the Result Code Parameter reported as Failure (1).

5 Test case mapping

The Test Case Mapping Table (TCMT) maps test cases to specific requirements in the ICS. The IUT is tested in all roles for which support is declared in the ICS document.

The columns for the TCMT are defined as follows:

Item: Contains a logical expression based on specific entries from the associated ICS document. Contains a logical expression (using the operators AND, OR, NOT as needed) based on specific entries from the applicable ICS document(s). The entries are in the form of y/x references, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS document for Binary Sensor Profile (BSP) [7].

Feature: A brief, informal description of the feature being tested.

Test Case(s): The applicable test case identifiers are required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported. Further details about the function of the TCMT are elaborated in [2].

For the purpose and structure of the ICS/IXIT, refer to [2].

Item	Feature	Test Case(s)
BSP 3/2	Service UUID in advertising	BSP/SEN/AD/BV-01-C
BSP 3/3	Local Name in advertising	BSP/SEN/AD/BV-02-C
BSP 6/1	Service discovery	BSP/COL/CGGIT/SER/BV-01-C
BSP 6/2	BSS Control Point characteristic discovery	BSP/COL/CGGIT/CHA/BV-01-C
BSP 6/3	BSS Response characteristic discovery	BSP/COL/CGGIT/CHA/BV-02-C
BSP 6/4	BSS Response characteristic descriptor discovery	BSP/COL/CGGIT/DES/BV-01-C
BSP 6/5	Configure indications for BSS Response	BSP/COL/CON/BV-01-C
BSP 7/1	Get Sensor Status Command Procedure	BSP/COL/CPP/BV-01-C BSP/COL/CPP/BV-02-C BSP/COL/CPP/BV-03-C BSP/COL/CPP/BV-04-C BSP/COL/CPP/BV-05-C
BSP 7/2	Setting Sensor Command Procedure	BSP/COL/CPP/BV-06-C BSP/COL/CPP/BV-08-C BSP/COL/CPP/BV-11-C BSP/COL/CPP/BV-12-C BSP/COL/CPP/BV-13-C BSP/COL/CPP/BI-01-C BSP/COL/CPP/BI-02-C
BSP 7/3	Sensor Status Event Procedure	BSP/COL/CPP/BV-07-C BSP/COL/CPP/BV-09-C BSP/COL/CPP/BV-10-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2019-07-02	Binary Sensor Profile adopted by the Board of Directors. Prepared for publication.
	p1r00–r01	2023-10-19 – 2023-11-08	TSE 23254 (rating 1): Converted -I tests to -C tests as appropriate; updated the TCMT and TCRL accordingly. Replaced the Bluetooth logo in the footer and updated the copyright page to align with the latest DNMD. Added a Publication Number column to the revision history and revised the document numbering convention, setting the last released publication of 1.0.0 as p0. Performed editorials to align the document with the latest TS template, including positioning of Test Case Configuration tables. Deleted draft revision history comments prior to p0.
1	p1	2024-07-01	Approved by BTI on 2024-04-21. Prepared for TCRL 2024-1 publication.

Acknowledgments

Name	Company
Frank Berntsen	Nordic Semiconductor
Hironari Ushikubo	NTT Docomo