Indoor Positioning Service (IPS)

Bluetooth® **Test Suite**

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Contents

1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and test cases to test the implementation of the Bluetooth Indoor Positioning Service 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], [2], and [3].

[1] Bluetooth Core Specification, Version 4.0 or later

[2] Test Strategy and Terminology Overview

[3] Indoor Positioning Service Specification, Version 1.0

[4] ICS Proforma for Indoor Positioning Service, IPS.ICS

[5] GATT Test Suite, GATT.TS

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

[7] GAP Test Suite, GAP.TS

[8] IXIT Proforma for Indoor Positioning Service Implementation eXtra Information for Test

2.2 Definitions

In this Bluetooth document, the definitions from [1], [2], and [3] apply.

2.3 Acronyms and abbreviations

In this Bluetooth document, the definitions, acronyms, and abbreviations from [1], [2], and [3] apply.

Acronyms and abbreviations	Definition
ATT	Attribute Protocol
BR/EDR	Basic Rate / Enhanced Data Rate
CR	Characteristic Read
CW	Characteristic Write
DEC	Characteristic Declaration
GATT	Generic Attribute Protocol
ICS	Implementation Conformance Statement
IP	Indoor Positioning
IUT	Implementation Under Test
IXIT	Implementation eXtra Information for Test
LE	Low Energy
SD	Service Definition
TSS	Test Suite Structure

Table 2.1: Acronyms and abbreviations

3 Test Suite Structure (TSS)

3.1 Test Strategy

The test objectives are to verify functionality of the Indoor Positioning Service 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.

3.2 Test groups

The following test groups have been defined:

- Generic GATT Integrated Tests

- Characteristic Read

- Characteristic Write

- Service Procedures

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 GGIT tests 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>
IPS	Indoor Positioning Service
Identifier Abbreviation	**IUT role <IUT role>**
SR	Server Role
Identifier Abbreviation	**Reference Identifier <GGIT test group>**
SGGIT	Server Generic GATT Integrated Tests
Identifier Abbreviation	**Reference Identifier <GGIT class>**
CHA	Characteristic
SDP	Validate SDP Record
SER	Service
Identifier Abbreviation	**Feature Identifier <feat>**
CEP	Characteristic Extended Properties
CW	Characteristic Write
IP	Indoor Positioning
IPADV	Indoor Positioning Advertising Data Format

Table 4.1: IPS 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 exist, 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 Launch Studio, 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, the outcome of the test is a Fail verdict.

4.2 Setup preambles

The procedures defined in this section are used to achieve specific conditions on the IUT and the test equipment within the tests defined in this document. The preambles here are commonly used to establish initial conditions.

4.2.1 ATT Bearer on LE Transport

Follow the preamble procedure described in [5] Section 4.2.1.2.

4.2.2 ATT Bearer on BR/EDR Transport

Follow the preamble procedure described in [5] Section 4.2.1.1.

4.3   Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in Section 6.3, Server test procedures (SGGIT), in [5] using Table 4.2 below as input:

TCID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Service Type
IPS/SR/SGGIT/SER/BV-01-C [Service GGIT – Indoor Positioning]	Indoor Positioning Service	[3] 2	-	-	Primary or Secondary Service
IPS/SR/SGGIT/CHA/BV-01-C [Characteristic GGIT – Indoor Positioning Configuration (Read)]	Indoor Positioning Configuration Characteristic	[3] 3	0x02 (Read)	Skip	-
IPS/SR/SGGIT/CHA/BV-02-C [Characteristic GGIT – Indoor Positioning Configuration (Read, Write)]	Indoor Positioning Configuration Characteristic	[3] 3	0x0A (Read, Write)	Skip	-
IPS/SR/SGGIT/CHA/BV-03-C [Characteristic GGIT – Indoor Positioning Configuration (Read, Write, Write Without Response)]	Indoor Positioning Configuration Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-
IPS/SR/SGGIT/CHA/BV-04-C [Characteristic GGIT – Indoor Positioning Configuration (Read, Write, Extended Properties)]	Indoor Positioning Configuration Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-05-C [Characteristic GGIT – Indoor Positioning Configuration (Read, Write, Write Without Response, Extended Properties)]	Indoor Positioning Configuration Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-06-C [Characteristic GGIT – Latitude (Read)]	Latitude Characteristic	[3] 3	0x02 (Read)	Skip	-
IPS/SR/SGGIT/CHA/BV-07-C [Characteristic GGIT – Latitude (Read, Write)]	Latitude Characteristic	[3] 3	0x0A (Read, Write)	Skip	-

TCID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Service Type
IPS/SR/SGGIT/CHA/BV-08-C [Characteristic GGIT – Latitude (Read, Write, Write Without Response)]	Latitude Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-
IPS/SR/SGGIT/CHA/BV-09-C [Characteristic GGIT – Latitude (Read, Write, Extended Properties)]	Latitude Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-10-C [Characteristic GGIT – Latitude (Read, Write, Write Without Response, Extended Properties)]	Latitude Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-11-C [Characteristic GGIT – Longitude (Read)]	Longitude Characteristic	[3] 3	0x02 (Read)	Skip	-
IPS/SR/SGGIT/CHA/BV-12-C [Characteristic GGIT – Longitude (Read, Write)]	Longitude Characteristic	[3] 3	0x0A (Read, Write)	Skip	-
IPS/SR/SGGIT/CHA/BV-13-C [Characteristic GGIT – Longitude (Read, Write, Write Without Response)]	Longitude Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-
IPS/SR/SGGIT/CHA/BV-14-C [Characteristic GGIT – Longitude (Read, Write, Extended Properties)]	Longitude Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-15-C [Characteristic GGIT – Longitude (Read, Write, Write Without Response, Extended Properties)]	Longitude Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-16-C [Characteristic GGIT – Local North Coordinate (Read)]	Local North Coordinate Characteristic	[3] 3	0x02 (Read)	Skip	-

TCID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Service Type
IPS/SR/SGGIT/CHA/BV-17-C [Characteristic GGIT – Local North Coordinate (Read, Write)]	Local North Coordinate Characteristic	[3] 3	0x0A (Read, Write)	Skip	-
IPS/SR/SGGIT/CHA/BV-18-C [Characteristic GGIT – Local North Coordinate (Read, Write, Write Without Response)]	Local North Coordinate Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-
IPS/SR/SGGIT/CHA/BV-19-C [Characteristic GGIT – Local North Coordinate (Read, Write, Extended Properties)]	Local North Coordinate Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-20-C [Characteristic GGIT – Local North Coordinate (Read, Write, Write Without Response, Extended Properties)]	Local North Coordinate Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-21-C [Characteristic GGIT – Local East Coordinate (Read)]	Local East Coordinate Characteristic	[3] 3	0x02 (Read)	Skip	-
IPS/SR/SGGIT/CHA/BV-22-C [Characteristic GGIT – Local East Coordinate (Read, Write)]	Local East Coordinate Characteristic	[3] 3	0x0A (Read, Write)	Skip	-
IPS/SR/SGGIT/CHA/BV-23-C [Characteristic GGIT – Local East Coordinate (Read, Write, Write Without Response)]	Local East Coordinate Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-
IPS/SR/SGGIT/CHA/BV-24-C [Characteristic GGIT – Local East Coordinate (Read, Write, Extended Properties)]	Local East Coordinate Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-

TCID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Service Type
IPS/SR/SGGIT/CHA/BV-25-C [Characteristic GGIT – Local East Coordinate (Read, Write, Write Without Response, Extended Properties)]	Local East Coordinate Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-26-C [Characteristic GGIT – Floor Number (Read)]	Floor Number Characteristic	[3] 3	0x02 (Read)	Skip	-
IPS/SR/SGGIT/CHA/BV-27-C [Characteristic GGIT – Floor Number (Read, Write)]	Floor Number Characteristic	[3] 3	0x0A (Read, Write)	Skip	-
IPS/SR/SGGIT/CHA/BV-28-C [Characteristic GGIT – Floor Number (Read, Write, Write Without Response)]	Floor Number Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-
IPS/SR/SGGIT/CHA/BV-29-C [Characteristic GGIT – Floor Number (Read, Write, Extended Properties)]	Floor Number Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-30-C [Characteristic GGIT – Floor Number (Read, Write, Write Without Response, Extended Properties)]	Floor Number Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-31-C [Characteristic GGIT – Altitude (Read)]	Altitude Characteristic	[3] 3	0x02 (Read)	Skip	-
IPS/SR/SGGIT/CHA/BV-32-C [Characteristic GGIT – Altitude (Read, Write)]	Altitude Characteristic	[3] 3	0x0A (Read, Write)	Skip	-
IPS/SR/SGGIT/CHA/BV-33-C [Characteristic GGIT – Altitude (Read, Write, Write Without Response)]	Altitude Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-

TCID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Service Type
IPS/SR/SGGIT/CHA/BV-34-C [Characteristic GGIT – Altitude (Read, Write, Extended Properties)]	Altitude Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-35-C [Characteristic GGIT – Altitude (Read, Write, Write Without Response, Extended Properties)]	Altitude Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-36-C [Characteristic GGIT – Uncertainty (Read)]	Uncertainty Characteristic	[3] 3	0x02 (Read)	Skip	-
IPS/SR/SGGIT/CHA/BV-37-C [Characteristic GGIT – Uncertainty (Read, Write)]	Uncertainty Characteristic	[3] 3	0x0A (Read, Write)	Skip	-
IPS/SR/SGGIT/CHA/BV-38-C [Characteristic GGIT – Uncertainty (Read, Write, Write Without Response)]	Uncertainty Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-
IPS/SR/SGGIT/CHA/BV-39-C [Characteristic GGIT – Uncertainty (Read, Write, Extended Properties)]	Uncertainty Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-40-C [Characteristic GGIT – Uncertainty (Read, Write, Write Without Response, Extended Properties)]	Uncertainty Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-41-C [Characteristic GGIT – Location Name (Read)]	Location Name Characteristic	[3] 3	0x02 (Read)	Skip	-
IPS/SR/SGGIT/CHA/BV-42-C [Characteristic GGIT – Location Name (Read, Write)]	Location Name Characteristic	[3] 3	0x0A (Read, Write)	Skip	-

TCID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Service Type
IPS/SR/SGGIT/CHA/BV-43-C [Characteristic GGIT – Location Name (Read, Write, Write Without Response)]	Location Name Characteristic	[3] 3	0x0E (Read, Write, Write Without Response)	Skip	-
IPS/SR/SGGIT/CHA/BV-44-C [Characteristic GGIT – Location Name (Read, Write, Extended Properties)]	Location Name Characteristic	[3] 3	0x8A (Read, Write, Extended Properties)	Skip	-
IPS/SR/SGGIT/CHA/BV-45-C [Characteristic GGIT – Location Name (Read, Write, Write Without Response, Extended Properties)]	Location Name Characteristic	[3] 3	0x8E (Read, Write, Write Without Response, Extended Properties)	Skip	-
IPS/SR/SGGIT/SDP/BV-01-C [SDP Record – Indoor Positioning]	Indoor Positioning Service	[3] 3	-	-	-

Table 4.2: Input for the GGIT Server test procedure

4.4   Characteristic Extended Properties

- Test Purpose

  This test group contains test cases to verify that each characteristic's Characteristic Extended Properties descriptor meets the requirements of the service. The verification is performed one property at a time, as enumerated in the test cases in Table 4.3, using this generic test procedure.

- Reference

  [3] 3

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.

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

  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

  - If the attribute permissions for the characteristic has been set by the IUT, and it has specific authentication requirements or authorization requirements, the established connection should meet these requirements.

- Characteristic Extended Properties Test Cases

Test Case	Characteristics
IPS/SR/CEP/BV-01-C [Characteristic Extended Properties – Indoor Positioning Configuration]	Indoor Positioning Configuration
IPS/SR/CEP/BV-02-C [Characteristic Extended Properties – Latitude]	Latitude
IPS/SR/CEP/BV-03-C [Characteristic Extended Properties – Longitude]	Longitude
IPS/SR/CEP/BV-04-C [Characteristic Extended Properties – Local North Coordinate]	Local North Coordinate
IPS/SR/CEP/BV-05-C [Characteristic Extended Properties – Local East Coordinate]	Local East Coordinate
IPS/SR/CEP/BV-06-C [Characteristic Extended Properties – Floor Number]	Floor Number
IPS/SR/CEP/BV-07-C [Characteristic Extended Properties – Altitude]	Altitude
IPS/SR/CEP/BV-08-C [Characteristic Extended Properties – Uncertainty]	Uncertainty
IPS/SR/CEP/BV-09-C [Characteristic Extended Properties – Location Name]	Location Name

Table 4.3 Characteristic Declaration test cases

- Test Procedure

  1. The Lower Tester executes the Discover All Characteristic Descriptors sub-procedure to discover the characteristic's Characteristic Extended Properties descriptor from Table 4.3.
  2. The Lower Tester executes the Read Characteristic Descriptors sub-procedure using the handle range of the discovered Characteristic Extended Properties descriptor from step 1.
  3. Verify that the characteristic's Characteristic Extended Properties descriptor value is set to 0x0001.

- Expected Outcome

  The following Pass and Fail verdicts apply to the test cases listed in Table 4.3:

  Pass verdict

  Each characteristic's Characteristic Extended Properties descriptor is discovered and the corresponding descriptor value is set to 0x0001.

4.5   Characteristic Read

- Test Purpose

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

- Reference

  [3] 3

- Initial Condition

  - The values of the characteristic are specified by the IUT in IXIT [8].

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.

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

  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.

  - If the attribute permissions for the characteristic has been set by the IUT, and it has specific authentication requirements or authorization requirements, the established connection should meet these requirements.

- Characteristic Read Value Test Cases

Test Case	Value (Requirements)
IPS/SR/CR/BV-01-C [Characteristic Read – Indoor Positioning Configuration]	Defined in IXIT [8].
IPS/SR/CR/BV-02-C [Characteristic Read - Latitude]	Defined in IXIT [8].
IPS/SR/CR/BV-03-C [Characteristic Read – Longitude]	Defined in IXIT [8].
IPS/SR/CR/BV-04-C [Characteristic Read – Local North Coordinate]	Defined in IXIT [8].
IPS/SR/CR/BV-05-C [Characteristic Read – Local East Coordinate]	Defined in IXIT [8].
IPS/SR/CR/BV-06-C [Characteristic Read – Floor Number]	Defined in IXIT [8].
IPS/SR/CR/BV-07-C [Characteristic Read – Altitude]	Defined in IXIT [8].

Test Case	Value (Requirements)
IPS/SR/CR/BV-08-C [Characteristic Read – Uncertainty]	Defined in IXIT [8].
IPS/SR/CR/BV-09-C [Characteristic Read – Location Name]	Defined in IXIT [8].

Table 4.4: Characteristic Read Value test cases

- Test Procedure

  1. The Lower Tester sends an ATT_Read_Request to the IUT to read the characteristic value.
  2. The IUT sends an ATT_Read_Response to the Lower Tester.
  3. 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 4.4:

  Pass verdict

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

4.6   Characteristic Write

- Test Purpose

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

- Reference

  [3] 3

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.

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

  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.

  - If the attribute permissions for the characteristic has been set by the IUT, and it has specific authentication requirements or authorization requirements, the established connection should meet these requirements.

- Characteristic Write Value Test Cases

Test Case	Value (Requirements)
IPS/SR/CW/BV-01-C [Characteristic Write – Indoor Positioning Configuration]	Defined in [6].
IPS/SR/CW/BV-02-C [Characteristic Write – Latitude]	Defined in [6].
IPS/SR/CW/BV-03-C [Characteristic Write – Longitude]	Defined in [6].
IPS/SR/CW/BV-04-C [Characteristic Write – Local North Coordinate]	Defined in [6].
IPS/SR/CW/BV-05-C [Characteristic Write – Local East Coordinate]	Defined in [6].

Test Case	Value (Requirements)
IPS/SR/CW/BV-06-C [Characteristic Write – Floor Number]	Defined in [6].
IPS/SR/CW/BV-07-C [Characteristic Write – Altitude]	Defined in [6].
IPS/SR/CW/BV-08-C [Characteristic Write – Uncertainty]	Defined in [6].
IPS/SR/CW/BV-09-C [Characteristic Write – Location Name]	Defined in [6].

Table 4.5: Characteristic Write Value test cases

- Test Procedure

    1. The Lower Tester sends an ATT_Write_Request to the IUT to write the characteristic value.
    2. The IUT sends an ATT_Write_Response to the Lower Tester.
    3. The Lower Tester sends an ATT_Read_Request to the IUT to read the characteristic value written in step 1.
    4. The IUT sends an ATT_Read_Response to the Lower Tester.
    5. 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 4.5:

    Pass verdict

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

4.7   Characteristic Write – Reliable Write

- Test Purpose

    Verify that the IUT supports Reliable Write procedure.

    This test group contains test cases to write and verify that the characteristic values required by the service are compliant. The verification is done one value at a time, as enumerated in the test cases in Table 4.6, using this generic test procedure.

- Reference

    [3] 3

- Initial Condition

    - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.

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

    - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.

    - If the attribute permissions for the characteristic have been set by the IUT, and it has specific authentication requirements or authorization requirements, the established connection should meet these requirements.

- Characteristic Reliable Write Test Cases

Test Case	Value (Requirements)
IPS/SR/CW/BV-11-C [Characteristic Reliable Write – Indoor Positioning Configuration]	Defined in [6].
IPS/SR/CW/BV-12-C [Characteristic Reliable Write – Latitude]	Defined in [6].
IPS/SR/CW/BV-13-C [Characteristic Reliable Write – Longitude]	Defined in [6].
IPS/SR/CW/BV-14-C [Characteristic Reliable Write – Local North Coordinate]	Defined in [6].
IPS/SR/CW/BV-15-C [Characteristic Reliable Write – Local East Coordinate]	Defined in [6].
IPS/SR/CW/BV-16-C [Characteristic Reliable Write – Floor Number]	Defined in [6].
IPS/SR/CW/BV-17-C [Characteristic Reliable Write – Altitude]	Defined in [6].
IPS/SR/CW/BV-18-C [Characteristic Reliable Write – Uncertainty]	Defined in [6].
IPS/SR/CW/BV-19-C [Characteristic Reliable Write – Location Name]	Defined in [6].

Table 4.6: Characteristic Reliable Write test cases

- Test Procedure

  1. The Lower Tester executes the Characteristic Value Reliable Writes sub-procedure.
  2. 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 4.6:

  Pass verdict

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

4.8   Characteristic Write – Write Without Response

- Test Purpose

  Verify that the IUT supports Write Without Response procedure.

  This test group contains test cases to write and verify that the characteristic values required by the service are compliant. The verification is done one value at a time, as enumerated in the test cases in Table 4.7, using this generic test procedure.

- Reference

  [3] 3

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.

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

  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.

- If the attribute permissions for the characteristic has been set by the IUT, and it has specific authentication requirements or authorization requirements, the established connection should meet these requirements.

- Characteristic Write Without Response Test Cases

Test Case	Value (Requirements)
IPS/SR/CW/BV-21-C [Characteristic Write Without Response – Indoor Positioning Configuration]	Defined in [6].
IPS/SR/CW/BV-22-C [Characteristic Write Without Response – Latitude]	Defined in [6].
IPS/SR/CW/BV-23-C [Characteristic Write Without Response – Longitude]	Defined in [6].
IPS/SR/CW/BV-24-C [Characteristic Write Without Response – Local North Coordinate]	Defined in [6].
IPS/SR/CW/BV-25-C [Characteristic Write Without Response – Local East Coordinate]	Defined in [6].
IPS/SR/CW/BV-26-C [Characteristic Write Without Response – Floor Number]	Defined in [6].
IPS/SR/CW/BV-27-C [Characteristic Write Without Response – Altitude]	Defined in [6].
IPS/SR/CW/BV-28-C [Characteristic Write Without Response – Uncertainty]	Defined in [6].
IPS/SR/CW/BV-29-C [Characteristic Write Without Response – Location Name]	Defined in [6].

Table 4.7: Characteristic Write Without Response test cases

- Test Procedure

  1. Write the characteristic value by executing the GATT Write Without Response sub-procedure.
  2. Read the characteristic value by executing the GATT Read Characteristic Value sub-procedure.
  3. 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 written (verified by the read) and the characteristic value meets the requirements of the service.

4.9   Service Procedures – Indoor Positioning Service

Verify compliant operation when the Lower Tester changes the characteristics included in the Indoor Positioning Service.

4.9.1   Changing Advertisement Data

- Test Purpose

  The following test subgroup contains test cases to verify the change of the advertisement data values defined in the characteristics included in Indoor Positioning Service. The verification is done, as enumerated in the test cases in Table 4.8, using this generic test procedure.

- Reference

  [3] 2

- Initial Condition

  - The handle of Indoor Positioning Service has been discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.

  - If the attribute permissions for the characteristic have been set by the IUT, and it has specific authentication requirements, the established connection in step 2 should meet these requirements.

  - The IUT is configured to include the information of the test case (from Table 4.8) in its advertising packet.

- Changing Advertisement Data Test Cases

Test Case	Value
IPS/SR/IP/BV-01-C [Changing Advertising Data – Latitude]	Defined in [6]. Different from the observed in step 1
IPS/SR/IP/BV-02-C [Changing Advertising Data – Longitude]	Defined in [6]. Different from the observed in step 1
IPS/SR/IP/BV-03-C [Changing Advertising Data – Local North Coordinate]	Defined in [6]. Different from the observed in step 1
IPS/SR/IP/BV-04-C [Changing Advertising Data – Local East Coordinate]	Defined in [6]. Different from the observed in step 1
IPS/SR/IP/BV-05-C [Changing Advertising Data – Floor Number]	Defined in [6]. Different from the observed in step 1
IPS/SR/IP/BV-06-C [Changing Advertising Data – Altitude]	Defined in [6]. Different from the observed in step 1
IPS/SR/IP/BV-07-C [Changing Advertising Data – Uncertainty]	Defined in [6]. Different from the observed in step 1
IPS/SR/IP/BI-01-C [Changing Advertising Data – Uncertainty, Ignore RFU bits]	Defined in [6]. Different from the observed in step 1. Same as in IPS/SR/IP/BV-07-C [Changing Advertising Data – Uncertainty] except that in the test procedure in step 3 the Lower Tester sets all RFU bits to '1' when writing the characteristic value.

Table 4.8: Update advertising information test cases

- Test Procedure

  1. The Lower Tester observes the current advertising packet from the IUT, using test IPS/SR/IPADV/BV-01-C [Indoor Positioning AD Type Format].
  2. The establishment of an ATT Bearer connection between the Lower Tester and IUT on transport defined in Section 4.2. See Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  3. The Lower Tester writes a new value defined in Table 4.8 to the characteristic of the Indoor Positioning.
  4. If the Write Characteristic Value or Reliable Write sub-procedure is used in step 3, the IUT sends a Write Response to acknowledge the procedure is successfully completed. This step is not applicable if the Write Without Response sub-procedure is used in step 3.
  5. The Lower Tester terminates the ATT Bearer connection.
  6. The Lower Tester observes the advertising packet from the IUT, using test IPS/SR/IPADV/BV-01-C [Indoor Positioning AD Type Format].

- Expected Outcome

The following Pass and Fail verdicts apply to the test cases listed in Table 4.8:

Pass verdict

The advertising packet from the IUT has been updated with the written data.

4.9.2   Changing Configuration Characteristic

- Test Purpose

The following test subgroup contains test cases to verify that the changes written to the Indoor Positioning Configuration Characteristic are reflected in the advertisement. The verification is done, as enumerated in the test cases in Table 4.9, using this generic test procedure.

- Reference

[3] 2

- Initial Condition

  - The handle of Indoor Positioning Service has been discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.

  - Establish an ATT Bearer connection between the Lower Tester and IUT on transport defined in Section 4.2. See Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.

  - If the attribute permissions for the characteristic have been set by the IUT, and it has specific authentication requirements, the established connection in step 2 should meet these requirements.

  - All affected characteristics are populated.

- Changing Configuration Characteristic Test Cases

Test Case	Value
IPS/SR/IP/BV-08-C [Configuring Advertisements – Presence of coordinates]	Defined in [6]. Indoor Positioning Configuration Characteristic is configured for including coordinates in the advertisement.
IPS/SR/IP/BV-09-C [Configuring Advertisements – WGS84 coordinate system]	Defined in [6]. Indoor Positioning Configuration Characteristic is configured for WGS84 coordinate system.
IPS/SR/IP/BV-10-C [Configuring Advertisements – Local coordinate system]	Defined in [6]. Indoor Positioning Configuration Characteristic is configured for Local coordinate system.
IPS/SR/IP/BV-11-C [Configuring Advertisements – Tx Power]	Defined in [6]. Indoor Positioning Configuration Characteristic is configured to include the advertisement Tx power of the device in the advertisement. The Tx power is defined in IXIT.
IPS/SR/IP/BV-12-C [Configuring Advertisements – Altitude]	Defined in [6]. Indoor Positioning Configuration Characteristic is configured to include the Altitude in the advertisement.
IPS/SR/IP/BV-13-C [Configuring Advertisements – Floor Number]	Defined in [6]. Indoor Positioning Configuration Characteristic is configured to include the Floor Number in the advertisement.
IPS/SR/IP/BV-14-C [Configuring Advertisements – AD Type only]	Defined in [6]. Indoor Positioning Configuration Characteristic is configured so that the bits in the Flags field are all zero, meaning that no data is advertised after the AD type.

Table 4.9: Update configuration test cases

- Test Procedure

  1. The Lower Tester writes a new value defined in Table 4.9 to the Indoor Positioning Configuration Characteristic.
  2. If the Write Characteristic Value or Reliable Write sub-procedure is used in step 1, the IUT sends a Write Response to acknowledge the procedure is successfully completed. This step is not applicable if the Write Without Response sub-procedure is used in step 1.
  3. The Lower Tester terminates the ATT Bearer connection.
  4. The Lower Tester observes the advertising packet from the IUT, using test IPS/SR/IPADV/BV-01-C [Indoor Positioning AD Type Format].

- Expected Outcome

  The following Pass and Fail verdicts apply to the test cases listed in Table 4.9:

  <u>Pass verdict</u>

  The advertising packet from the IUT includes the data as set in the configuration.

4.9.3   Advertising Procedures

- Test Purpose

  The following test subgroup contains test cases to verify that the device is able to advertise. This test subgroup supports non-connectable Indoor Positioning Service implementations.

  The verification is done, as enumerated in the test cases in Table 4.10, using this generic test procedure.

- Reference

  [3] 2

- Initial Condition

  - The IUT is advertising.

- Advertising Procedures Test Cases

Test Case	Value
IPS/SR/IP/BV-15-C [Advertising AD Type Only]	Indoor Positioning AD-type

Table 4.10: Advertising procedures test cases

- Test Procedure

  1. The Lower Tester observes the advertising packet from the IUT, includes the Indoor Positioning AD type [3], where the 2 first octets contain the length and the AD-type.

- Expected Outcome

  The following Pass and Fail verdicts apply to the test cases listed in Table 4.10:

  <u>Pass verdict</u>

  The advertising packet from the IUT includes the AD type.

4.9.4   Location Name Check Procedures

- Test Purpose

  The following test subgroup contains test cases to verify that the device advertise the present of Location Name, also contains the Location Name Characteristics. The verification is done, as enumerated in the test cases in Table 4.11, using this generic test procedure.

- Reference

  [3] 2.2.1.9

- Initial Condition

  - The IUT is advertising.

- Location Name Check Test Cases

Test Case	Value
IPS/SR/IP/BV-16-C [Location Name Check]	Indoor Positioning AD-type contains Location Name Flag. Location Name Characteristic is present and readable.

Table 4.11: Location Name Check test cases

- Test Procedure

  The Lower Tester observes the current advertising packet from the IUT, using test IPS/SR/IPADV/BV-01-C [Indoor Positioning AD Type Format]. The Lower Tester check that the flag defined in Table 4.11 is set.

  1. The establishment of an ATT Bearer connection between the Lower Tester and IUT on transport defined in Section 4.2 is carried out. See Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  2. The Lower Tester reads the characteristic defined in Table 4.11.
  3. The Lower Tester terminates the ATT Bearer connection.

- Expected Outcome

  The following Pass and Fail verdicts apply to the test cases listed in Table 4.11:

  Pass verdict

  The advertising packet from the IUT includes the AD type with the correct flag set.

  The GATT database contain the requested characteristic which where readable.

4.10   Indoor Positioning Advertising Data Format

Verify that the IUT supports the Indoor Positioning Advertising Data Format.

This test group contains test cases to verify that the Indoor Positioning AD Type format required by the service is compliant.

IPS/SR/IPADV/BV-01-C [Indoor Positioning AD Type Format]

- Test Purpose

  Verify that the IUT sends valid Indoor Positioning AD Type in advertising data.

  The IUT is Indoor Positioning Service Advertiser.

  The Lower Tester is GAP Observer or Central.

- Reference

  [3] 2.2.2

  [6] Indoor Positioning AD Type, in Assigned Numbers

- Initial Condition

  - The IUT is in Standby mode.

- Test Procedure

  1. The Upper Tester orders the IUT to enter broadcast mode using the Indoor Positioning AD Type.
  2. The IUT enters broadcast mode advertising Indoor Positioning AD Type.

- Expected Outcome

  <u>Pass verdict</u>

  The advertising data from the IUT includes the Indoor Positioning AD type.

5   Test case mapping

The Test Case Mapping Table (TCMT) maps test cases to specific capabilities 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 Indoor Positioning Service [4].

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.

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

Item	Feature	Test Case(s)
IPS 3/1 OR IPS 3/2	Discover Indoor Positioning Service	IPS/SR/SGGIT/SER/BV-01-C
IPS 5/1 AND NOT IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Indoor Positioning Configuration Characteristic – Read	IPS/SR/SGGIT/CHA/BV-01-C
IPS 5/1 AND IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Indoor Positioning Configuration Characteristic – Read, Write	IPS/SR/SGGIT/CHA/BV-02-C
IPS 5/1 AND IPS 6/4 AND NOT IPS 6/5 AND IPS 6/6	Indoor Positioning Configuration Characteristic – Read, Write, Write Without Response	IPS/SR/SGGIT/CHA/BV-03-C
IPS 5/1b AND IPS 6/4 AND IPS 6/5 AND NOT IPS 6/6	Indoor Positioning Configuration Characteristic – Read, Write, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-04-C
IPS 5/1b AND IPS 6/4 AND IPS 6/5 AND IPS 6/6	Indoor Positioning Configuration Characteristic – Read, Write, Write Without Response, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-05-C
IPS 5/1 AND IPS 6/4	Indoor Positioning Configuration - Write	IPS/SR/CW/BV-01-C
IPS 5/1b	Indoor Positioning Configuration – Reliable Write	IPS/SR/CW/BV-11-C IPS/SR/CEP/BV-01-C
IPS 5/1 AND IPS 6/6	Indoor Positioning Configuration - Write Without Response	IPS/SR/CW/BV-21-C
IPS 5/1	Indoor Positioning Configuration - Characteristic Read	IPS/SR/CR/BV-01-C
IPS 5/2 AND NOT IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Latitude and Longitude Characteristics – Read	IPS/SR/SGGIT/CHA/BV-06-C IPS/SR/SGGIT/CHA/BV-11-C
IPS 5/2 AND IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Latitude and Longitude Characteristics – Read, Write	IPS/SR/SGGIT/CHA/BV-07-C IPS/SR/SGGIT/CHA/BV-12-C

Item	Feature	Test Case(s)
IPS 5/2 AND IPS 6/4 AND NOT IPS 6/5 AND IPS 6/6	Latitude and Longitude Characteristics – Read, Write, Write Without Response	IPS/SR/SGGIT/CHA/BV-08-C IPS/SR/SGGIT/CHA/BV-13-C
IPS 5/2b AND IPS 6/4 AND IPS 6/5 AND NOT IPS 6/6	Latitude and Longitude Characteristics – Read, Write, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-09-C IPS/SR/SGGIT/CHA/BV-14-C
IPS 5/2b AND IPS 6/4 AND IPS 6/5 AND IPS 6/6	Latitude and Longitude Characteristics – Read, Write, Write Without Response, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-10-C IPS/SR/SGGIT/CHA/BV-15-C
IPS 5/2 AND IPS 6/4	Global Coordinates - Write	IPS/SR/CW/BV-02-C IPS/SR/CW/BV-03-C
IPS 5/2b	Global Coordinates –Reliable Write	IPS/SR/CW/BV-12-C IPS/SR/CW/BV-13-C IPS/SR/CEP/BV-02-C IPS/SR/CEP/BV-03-C
IPS 5/2 AND IPS 6/6	Global Coordinates – Write Without Response	IPS/SR/CW/BV-22-C IPS/SR/CW/BV-23-C
IPS 5/2	Global Coordinates - Characteristic Read	IPS/SR/CR/BV-02-C IPS/SR/CR/BV-03-C
IPS 5/3 AND NOT IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Local North Coordinate and Local East Coordinate Characteristics – Read	IPS/SR/SGGIT/CHA/BV-16-C IPS/SR/SGGIT/CHA/BV-21-C
IPS 5/3 AND IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Local North Coordinate and Local East Coordinate Characteristics – Read, Write	IPS/SR/SGGIT/CHA/BV-17-C IPS/SR/SGGIT/CHA/BV-22-C
IPS 5/3 AND IPS 6/4 AND NOT IPS 6/5 AND IPS 6/6	Local North Coordinate and Local East Coordinate Characteristics – Read, Write, Write Without Response	IPS/SR/SGGIT/CHA/BV-18-C IPS/SR/SGGIT/CHA/BV-23-C
IPS 5/3b AND IPS 6/4 AND IPS 6/5 AND NOT IPS 6/6	Local North Coordinate and Local East Coordinate Characteristics – Read, Write, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-19-C IPS/SR/SGGIT/CHA/BV-24-C
IPS 5/3b AND IPS 6/4 AND IPS 6/5 AND IPS 6/6	Local North Coordinate and Local East Coordinate Characteristics – Read, Write, Write Without Response, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-20-C IPS/SR/SGGIT/CHA/BV-25-C
IPS 5/3 AND IPS 6/4	Local Coordinates - Write	IPS/SR/CW/BV-04-C IPS/SR/CW/BV-05-C
IPS 5/3b	Local Coordinates –Reliable Write	IPS/SR/CW/BV-14-C IPS/SR/CW/BV-15-C IPS/SR/CEP/BV-04-C IPS/SR/CEP/BV-05-C
IPS 5/3 AND IPS 6/6	Local Coordinates – Write Without Response	IPS/SR/CW/BV-24-C IPS/SR/CW/BV-25-C
IPS 5/3	Local Coordinates - Characteristic Read	IPS/SR/CR/BV-04-C IPS/SR/CR/BV-05-C

Item	Feature	Test Case(s)
IPS 5/4 AND NOT IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Floor Number Characteristic – Read	IPS/SR/SGGIT/CHA/BV-26-C
IPS 5/4 AND IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Floor Number Characteristic – Read, Write	IPS/SR/SGGIT/CHA/BV-27-C
IPS 5/4 AND IPS 6/4 AND NOT IPS 6/5 AND IPS 6/6	Floor Number Characteristic – Read, Write, Write Without Response	IPS/SR/SGGIT/CHA/BV-28-C
IPS 5/4b AND IPS 6/4 AND IPS 6/5 AND NOT IPS 6/6	Floor Number Characteristic – Read, Write, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-29-C
IPS 5/4b AND IPS 6/4 AND IPS 6/5 AND IPS 6/6	Floor Number Characteristic – Read, Write, Write Without Response, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-30-C
IPS 5/4 AND IPS 6/4	Floor Number - Write	IPS/SR/CW/BV-06-C
IPS 5/4b	Floor Number –Reliable Write	IPS/SR/CW/BV-16-C IPS/SR/CEP/BV-06-C
IPS 5/4 AND IPS 6/6	Floor Number – Write Without Response	IPS/SR/CW/BV-26-C
IPS 5/4	Floor Number – Characteristic Read	IPS/SR/CR/BV-06-C
IPS 5/5 AND NOT IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Altitude Characteristic – Read	IPS/SR/SGGIT/CHA/BV-31-C
IPS 5/5 AND IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Altitude Characteristic – Read, Write	IPS/SR/SGGIT/CHA/BV-32-C
IPS 5/5 AND IPS 6/4 AND NOT IPS 6/5 AND IPS 6/6	Altitude Characteristic – Read, Write, Write Without Response	IPS/SR/SGGIT/CHA/BV-33-C
IPS 5/5b AND IPS 6/4 AND IPS 6/5 AND NOT IPS 6/6	Altitude Characteristic – Read, Write, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-34-C
IPS 5/5b AND IPS 6/4 AND IPS 6/5 AND IPS 6/6	Altitude Characteristic – Read, Write, Write Without Response, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-35-C
IPS 5/5 AND IPS 6/4	Altitude - Write	IPS/SR/CW/BV-07-C
IPS 5/5b	Altitude – Reliable Write	IPS/SR/CW/BV-17-C IPS/SR/CEP/BV-07-C
IPS 5/5 AND IPS 6/6	Altitude – Write Without Response	IPS/SR/CW/BV-27-C
IPS 5/5	Altitude – Characteristic Read	IPS/SR/CR/BV-07-C
IPS 5/6 AND NOT IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Uncertainty Characteristic – Read	IPS/SR/SGGIT/CHA/BV-36-C
IPS 5/6 AND IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Uncertainty Characteristic – Read, Write	IPS/SR/SGGIT/CHA/BV-37-C
IPS 5/6 AND IPS 6/4 AND NOT IPS 6/5 AND IPS 6/6	Uncertainty Characteristic – Read, Write, Write Without Response	IPS/SR/SGGIT/CHA/BV-38-C

Item	Feature	Test Case(s)
IPS 5/6b AND IPS 6/4 AND IPS 6/5 AND NOT IPS 6/6	Uncertainty Characteristic – Read, Write, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-39-C
IPS 5/6b AND IPS 6/4 AND IPS 6/5 AND IPS 6/6	Uncertainty Characteristic – Read, Write, Write Without Response, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-40-C
IPS 5/6 AND IPS 6/4	Uncertainty - Write	IPS/SR/CW/BV-08-C
IPS 5/6b	Uncertainty – Reliable Write	IPS/SR/CW/BV-18-C IPS/SR/CEP/BV-08-C
IPS 5/6 AND IPS 6/6	Uncertainty – Write Without Response	IPS/SR/CW/BV-28-C
IPS 5/6	Uncertainty – Characteristic Read	IPS/SR/CR/BV-08-C
IPS 5/7 AND NOT IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Location Name Characteristic – Read	IPS/SR/SGGIT/CHA/BV-41-C
IPS 5/7 AND IPS 6/4 AND NOT IPS 6/5 AND NOT IPS 6/6	Location Name Characteristic – Read, Write	IPS/SR/SGGIT/CHA/BV-42-C
IPS 5/7 AND IPS 6/4 AND NOT IPS 6/5 AND IPS 6/6	Location Name Characteristic – Read, Write, Write Without Response	IPS/SR/SGGIT/CHA/BV-43-C
IPS 5/7b AND IPS 6/4 AND IPS 6/5 AND NOT IPS 6/6	Location Name Characteristic – Read, Write, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-44-C
IPS 5/7b AND IPS 6/4 AND IPS 6/5 AND IPS 6/6	Location Name Characteristic – Read, Write, Write Without Response, Extended Properties (Reliable Writes)	IPS/SR/SGGIT/CHA/BV-45-C
IPS 5/7 AND IPS 6/4	Location Name - Write	IPS/SR/CW/BV-09-C
IPS 5/7b	Location Name –Reliable Write	IPS/SR/CW/BV-19-C IPS/SR/CEP/BV-09-C
IPS 5/7 AND IPS 6/6	Location Name – Write Without Response	IPS/SR/CW/BV-29-C
IPS 5/7	Location Name – Characteristic Read	IPS/SR/CR/BV-09-C
IPS 4/1	Advertising AD-type only	IPS/SR/IP/BV-14-C IPS/SR/IP/BV-15-C
IPS 4/2 AND IPS 5/2 AND (IPS 6/4 OR IPS 6/5 OR IPS 6/6)	Advertising global coordinates	IPS/SR/IP/BV-01-C IPS/SR/IP/BV-02-C IPS/SR/IP/BV-09-C
IPS 4/2 AND IPS 5/3 AND (IPS 6/4 OR IPS 6/5 OR IPS 6/6)	Advertising local coordinates	IPS/SR/IP/BV-03-C IPS/SR/IP/BV-04-C IPS/SR/IP/BV-10-C
IPS 4/2 AND (IPS 5/2 OR IPS 5/3) AND (IPS 6/4 OR IPS 6/5 OR IPS 6/6)	Advertising coordinates	IPS/SR/IP/BV-08-C
IPS 4/2 AND IPS 5/4 AND (IPS 6/4 OR IPS 6/5 OR IPS 6/6)	Advertising floor number	IPS/SR/IP/BV-05-C IPS/SR/IP/BV-13-C

Item	Feature	Test Case(s)
IPS 4/2 AND IPS 5/5 AND (IPS 6/4 OR IPS 6/5 OR IPS 6/6)	Advertising altitude	IPS/SR/IP/BV-06-C IPS/SR/IP/BV-12-C
IPS 4/2 AND IPS 5/6 AND (IPS 6/4 OR IPS 6/5 OR IPS 6/6)	Advertising uncertainty	IPS/SR/IP/BV-07-C IPS/SR/IP/BI-01-C
IPS 4/2 AND IPS 5/7 AND (IPS 6/4 OR IPS 6/5 OR IPS 6/6)	Advertising location name which is present in GATT database	IPS/SR/IP/BV-16-C
IPS 4/2 AND IPS 5/1 AND (IPS 6/4 OR IPS 6/5 OR IPS 6/6)	Advertising Tx power	IPS/SR/IP/BV-11-C
IPS 3/1	Indoor Positioning Service - SDP record	IPS/SR/SGGIT/SDP/BV-01-C
IPS 4a/1	Indoor Positioning AD type format	IPS/SR/IPADV/BV-01-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2015-05-26	Prepared for publication
	1.0.1r00	2016-05-25	Converted to new Test Case ID conventions as defined in TSTO v4.1.
1	1.0.1	2016-07-14	Prepared for TCRL 2016-1 publication.
	1.0.2r00-01	2018-02-22 – 2018-04-13	TSE 10125 (rating: 2): Moved test cases and added "Characteristic Declarations" to features in the TCMT: Added AND IPS 6/5 to mapping for IPS/SR/DEC/BV-02-C, 04-C, 06-C, 12-C, 14-C, 16-C, and 18-C. Also added AND IPS 5/5 to mapping for IPS/SR/DEC/BV-08-C, 10-C. TSE 10508 (rating 4): Added new test case IPS/SR/IP/BI-01-C to the Changing Advertisement Data Test Cases table and the TCMT.
2	1.0.2	2018-06-27	Approved by BTI. Prepared for TCRL 2018-1 publication.
	1.0.3r00	2018-10-03	TSE 11008 (rating 3): Updated TCMT
3	1.0.3	2018-11-21	Approved by BTI. Prepared for TCRL 2018-2 publication.
	1.0.4r00	2019-05-21	TSE 11437 (rating 1): Updated template. Reinserted test case IPS/SR/CW/BV-02-C into the TCMT to fix a clerical error from TSE 11008.
4	1.0.4	2019-07-29	Approved by BTI. Prepared for TCRL 2019-1 publication.
	p5r00–r02	2020-09-14 – 2020-11-17	TSE 15425 (rating 1): Removed duplicated entry of test case IPS/SR/DEC/BV-11-C from TCMT. Minor editorial/formatting updates. Consistency Checker fixes and template-related updates, including assigning publication number 4 to previous v1.0.4, updating doc ID, updating TCID heading styles, locating test case tables within test case per template, and replacing text of Conformance and Pass/Fail Verdict Conventions sections.
5	p5	2020-12-22	Approved by BTI on 2020-12-02. Prepared for TCRL 2020-1 publication.
	p6r00–r02	2023-05-04 – 2023-05-23	TSE 22817 (rating 2): Converted the following 20 test cases to GGIT: IPS/SR/SD/BV-01-C and -02-C and IPS/SR/DEC/BV-01-C – -18-C. The 56 new GGIT converted TCIDs are IPS/SR/SGGIT/SER/BV-01-C, IPS/SR/SGGIT/SDP/BV-01-C, IPS/SR/SGGIT/CHA/BV-01-C – -45-C, and IPS/SR/CEP/BV-01-C – -09-C. Updated the TCMT accordingly. Updated the test groups section and the test case identification conventions. Updated the test purpose, initial condition, TC table, test procedure, and expected outcome for IPS/SR/CEP/BV-01-C –

Publication Number	Revision Number	Date	Comments
			-09-C. Updated the test procedure for IPS/SR/CR/BV-01-C – -09-C, IPS/SR/CW/BV-01-C – -09-C, IPS/SR/CW/BV-11-C – -19-C, and IPS/SR/CW/BV-21-C – -29-C. Performed other editorials to align the document with the latest TS template, including updates to the scope, references, Test Strategy, test case identification conventions, conformance, Pass/Fail verdict conventions, and TCMT introductory text. Updated the copyright page to align with v2 of the DNMD. Deleted draft revision history comments prior to p0.
6	p6	2023-06-29	Approved by BTI on 2023-05-28. Prepared for TCRL 2023-1 publication.