User Data Service (UDS)

***Bluetooth*® Test Suite**

- **Revision:** UDS.TS.p7
- **Revision Date:** 2022-06-28
- **Group Prepared By:** Sports and Fitness WG

Contents

1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and test cases to test the implementation of the Bluetooth User Data 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, by dated or undated reference, provisions from other publications. 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] Test Strategy and Terminology Overview

[2] Bluetooth Core Specification, Version 4.0 or later

[3] User Data Service Specification, Version 1.0 or later

[4] ICS Proforma for User Data Service

[5] GATT Test Suite

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

[7] User Data Service Implementation eXtra Information for Test, IXIT

[8] User Data Service Specification, Version 1.1 or later

[9] GATT Specification Supplement, Version 1.0 or later

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 User Data Service requires the presence of GAP and GATT. UDS furthermore requires SM when using the LE transport, and SDP when using the BR/EDR transport.

This is illustrated in Figure 3.1.

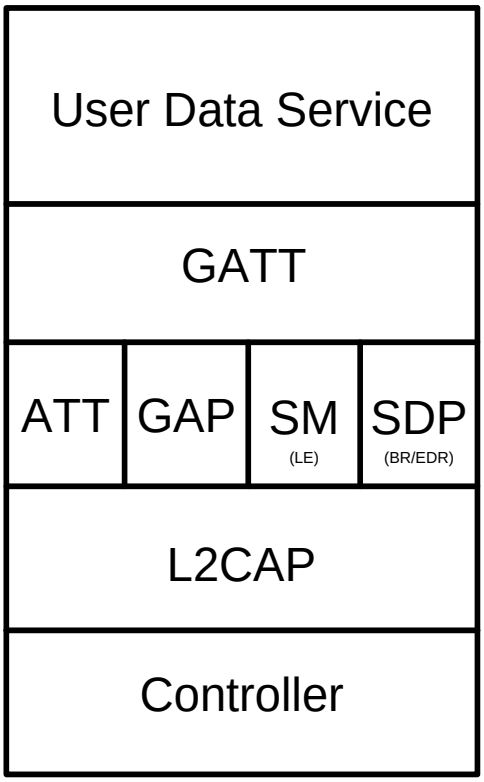

Figure 3.1: User Data Service Test Model

3.2 Test Strategy

The test objectives are to verify functionality of the User Data 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 specification and to match 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:

- Generic GATT Integrated Tests
- Characteristic Read
- Characteristic Read Long
- Characteristic Write
- Characteristic Write Long
- Configure Notification
- Configure Indication
- Characteristic Notification
- Service Procedure

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

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

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>**
UDS	User Data Service
Identifier Abbreviation	**Role Identifier <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>**
CN	Characteristic Notification
CON	Configure Indication or Notification
CR	Characteristic Read
CRL	Characteristic Read Long
CW	Characteristic Write
CWL	Characteristic Write Long
SPE	Service Procedure – Error Handling
SPU	Service Procedures – User Control Point Register New User Consent Delete User Data List All Users Delete User(s)

Table 4.1: User Data Service TC feature naming convention

4.1.2 Conformance

When conformance is claimed for a particular specification, all capabilities are to be supported in the specified manner (process-mandatory). 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 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 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

- 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 ATT Bearer on BR/EDR Transport

- Preamble Procedure

  1. Establish a BR/EDR transport connection between the IUT and the Lower Tester.
  2. Establish several L2CAP channels (PSM 0x001F) between the IUT and the Lower Tester over that BR/EDR transport.

4.2.3 User Control Point

- Preamble Purpose

  This preamble procedure enables the IUT for use with the User Control Point.

- Preamble Procedure

  1. 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.
  2. The handles of the UDS Characteristics, the User Index and the User Control Point have been previously discovered by the Lower Tester during the test procedure in Section 4.3 or are known to the Lower Tester by other means.
  3. The handle of the Client Characteristic Configuration descriptors of the User Control Point and the Database Change Increment characteristics have been previously discovered by the Lower Tester during the test procedure in Section 4.3 or are known to the Lower Tester by other means.
  4. If the IUT requires bonding, then the Lower Tester performs a bonding procedure.
  5. The IUT configures the User Control Point characteristic for indications, and if the test case requires notifications of the Database Change Increment characteristic, then the IUT configures this characteristic for notifications. Those configurations may happen in any order.

4.2.4 Registered User Setup

- Preamble Purpose

  This preamble procedure enables the IUT for use with the User Control Point and Registered User characteristic.

- Preamble Procedure

  1. 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.
  2. Enable the IUT to use the User Control Point as described in Section 4.2.3.
  3. The handle of the Registered User characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or are known to the Lower Tester by other means.
  4. The handle of the Client Characteristic Configuration descriptor of the Registered User characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or are known to the Lower Tester by other means.
  5. If the IUT requires bonding, then the Lower Tester performs a bonding procedure.
  6. The Lower Tester configures the User Control Point characteristic for indications.

4.3 Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in [5] Section 6.3 Server Test Procedures using Table 4.2 below as input:

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
UDS/SR/SGGIT/SER/BV-01-C [Service GGIT – User Data]	User Data Service	[3] 2	-	-	Primary or Secondary Service
UDS/SR/SGGIT/SDP/BV-01-C [SDP Record]	User Data Service	[3] 2, 4	-	-	-
UDS/SR/SGGIT/CHA/BV-01-C [Characteristic GGIT – First Name]	First Name Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-02-C [Characteristic GGIT – Last Name]	Last Name Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-03-C [Characteristic GGIT – Email Address]	Email Address Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-04-C [Characteristic GGIT – Age]	Age Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-05-C [Characteristic GGIT – Gender]	Gender Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-06-C [Characteristic GGIT – Weight]	Weight Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-07-C [Characteristic GGIT – Height]	Height Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-08-C [Characteristic GGIT – VO2 Max]	VO2 Max Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-09-C [Characteristic GGIT – Heart Rate Max]	Heart Rate Max Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-10-C [Characteristic GGIT – Resting Heart Rate]	Resting Heart Rate Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
UDS/SR/SGGIT/CHA/BV-11-C [Characteristic GGIT – Maximum Recommended Heart Rate]	Maximum Recommended Heart Rate Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-12-C [Characteristic GGIT – Aerobic Threshold]	Aerobic Threshold Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-13-C [Characteristic GGIT – Anaerobic Threshold]	Anaerobic Threshold Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-14-C [Characteristic GGIT – Sport Type for Aerobic and Anaerobic Thresholds]	Sport Type for Aerobic and Anaerobic Thresholds Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-15-C [Characteristic GGIT – Date of Threshold Assessment]	Date of Threshold Assessment Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-16-C [Characteristic GGIT – Waist Circumference]	Waist Circumference Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-17-C [Characteristic GGIT – Hip Circumference]	Hip Circumference Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-18-C [Characteristic GGIT – Fat Burn Heart Rate Lower Limit]	Fat Burn Heart Rate Lower Limit Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-19-C [Characteristic GGIT – Fat Burn Heart Rate Upper Limit]	Fat Burn Heart Rate Upper Limit Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-20-C [Characteristic GGIT – Aerobic Heart Rate Lower Limit]	Aerobic Heart Rate Lower Limit Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-21-C [Characteristic GGIT – Aerobic Heart Rate Upper Limit]	Aerobic Heart Rate Upper Limit Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-22-C [Characteristic GGIT – Anaerobic Heart Rate Lower Limit]	Anaerobic Heart Rate Lower Limit Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-23-C [Characteristic GGIT – Anaerobic Heart Rate Upper Limit]	Anaerobic Heart Rate Upper Limit Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
UDS/SR/SGGIT/CHA/BV-24-C [Characteristic GGIT – Five Zone Heart Rate Limits]	Five Zone Heart Rate Limits Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-25-C [Characteristic GGIT – Three Zone Heart Rate Limits]	Three Zone Heart Rate Limits Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-26-C [Characteristic GGIT – Two Zone Heart Rate Limits]	Two Zone Heart Rate Limits Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-27-C [Characteristic GGIT – Database Change Increment]	Database Change Increment	[3] 3.2	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-28-C [Characteristic GGIT – Database Change Increment – Notify]	Database Change Increment	[3] 3.2	0x1A (Read, Write, Notify)	Skip	-
UDS/SR/SGGIT/CHA/BV-29-C [Characteristic GGIT – User Index]	User Index Characteristic	[3] 3.3	0x02 (Read)	Skip	-
UDS/SR/SGGIT/CHA/BV-30-C [Characteristic GGIT – User Control Point]	User Control Point Characteristic	[3] 3.5	0x28 (Write, Indicate)	Skip	-
UDS/SR/SGGIT/CHA/BV-31-C [Characteristic GGIT – Date of Birth]	Date of Birth Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-32-C [Characteristic GGIT – Language]	Language Characteristic	[3] 3.1	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-33-C [Characteristic GGIT – Registered User]	Registered User Characteristic	[8] 3.5	0x20 (Indicate)	Skip	-
UDS/SR/SGGIT/CHA/BV-34-C [Characteristic GGIT – Preferred Units]	Preferred Units Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-35-C [Characteristic GGIT – High Resolution Height]	High Resolution Height Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-36-C [Characteristic GGIT – Middle Name]	Middle Name Characteristic	[9]	0x0A (Read, Write)	Skip	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
UDS/SR/SGGIT/CHA/BV-37-C [Characteristic GGIT – Stride Length]	Stride Length Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-38-C [Characteristic GGIT – Handedness]	Handedness Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-39-C [Characteristic GGIT – Device Wearing Position]	Device Wearing Position Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-40-C [Characteristic GGIT – Four Zone Heart Rate Limits]	Four Zone Heart Rate Limits Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-41-C [Characteristic GGIT – High Intensity Exercise Threshold]	High Intensity Exercise Threshold Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-42-C [Characteristic GGIT – Activity Goal]	Activity Goal Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-43-C [Characteristic GGIT – Sedentary Interval Notification]	Sedentary Interval Notification Characteristic	[9]	0x0A (Read, Write)	Skip	-
UDS/SR/SGGIT/CHA/BV-44-C [Characteristic GGIT – Caloric Intake]	Caloric Intake Characteristic	[9]	0x0A (Read, Write)	Skip	-

Table 4.2: Input for the GGIT Server Test Procedure

4.4 Characteristic Read

- Test Purpose

  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 4.3, using this generic test procedure.

- Reference

  [3] 3.1.1, 3.2.1, and 3.3.1

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.
  - If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.
  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - The test procedure UDS/SR/SPU/BV-03-C [Consent] is used prior to accessing the user data.

- Test Case Configuration

Test Case	Value (Requirements)
UDS/SR/CR/BV-01-C [Characteristic Read – First Name]	Defined in [6].
UDS/SR/CR/BV-02-C [Characteristic Read – Last Name]	Defined in [6].
UDS/SR/CR/BV-03-C [Characteristic Read – Email Address]	Defined in [6].
UDS/SR/CR/BV-04-C [Characteristic Read – Age]	Defined in [6].
UDS/SR/CR/BV-05-C [Characteristic Read – Gender]	Defined in [6].
UDS/SR/CR/BV-06-C [Characteristic Read – Weight]	Defined in [6].
UDS/SR/CR/BV-07-C [Characteristic Read – Height]	Defined in [6].
UDS/SR/CR/BV-08-C [Characteristic Read – VO2 Max]	Defined in [6].
UDS/SR/CR/BV-09-C [Characteristic Read – Heart Rate Max]	Defined in [6].
UDS/SR/CR/BV-10-C [Characteristic Read – Resting Heart Rate]	Defined in [6].
UDS/SR/CR/BV-11-C [Characteristic Read – Maximum Recommended Heart Rate]	Defined in [6].
UDS/SR/CR/BV-12-C [Characteristic Read – Aerobic Threshold]	Defined in [6].
UDS/SR/CR/BV-13-C [Characteristic Read – Anaerobic Threshold]	Defined in [6].
UDS/SR/CR/BV-14-C [Characteristic Read – Sport Type for Aerobic and Anaerobic Thresholds]	Defined in [6].
UDS/SR/CR/BV-15-C [Characteristic Read – Date of Threshold Assessment]	Defined in [6].
UDS/SR/CR/BV-16-C [Characteristic Read – Waist Circumference]	Defined in [6].
UDS/SR/CR/BV-17-C [Characteristic Read – Hip Circumference]	Defined in [6].
UDS/SR/CR/BV-18-C [Characteristic Read – Fat Burn Heart Rate Lower Limit]	Defined in [6].
UDS/SR/CR/BV-19-C [Characteristic Read – Fat Burn Heart Rate Upper Limit]	Defined in [6].

Test Case	Value (Requirements)
UDS/SR/CR/BV-20-C [Characteristic Read – Aerobic Heart Rate Lower Limit]	Defined in [6].
UDS/SR/CR/BV-21-C [Characteristic Read – Aerobic Heart Rate Upper Limit]	Defined in [6].
UDS/SR/CR/BV-22-C [Characteristic Read – Anaerobic Heart Rate Lower Limit]	Defined in [6].
UDS/SR/CR/BV-23-C [Characteristic Read – Anaerobic Heart Rate Upper Limit]	Defined in [6].
UDS/SR/CR/BV-24-C [Characteristic Read – Five Zone Heart Rate Limits]	Defined in [6].
UDS/SR/CR/BV-25-C [Characteristic Read – Three Zone Heart Rate Limits]	Defined in [6].
UDS/SR/CR/BV-26-C [Characteristic Read – Two Zone Heart Rate Limits]	Defined in [6].
UDS/SR/CR/BV-27-C [Characteristic Read – Database Change Increment]	4 octets
UDS/SR/CR/BV-28-C [Characteristic Read – User Index]	1 octet
UDS/SR/CR/BV-29-C [Characteristic Read – Date of Birth]	Defined in [6].
UDS/SR/CR/BV-30-C [Characteristic Read – Language]	Defined in [6].
UDS/SR/CR/BV-31-C [Characteristic Read – Preferred Units]	Defined in [6].
UDS/SR/CR/BV-32-C [Characteristic Read – High Resolution Height]	Defined in [6].
UDS/SR/CR/BV-33-C [Characteristic Read – Middle Name]	Defined in [6].
UDS/SR/CR/BV-34-C [Characteristic Read – Stride Length]	Defined in [6].
UDS/SR/CR/BV-35-C [Characteristic Read – Handedness]	Defined in [6].
UDS/SR/CR/BV-36-C [Characteristic Read – Device Wearing Position]	Defined in [6].
UDS/SR/CR/BV-37-C [Characteristic Read – Four Zone Heart Rate Limits]	Defined in [6].
UDS/SR/CR/BV-38-C [Characteristic Read – High Intensity Exercise Threshold]	Defined in [6].
UDS/SR/CR/BV-39-C [Characteristic Read – Activity Goal]	Defined in [6].
UDS/SR/CR/BV-40-C [Characteristic Read – Sedentary Interval Notification]	Defined in [6].
UDS/SR/CR/BV-41-C [Characteristic Read – Caloric Intake]	Defined in [6].

Table 4.3: 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

  Pass verdict

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

4.5 Characteristic Read – Without User Consent

- Test Purpose

  Read a characteristic value when the user has not given consent to allow the IUT to share the user data. 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] 3.1.1, 3.2.1, and 3.3.1

- Initial Condition
  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 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 using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.
- Test Case Configuration

Test Case	Value (Requirements)
UDS/SR/CR/BI-01-C [Characteristic Read Without Consent – First Name]	User Data Access Not Permitted.
UDS/SR/CR/BI-02-C [Characteristic Read Without Consent – Last Name]	User Data Access Not Permitted.
UDS/SR/CR/BI-03-C [Characteristic Read Without Consent – Email Address]	User Data Access Not Permitted.
UDS/SR/CR/BI-04-C [Characteristic Read Without Consent – Age]	User Data Access Not Permitted.
UDS/SR/CR/BI-05-C [Characteristic Read Without Consent – Gender]	User Data Access Not Permitted.
UDS/SR/CR/BI-06-C [Characteristic Read Without Consent – Weight]	User Data Access Not Permitted.
UDS/SR/CR/BI-07-C [Characteristic Read Without Consent – Height]	User Data Access Not Permitted.
UDS/SR/CR/BI-08-C [Characteristic Read Without Consent – VO2 Max]	User Data Access Not Permitted.
UDS/SR/CR/BI-09-C [Characteristic Read Without Consent – Heart Rate Max]	User Data Access Not Permitted.
UDS/SR/CR/BI-10-C [Characteristic Read Without Consent – Resting Heart Rate]	User Data Access Not Permitted.
UDS/SR/CR/BI-11-C [Characteristic Read Without Consent – Maximum Recommended Heart Rate]	User Data Access Not Permitted.
UDS/SR/CR/BI-12-C [Characteristic Read Without Consent – Aerobic Threshold]	User Data Access Not Permitted.
UDS/SR/CR/BI-13-C [Characteristic Read Without Consent – Anaerobic Threshold]	User Data Access Not Permitted.
UDS/SR/CR/BI-14-C [Characteristic Read Without Consent – Sport Type for Aerobic and Anaerobic Thresholds]	User Data Access Not Permitted.
UDS/SR/CR/BI-15-C [Characteristic Read Without Consent – Date of Threshold Assessment]	User Data Access Not Permitted.
UDS/SR/CR/BI-16-C [Characteristic Read Without Consent – Waist Circumference]	User Data Access Not Permitted.
UDS/SR/CR/BI-17-C [Characteristic Read Without Consent – Hip Circumference]	User Data Access Not Permitted.
UDS/SR/CR/BI-18-C [Characteristic Read Without Consent – Fat Burn Heart Rate Lower Limit]	User Data Access Not Permitted.

Test Case	Value (Requirements)
UDS/SR/CR/BI-19-C [Characteristic Read Without Consent – Fat Burn Heart Rate Upper Limit]	User Data Access Not Permitted.
UDS/SR/CR/BI-20-C [Characteristic Read Without Consent – Aerobic Heart Rate Lower Limit]	User Data Access Not Permitted.
UDS/SR/CR/BI-21-C [Characteristic Read Without Consent – Aerobic Heart Rate Upper Limit]	User Data Access Not Permitted.
UDS/SR/CR/BI-22-C [Characteristic Read Without Consent – Anaerobic Heart Rate Lower Limit]	User Data Access Not Permitted.
UDS/SR/CR/BI-23-C [Characteristic Read Without Consent – Anaerobic Heart Rate Upper Limit]	User Data Access Not Permitted.
UDS/SR/CR/BI-24-C [Characteristic Read Without Consent – Five Zone Heart Rate Limits]	User Data Access Not Permitted.
UDS/SR/CR/BI-25-C [Characteristic Read Without Consent – Three Zone Heart Rate Limits]	User Data Access Not Permitted.
UDS/SR/CR/BI-26-C [Characteristic Read Without Consent – Two Zone Heart Rate Limits]	User Data Access Not Permitted.
UDS/SR/CR/BI-28-C [Characteristic Read Without Consent – Date of Birth]	User Data Access Not Permitted.
UDS/SR/CR/BI-29-C [Characteristic Read Without Consent – Language]	User Data Access Not Permitted.
UDS/SR/CR/BI-30-C [Characteristic Read Without Consent – Preferred Units]	User Data Access Not Permitted.
UDS/SR/CR/BI-31-C [Characteristic Read Without Consent – High Resolution Height]	User Data Access Not Permitted.
UDS/SR/CR/BI-32-C [Characteristic Read Without Consent – Middle Name]	User Data Access Not Permitted.
UDS/SR/CR/BI-33-C [Characteristic Read Without Consent – Stride Length]	User Data Access Not Permitted.
UDS/SR/CR/BI-34-C [Characteristic Read Without Consent – Handedness]	User Data Access Not Permitted.
UDS/SR/CR/BI-35-C [Characteristic Read Without Consent – Device Wearing Position]	User Data Access Not Permitted.
UDS/SR/CR/BI-36-C [Characteristic Read Without Consent – Four Zone Heart Rate Limits]	User Data Access Not Permitted.
UDS/SR/CR/BI-37-C [Characteristic Read Without Consent – High Intensity Exercise Threshold]	User Data Access Not Permitted.
UDS/SR/CR/BI-38-C [Characteristic Read Without Consent – Activity Goal]	User Data Access Not Permitted.
UDS/SR/CR/BI-39-C [Characteristic Read Without Consent – Sedentary Interval Notification]	User Data Access Not Permitted.
UDS/SR/CR/BI-40-C [Characteristic Read Without Consent – Caloric Intake]	User Data Access Not Permitted.

Table 4.4: Unauthorized Characteristic Read 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 IUT returns the appropriate error response.

- Expected Outcome

  Pass verdict

  The IUT returns the appropriate error response that meets the requirements of the service.

4.6 Characteristic Read Long

- Test Purpose

  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 4.5, using this generic test procedure.

- Reference

  [3] 3.1.1

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.
  - If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.
  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - The test procedure UDS/SR/SPU/BV-03-C [Consent] is used prior to accessing the user data.

- Test Case Configuration

Test Case	Value (Requirements)
UDS/SR/CRL/BV-01-C [Characteristic Read Long – First Name]	Defined in [6].
UDS/SR/CRL/BV-02-C [Characteristic Read Long – Last Name]	Defined in [6].
UDS/SR/CRL/BV-03-C [Characteristic Read Long – Email Address]	Defined in [6].
UDS/SR/CRL/BV-04-C [Characteristic Read Long – Preferred Units]	Defined in [6].
UDS/SR/CRL/BV-05-C [Characteristic Read Long – Middle Name]	Defined in [6].

Table 4.5: Characteristic Read Long Value test cases

- Test Procedure

  1. The Lower Tester executes the GATT Read Long Characteristic Values sub-procedure to read the characteristic in Table 4.5.
  2. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

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

4.7 Characteristic Write

- Test Purpose

  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] 3.1.1, 3.3.1

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.
  - If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.
  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - The test procedure UDS/SR/SPU/BV-03-C [Consent] is used prior to accessing the user data.
  - 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.

- Test Case Configuration

Test Case	Value (Requirements)
UDS/SR/CW/BV-01-C [Characteristic Write – First Name]	Defined in [6].
UDS/SR/CW/BV-02-C [Characteristic Write – Last Name]	Defined in [6].
UDS/SR/CW/BV-03-C [Characteristic Write – Email Address]	Defined in [6].
UDS/SR/CW/BV-04-C [Characteristic Write – Age]	Defined in [6].
UDS/SR/CW/BV-05-C [Characteristic Write – Gender]	Defined in [6].
UDS/SR/CW/BV-06-C [Characteristic Write – Weight]	Defined in [6].
UDS/SR/CW/BV-07-C [Characteristic Write – Height]	Defined in [6].
UDS/SR/CW/BV-08-C [Characteristic Write – VO2 Max]	Defined in [6].
UDS/SR/CW/BV-09-C [Characteristic Write – Heart Rate Max]	Defined in [6].
UDS/SR/CW/BV-10-C [Characteristic Write – Resting Heart Rate]	Defined in [6].
UDS/SR/CW/BV-11-C [Characteristic Write – Maximum Recommended Heart Rate]	Defined in [6].
UDS/SR/CW/BV-12-C [Characteristic Write – Aerobic Threshold]	Defined in [6].
UDS/SR/CW/BV-13-C [Characteristic Write – Anaerobic Threshold]	Defined in [6].
UDS/SR/CW/BV-14-C [Characteristic Write – Sport Type for Aerobic and Anaerobic Thresholds]	Defined in [6].
UDS/SR/CW/BV-15-C [Characteristic Write – Date of Threshold Assessment]	Defined in [6].
UDS/SR/CW/BV-16-C [Characteristic Write – Waist Circumference]	Defined in [6].
UDS/SR/CW/BV-17-C [Characteristic Write – Hip Circumference]	Defined in [6].
UDS/SR/CW/BV-18-C [Characteristic Write – Fat Burn Heart Rate Lower Limit]	Defined in [6].

Test Case	Value (Requirements)
UDS/SR/CW/BV-19-C [Characteristic Write – Fat Burn Heart Rate Upper Limit]	Defined in [6].
UDS/SR/CW/BV-20-C [Characteristic Write – Aerobic Heart Rate Lower Limit]	Defined in [6].
UDS/SR/CW/BV-21-C [Characteristic Write – Aerobic Heart Rate Upper Limit]	Defined in [6].
UDS/SR/CW/BV-22-C [Characteristic Write – Anaerobic Heart Rate Lower Limit]	Defined in [6].
UDS/SR/CW/BV-23-C [Characteristic Write – Anaerobic Heart Rate Upper Limit]	Defined in [6].
UDS/SR/CW/BV-24-C [Characteristic Write – Five Zone Heart Rate Limits]	Defined in [6].
UDS/SR/CW/BV-25-C [Characteristic Write – Three Zone Heart Rate Limits]	Defined in [6].
UDS/SR/CW/BV-26-C [Characteristic Write – Two Zone Heart Rate Limits]	Defined in [6].
UDS/SR/CW/BV-27-C [Characteristic Write – Database Change Increment]	4 octets
UDS/SR/CW/BV-28-C [Characteristic Write – Date of Birth]	Defined in [6].
UDS/SR/CW/BV-29-C [Characteristic Write – Language]	Defined in [6].
UDS/SR/CW/BV-30-C [Characteristic Write – Preferred Units]	Defined in [6].
UDS/SR/CW/BV-31-C [Characteristic Write – High Resolution Height]	Defined in [6].
UDS/SR/CW/BV-32-C [Characteristic Write – Middle Name]	Defined in [6].
UDS/SR/CW/BV-33-C [Characteristic Write – Stride Length]	Defined in [6].
UDS/SR/CW/BV-34-C [Characteristic Write – Handedness]	Defined in [6].
UDS/SR/CW/BV-35-C [Characteristic Write – Device Wearing Position]	Defined in [6].
UDS/SR/CW/BV-36-C [Characteristic Write – Four Zone Heart Rate Limits]	Defined in [6].
UDS/SR/CW/BV-37-C [Characteristic Write – High Intensity Exercise Threshold]	Defined in [6].
UDS/SR/CW/BV-38-C [Characteristic Write – Activity Goal]	Defined in [6].
UDS/SR/CW/BV-39-C [Characteristic Write – Sedentary Interval Notification]	Defined in [6].
UDS/SR/CW/BV-40-C [Characteristic Write – Caloric Intake]	Defined in [6].

Table 4.6: 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

  Pass verdict

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

4.8 Characteristic Write – Without User Consent

- Test Purpose

  This test group contains test cases to write a characteristic value by an unauthorized user (i.e., when the user has not given his consent toto allow the IUT to share the user data). 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] 3.1.1, 3.2.1, and 3.3.1

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 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 using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Case Configuration

Test Case	Value (Requirements)
UDS/SR/CW/BI-01-C [Characteristic Write Without Consent – First Name]	User Data Access Not Permitted.
UDS/SR/CW/BI-02-C [Characteristic Write Without Consent – Last Name]	User Data Access Not Permitted.
UDS/SR/CW/BI-03-C [Characteristic Write Without Consent – Email Address]	User Data Access Not Permitted.
UDS/SR/CW/BI-04-C [Characteristic Write Without Consent – Age]	User Data Access Not Permitted.
UDS/SR/CW/BI-05-C [Characteristic Write Without Consent – Gender]	User Data Access Not Permitted.
UDS/SR/CW/BI-06-C [Characteristic Write Without Consent – Weight]	User Data Access Not Permitted.
UDS/SR/CW/BI-07-C [Characteristic Write Without Consent – Height]	User Data Access Not Permitted.
UDS/SR/CW/BI-08-C [Characteristic Write Without Consent – VO2 Max]	User Data Access Not Permitted.
UDS/SR/CW/BI-09-C [Characteristic Write Without Consent – Heart Rate Max]	User Data Access Not Permitted.
UDS/SR/CW/BI-10-C [Characteristic Write Without Consent – Resting Heart Rate]	User Data Access Not Permitted.
UDS/SR/CW/BI-11-C [Characteristic Write Without Consent – Maximum Recommended Heart Rate]	User Data Access Not Permitted.
UDS/SR/CW/BI-12-C [Characteristic Write Without Consent – Aerobic Threshold]	User Data Access Not Permitted.
UDS/SR/CW/BI-13-C [Characteristic Write Without Consent – Anaerobic Threshold]	User Data Access Not Permitted.

Test Case	Value (Requirements)
UDS/SR/CW/BI-14-C [Characteristic Write Without Consent – Sport Type for Aerobic and Anaerobic Thresholds]	User Data Access Not Permitted.
UDS/SR/CW/BI-15-C [Characteristic Write Without Consent – Date of Threshold Assessment]	User Data Access Not Permitted.
UDS/SR/CW/BI-16-C [Characteristic Write Without Consent – Waist Circumference]	User Data Access Not Permitted.
UDS/SR/CW/BI-17-C [Characteristic Write Without Consent – Hip Circumference]	User Data Access Not Permitted.
UDS/SR/CW/BI-18-C [Characteristic Write Without Consent – Fat Burn Heart Rate Lower Limit]	User Data Access Not Permitted.
UDS/SR/CW/BI-19-C [Characteristic Write Without Consent – Fat Burn Heart Rate Upper Limit]	User Data Access Not Permitted.
UDS/SR/CW/BI-20-C [Characteristic Write Without Consent – Aerobic Heart Rate Lower Limit]	User Data Access Not Permitted.
UDS/SR/CW/BI-21-C [Characteristic Write Without Consent – Aerobic Heart Rate Upper Limit]	User Data Access Not Permitted.
UDS/SR/CW/BI-22-C [Characteristic Write Without Consent – Anaerobic Heart Rate Lower Limit]	User Data Access Not Permitted.
UDS/SR/CW/BI-23-C [Characteristic Write Without Consent – Anaerobic Heart Rate Upper Limit]	User Data Access Not Permitted.
UDS/SR/CW/BI-24-C [Characteristic Write Without Consent – Five Zone Heart Rate Limits]	User Data Access Not Permitted.
UDS/SR/CW/BI-25-C [Characteristic Write Without Consent – Three Zone Heart Rate Limits]	User Data Access Not Permitted.
UDS/SR/CW/BI-26-C [Characteristic Write Without Consent – Two Zone Heart Rate Limits]	User Data Access Not Permitted.
UDS/SR/CW/BI-27-C [Characteristic Write Without Consent – Database Change Increment]	User Data Access Not Permitted.
UDS/SR/CW/BI-28-C [Characteristic Write Without Consent – Date of Birth]	User Data Access Not Permitted.
UDS/SR/CW/BI-29-C [Characteristic Write Without Consent – Language]	User Data Access Not Permitted.
UDS/SR/CW/BI-30-C [Characteristic Write Without Consent – Preferred Units]	User Data Access Not Permitted.
UDS/SR/CW/BI-31-C [Characteristic Write Without Consent – High Resolution Height]	User Data Access Not Permitted.
UDS/SR/CW/BI-32-C [Characteristic Write Without Consent – Middle Name]	User Data Access Not Permitted.
UDS/SR/CW/BI-33-C [Characteristic Write Without Consent – Stride Length]	User Data Access Not Permitted.
UDS/SR/CW/BI-34-C [Characteristic Write Without Consent – Handedness]	User Data Access Not Permitted.
UDS/SR/CW/BI-35-C [Characteristic Write Without Consent – Device Wearing Position]	User Data Access Not Permitted.
UDS/SR/CW/BI-36-C [Characteristic Write Without Consent – Four Zone Heart Rate Limits]	User Data Access Not Permitted.

Test Case	Value (Requirements)
UDS/SR/CW/BI-37-C [Characteristic Write Without Consent – High Intensity Exercise Threshold]	User Data Access Not Permitted.
UDS/SR/CW/BI-38-C [Characteristic Write Without Consent – Activity Goal]	User Data Access Not Permitted.
UDS/SR/CW/BI-39-C [Characteristic Write Without Consent – Sedentary Interval Notification]	User Data Access Not Permitted.
UDS/SR/CW/BI-40-C [Characteristic Write Without Consent – Caloric Intake]	User Data Access Not Permitted.

Table 4.7: Unauthorized Characteristic Write test cases

- Test Procedure

  1. The Lower Tester sends an ATT_Write_Request to the IUT to write the characteristic value.
  2. Verify that the IUT returns the appropriate error response.

- Expected Outcome

  Pass verdict

  The IUT returns the appropriate error response that meets the requirements of the service.

4.9 Configure Indication and Notification

- Test Purpose

  Verify compliant operation in response to enable and disable characteristic indication or notification. The verification is done one value at a time, as enumerated in the test cases in Table 4.8, using this generic test procedure.

- Reference

  [3] 3.2

- 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.
  - 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 4.3 or is known to the Lower Tester by other means.
  - If IUT permissions for the characteristic descriptor require a specific security mode or security level, establish a connection meeting those requirements.
  - 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.

- Test Case Configuration

Test Case	Requirements
UDS/SR/CON/BV-01-C [Configure Notification – Database Change Increment]	0x0001 ([3] 3.2)
UDS/SR/CON/BV-02-C [Configure Indication – User Control Point]	0x0002 ([3] 3.4)

Test Case	Requirements
UDS/SR/CON/BV-03-C [Configure Indication – Registered User]	0x0002 ([8] Table 3.1)

Table 4.8: Configure Indication and Notification test cases

- Test Procedure

  1. Disable indication or notification by writing value 0x0000 to the client characteristic configuration descriptor of the characteristic.
  2. If the test case is for notification, enable notification by writing value 0x0001 to the client characteristic configuration descriptor of the characteristic.
  3. Otherwise, if the test case is for indication, enable indication by writing value 0x0002 to the client characteristic configuration descriptor of the characteristic.
  4. The Lower Tester reads the value of the client characteristic configuration descriptor.

- Expected Outcome

  Pass verdict

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

4.10 Characteristic Notification

4.10.1 Service Characteristic – Database Change Increment

Verify the Database Change Increment characteristic behavior.

UDS/SR/CN/BV-01-C [Database Change Increment]

- Test Purpose

  Verify that the IUT can send notifications of the Database Change Increment characteristic when a user data has been updated in the IUT (e.g., through its UI).

- Reference

  [3] 3.2

- Initial Condition

  - If the IUT requires a bonding procedure, then perform a bonding procedure.
  - The Database Change Increment characteristic is configured for notification.
  - 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 IUT permissions for the Database Change Increment characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. 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.
  2. The Lower Tester reads the UDS Characteristics available in the IUT.
  3. The Lower Tester reads the Database Change Increment characteristic.

4. Perform an action on the IUT that will induce it to send one notification of the Database Change Increment characteristic (e.g., update the value of one of the UDS characteristics through the UI of the IUT).
5. The Lower Tester receives one ATT_Handle_Value_Notification from the IUT containing the Database Change Increment.
6. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends one notification of the Database Change Increment characteristic value greater than the value read in step 3 of the Test Procedure.

UDS/SR/CN/BV-02-C [Database Change Increment – Multiple Clients]

- Test Purpose

  Verify that the IUT acting as a UDS Server sends notifications of the Database Change Increment characteristic when it is connected to two or more Clients associated with the same user.

- Reference

  [3] 3.2

- Initial Condition

  - The Database Change Increment characteristic is configured for notification.
  - Establish an ATT Bearer connection between the Lower Tester 1 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.
  - Establish an ATT Bearer connection between the Lower Tester 2 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 IUT requires a bonding procedure, then perform a bonding procedure.
  - If IUT permissions for the Database Change Increment characteristic require a specific security mode or security level, establish a connection meeting those requirements.
  - If not already done, perform the test case UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.

- Test Procedure

  1. A connection is established between the Lower Tester 1 and IUT.
  2. The Lower Tester 1 initiates the Consent procedure and supplies the correct User Index and Consent Code parameters for the registered user (e.g., by executing test case UDS/SR/SPU/BV-03-C [Consent]).
  3. The IUT confirms that the Consent procedure was completed successfully.
  4. The Lower Tester 1 reads the Database Change Increment characteristic.
  5. Repeat steps 1–3 for Lower Tester 2.
  6. The Lower Tester 1 writes an incremented value of the Database Change Increment characteristic.
  7. The IUT sends an ATT_Write_Response to the Lower Tester 1.
  8. The Lower Tester 2 expects to receive one ATT_Handle_Value_Notification from the IUT containing the Database Change Increment.

- Expected Outcome

  Pass verdict

  The IUT sends one notification of the Database Change Increment characteristic with the value written at step 6 to the Lower Tester 2, in step 8.

4.10.2 Service Procedures – User Control Point

Verify compliant operation when the Lower Tester uses User Control Point procedures.

UDS/SR/SPU/BV-01-C [Register New User]

- Test Purpose

  Verify that the IUT can perform the Register New User procedure.

- Reference

  [3] 3.4.2.1

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - The IUT is in a mode that allows the registration of a new user.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes the Register New User Op Code (0x01) to the User Control Point with a Parameter Value of 0x04D2 which represents the Consent Code “1234”.
  3. The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for ‘success’ (0x01) with the Response Parameter set to the User Index value assigned by the IUT.
  4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the User Control Point characteristic handle and value.
  5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
  6. The Lower Tester deletes the user by executing the test case UDS/SR/SPU/BV-04-C [Delete User Data].

- Expected Outcome

  Pass verdict

  The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends one indication of the User Control Point characteristic with the Response Code Op Code containing valid contents.

UDS/SR/SPU/BV-02-C [Register New User – Maximum Number of Supported Users Reached]

- Test Purpose

  Verify that the IUT can perform the Register New User procedure when the maximum number of supported users is reached.

- Reference

  [3] 3.4.2.1

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - The IUT is in a mode that allows the registration of a new user.
  - The maximum number of supported users is defined in the IXIT [7].

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes the Register New User Op Code (0x01) to the User Control Point with a valid Parameter Value that represents the Consent Code. Since this step is repeated to register all the users supported by the IUT, the Lower Tester should use a different Consent Code for each registered user.
  3. The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for ‘success’ (0x01) with the Response Parameter set to the User Index value assigned by the IUT.
  4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the User Control Point characteristic handle and value.
  5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
  6. The Lower Tester repeats the steps 2–5 of the Test Procedure to register as many users as the IUT supports.
  7. Verify that the characteristic value meets the requirements of the service.
  8. The Lower Tester repeats step 2 of the Test Procedure to register a new user.
  9. The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for ‘Operation Failed’ (0x04).
  10. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the User Control Point characteristic handle and value.
  11. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
  12. Verify that the characteristic value meets the requirements of the service.
  13. The Lower Tester deletes all the registered users by executing the test cases UDS/SR/SPU/BV-03-C [Consent] followed by UDS/SR/SPU/BV-04-C [Delete User Data] for each user.

- Expected Outcome

  Pass verdict

  Steps 1–7:

  Verify that the IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends one indication of the User Control Point characteristic with the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for ‘success’ (0x01) with the Response Parameter set to the User Index value assigned by the IUT for each Register New User procedure initiated by the Lower Tester. Verify also that all the assigned User Index values are all different (i.e., unique in the Server).

Steps 8–12:

Verify that the IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends one indication of the User Control Point characteristic with the Response Code Op Code containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for ‘Operation Failed’ (0x04).

UDS/SR/SPU/BV-03-C [Consent]

- Test Purpose

  Verify that the IUT can perform the Consent procedure.

- Reference

  [3] 3.4.2.2

- Initial Condition

  - Perform the test case UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes the Consent Op Code (0x02) to the User Control Point with a Parameter Value that contains the User Index received from the IUT when executing the test case UDS/SR/SPU/BV-01-C [Register New User] followed by 0x04D2 which represents the Consent Code “1234”.
  3. The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02) followed by the Response Value for ‘success’ (0x01) without a Response Parameter.
  4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the User Control Point characteristic handle and value.
  5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
  6. Verify that the characteristic value meets the requirements of the service.
  7. The Lower Tester sends an ATT_Read_Request to read the User Index characteristic.
  8. The Lower Tester receives an ATT_Read_Response with the value of the User Index characteristic.
  9. The Lower Tester sends an ATT_Read_Request to read one of the supported UDS Characteristics.
  10. The Lower Tester receives an ATT_Read_Response with the value of the UDS Characteristic.
  11. Verify that the characteristic value meets the requirements of the service.
  12. The Lower Tester terminates the connection.
  13. The Lower Tester initiates a new connection and starts encryption. If requested by the IUT, the Lower Tester also performs GAP Authentication or GAP Authorization procedures.
  14. The Lower Tester sends an ATT_Read_Request *to* read one of the supported UDS Characteristics.
  15. The IUT sends an ATT_Error_Response with an Error Code set to User Data Access Not Permitted.

- Expected Outcome

  Pass verdict

  Steps 1–12:

  The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends one indication of the User Control Point characteristic with the Response Code Op Code containing valid contents.

  The value of the User Index characteristic is set to the value sent as a parameter of the Consent procedure initiated in step 2 of the Test Procedure.

  The value of the UDS Characteristic meets the requirement of the service.

  Steps 13–15:

  The IUT responds with an appropriate ATT_Error_Response when the Lower Tester attempts to read a UDS Characteristic value.

UDS/SR/SPU/BV-04-C [Delete User Data]

- Test Purpose

  Verify that the IUT can perform the Delete User Data procedure.

- Reference

  [3] 3.4.2.3

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - If not already done, perform the test case UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes the Consent Op Code (0x02) to the User Control Point with a Parameter Value that contains the User Index received from the IUT when executing the test case UDS/SR/SPU/BV-01-C [Register New User] followed by 0x04D2 which represents the Consent Code “1234”.
  3. The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02) followed by the Response Value for ‘success’ (0x01) without a Response Parameter.
  4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the User Control Point characteristic handle and value.
  5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
  6. Verify that the characteristic value meets the requirements of the service.
  7. The Lower Tester sends an ATT_Read_Request to read the User Index characteristic.
  8. The Lower Tester receives an ATT_Read_Response with the value of the User Index characteristic.
  9. The Lower Tester writes the Delete User Data Op Code (0x03) to the User Control Point without Parameter Value.

10. The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x03) followed by the Response Value for ‘success’ (0x01) without a Response Parameter.
11. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the User Control Point characteristic handle and value.
12. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
13. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

  Steps 1–6:

  The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends one indication of the User Control Point characteristic with the Response Code Op Code containing valid contents (i.e., The Response Value is set to “Success”).

  Steps 7–8:

  The value of the User Index characteristic is set to the value sent in step 2 as a parameter to the Consent Op Code.

  Steps 9–13:

  The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends one indication of the User Control Point characteristic with the Response Code Op Code containing valid contents (i.e., The Response Value is set to 0x01 for ’success’).

UDS/SR/SPU/BV-05-C [List All Users – User Name Not Present]

- Test Purpose

  Verify that the Server IUT can perform the List All Users procedure and send the registered users without the user name.

- Reference

  [8] 3.4.2.4

- Initial Condition

  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.
  - The IUT is in a mode that allows the registration of a new user. The IUT does not have any previously registered users.
  - The maximum number of supported users is defined in the IXIT [7].

- Test Procedure

  1. Perform steps 2–5 from UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.
  2. Repeat step 1 to register as many users as the IUT supports. The Lower Tester uses a different Consent Code for each registered user.
  3. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.

4. Within 30 seconds, the Lower Tester expects an indication of the Registered User characteristic containing the Segmentation Header field with First Segment set to ‘1’, Last Segment set to ‘1’ and Rolling Segment Counter set to a valid value and the Registered User Data structure with the Flags field set to 0x00 and the Registered User Index field set to the valid value received at step 1. Register User Name field is not present.
5. Repeat step 4 for all users registered at steps 1–2.
6. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for ‘success’ (0x01) with the Response Parameter set to the maximum number of supported users.

- Expected Outcome

  Pass verdict

  Within 30 seconds from receiving the Write Request, the IUT sends a Write Response to acknowledge the write, followed by one indication of the Registered User characteristic containing valid contents for each user registered by the Lower Tester.

  The IUT, after sending all indications of the Registered User characteristic, sends one indication of the User Control Point characteristic with the valid values from step 6.

UDS/SR/SPU/BV-06-C [List All Users – User Name Present]

- Test Purpose

  Verify that the IUT can perform the List All Users procedure and send the registered users with the user name.

- Reference

  [8] 3.4.2.4

- Initial Condition

  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.
  - The IUT is in a mode that allows the registration of a new user and does not have any users already registered.
  - The maximum number of supported users is defined in the IXIT [7].

- Test Procedure

  1. Perform steps 2–5 from UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.
  2. Perform UDS/SR/SPU/BV-03-C [Consent] prior to writing the First Name and Last Name characteristics.
  3. Execute the following steps as applicable:

     a. If the First Name characteristic is supported, the Lower Tester writes the First Name characteristic value by performing the procedure UDS/SR/CW/BV-01-C [Characteristic Write – First Name].

b. If the Last Name characteristic is supported, the Lower Tester writes the Last Name characteristic value by performing the procedure UDS/SR/CW/BV-02-C [Characteristic Write – Last Name].
c. The resulting Registered User Name is a random string value of a length in the range of 1 to (ATT_MTU – 6).

4. Repeat steps 1–3 to register as many users as the IUT supports. The Lower Tester uses a different Consent Code for each registered user.
5. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.
6. Within 30 seconds, the Lower Tester expects an indication of the Registered User characteristic containing the Segmentation Header field with First Segment set to '1', Last Segment set to '1' and Rolling Segment Counter set to a valid value and the Registered User Data structure with the Registered User Index field set to the valid value received at step 1, the Flags field set to 0x01 (Registered User Name present), and the Registered User Name field set to the user name stored at step 3, or the Flags field set to 0x3 (Registered User Name present and User Name is truncated) and the Registered User Name field set to a truncated part of the user name stored at step 3.
7. Repeat step 6 for all users registered at steps 1–3.
8. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for 'success' (0x01) with the Response Parameter set to the maximum number of supported users.

- Expected Outcome

  Pass verdict

  Within 30 seconds from receiving the Write Request, the IUT sends a Write Response to acknowledge the write, followed by one indication of the Registered User characteristic containing valid contents for each user registered by the Lower Tester.

  The IUT, after sending all indications of the Registered User characteristic, sends one indication of the User Control Point characteristic with the valid values in step 8.

UDS/SR/SPU/BV-07-C [List All Users – No Users]

- Test Purpose

  Verify that the IUT can perform the List All Users procedure when no users are registered.

- Reference

  [8] 3.4.2.4

- Initial Condition

  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.
  - The IUT does not have any registered users.

- Test Procedure

  1. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.
  2. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04)

followed by the Response Value for ‘success’ (0x01) with the Response Parameter set to 0x00 (no users).

- Expected Outcome

  Pass verdict

  Within 30 seconds from receiving the Write Request, the IUT sends a Write Response to acknowledge the request, followed by one indication of the User Control Point characteristic with specified valid values from step 2.

  Within 30 seconds from receiving the Write Request, the IUT does not send any indications of the Registered User characteristic.

UDS/SR/SPU/BV-08-C [List All Users – Segmented User Name Present]

- Test Purpose

  Verify that the IUT can perform the List All Users procedure and send the registered users with a segmented user name.

- Reference

  [8] 3.4.2.4

- Initial Condition

  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.
  - The IUT is in a mode that allows the registration of a new user and does not have any users already registered.

- Test Procedure

  1. Perform steps 2–5 from UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.
  2. Perform UDS/SR/SPU/BV-03-C [Consent] prior to writing the First Name and Last Name characteristics.
  3. Execute the following steps as applicable:
     a. If the First Name characteristic is supported, the Lower Tester writes the First Name characteristic value by performing the procedure UDS/SR/CWL/BV-01-C [Characteristic Write Long – First Name].
     b. If the Last Name characteristic is supported, the Lower Tester writes the Last Name characteristic value by performing the procedure UDS/SR/CWL/BV-02-C [Characteristic Write Long – Last Name].
     c. The resulting Registered User Name is a random string value of a length larger than (ATT_MTU – 5).
  4. Repeat steps 1–3 for another user.
  5. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.
  6. Within 30 seconds, the Lower Tester expects an indication of the Registered User characteristic containing the Segmentation Header field with First Segment set to ‘1’, Last Segment set to ‘0’ and Rolling Segment Counter set to a valid value and the Registered User Data structure with the Registered User Index field set to the valid value received at step 1, the Flags field set to 0x01 (‘Registered User Name present’), and the Registered User Name field set to the partially

registered user name of the first registered user, or the Flags field set to 0x3 (Registered User Name present and User Name is truncated) and the Registered User Name field set to the partially registered truncated user name of the first registered user.

7. Repeat step 6 for the rest of the parts comprising the registered user name for the first user. The First Segment is set to '0' and the Last Segment is set to '1' for the last indication; otherwise, it is set to '0'. The Rolling Segment Counter values are consecutive (with respect to the roll-over value).
8. Repeat steps 6–7 for the user registered at step 4.
9. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for 'success' (0x01) with the Response Parameter set to 0x02.

- Expected Outcome

  Pass verdict

  Within 30 seconds from receiving the Write Request, the IUT sends a Write Response to acknowledge the write, followed by an indication of the Registered User characteristic containing valid contents for each part of the user name registered by the Lower Tester.

  The indications for a user are consecutive and do not interleave with indications from another user. The Rolling Segment Counter values are consecutive (with respect to the roll-over value).

  The IUT, after sending all indications of the Registered User characteristic, sends one indication of the User Control Point characteristic with the values in step 9.

UDS/SR/SPU/BV-09-C [Delete User]

- Test Purpose

  Verify that the IUT can perform the Delete Users procedure for a specific registered user.

- Reference

  [8] 3.4.2.5

- Initial Condition

  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.
  - The IUT is in a mode that allows the registration of a new user and does not have any users already registered.
  - The maximum number of supported users is defined in the IXIT [7].

- Test Procedure

1. Perform steps 2–5 from UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.
2. If the IUT supports more than one user, repeat step 1 to register another user; otherwise, skip to step 8. The Lower Tester uses a different Consent Code.
3. The Lower Tester writes the Delete User Op Code (0x05) to the User Control Point characteristic with the User Index parameter set to the User Index received at step 2.
4. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x05) followed by the Response Value for 'success' (0x01) with the Response Parameter set to the User Index of the deleted user.

5. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.
6. Within 30 seconds, the Lower Tester expects an indication of the Registered User characteristic containing the Segmentation Header field with First Segment set to '1', Last Segment set to '1' and Rolling Segment Counter set to a valid value and the Registered User Data structure with the Flags field set to 0x00 and the Registered User Index field set to the valid value received at step 1. Register User Name field is not present.
7. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for 'success' (0x01) with the Response Parameter set to 0x01.
8. The Lower Tester writes the Delete User Op Code (0x05) to the User Control Point characteristic with the User Index parameter set to the User Index received at step 1.
9. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x05) followed by the Response Value for 'success' (0x01) with the Response Parameter set to the User Index of the deleted user.
10. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.
11. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for 'success' (0x01) with the Response Parameter set to 0x00 (no users).

- Expected Outcome

  Pass verdict

  Within 30 seconds from receiving the Write Request from step 3, the IUT sends a Write Response to acknowledge the write followed by one indication of the User Control Point characteristic with the valid value from step 4.

  Within 30 seconds from receiving the Write Request from step 5, the IUT sends a Write Response to acknowledge the write, followed by one indication of the Registered User characteristic containing valid contents for the second user registered by the Lower Tester.

  The IUT, after sending all indications of the Registered User characteristic, sends one indication of the User Control Point characteristic with the values from step 7.

  Within 30 seconds from receiving the Write Request from step 10, the IUT sends a Write Response to acknowledge the write, followed by one indication of the User Control Point characteristic with the values from step 11.

UDS/SR/SPU/BV-10-C [Delete Users – All Users]

- Test Purpose

  Verify that the IUT can perform the Delete Users procedure for all registered users.

- Reference

  [8] 3.4.2.5

- Initial Condition

  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.

- The IUT is in a mode that allows the registration of a new user and does not have any users already registered.
- The maximum number of supported users is defined in the IXIT [7].

- Test Procedure

1. Perform steps 2–5 from UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.
2. Repeat step 1 to register as many users as the IUT supports. The Lower Tester uses a different Consent Code for each registered user.
3. The Lower Tester writes the Delete User Op Code (0x05) to the User Control Point characteristic with the User Index parameter set to 0xFF (delete all users).
4. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x05) followed by the Response Value for ‘success’ (0x01) with the Response Parameter set to 0xFF.
5. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.
6. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for ‘success’ (0x01) with the Response Parameter set to 0x00 (no users).

- Expected Outcome

Pass verdict

Within 30 seconds from receiving the Write Request, the IUT sends a Write Response to acknowledge the write, followed by one indication of the User Control Point characteristic with the values from step 6.

UDS/SR/SPU/BV-11-C [Delete User – Invalid Parameter]

- Test Purpose

Verify that the IUT responds with an Invalid Operand when a Client initiates the Delete Users procedure with a User Index parameter value for which no registered users exist.

- Reference

[8] 3.4.2.5

- Initial Condition

- Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.
- The IUT is in a mode that allows the registration of a new user and does not have any users already registered.

- Test Procedure

1. Perform steps 2–5 from UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.
2. The Lower Tester writes the Delete User Op Code (0x05) to the User Control Point characteristic with the User Index parameter set to a value different than the User Index received at step 1 or 0xFF.

3. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x05) followed by the Response Value for ‘Invalid Parameter’ (0x03) and no Response Parameter field.
4. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.
5. Within 30 seconds, the Lower Tester expects an indication of the Registered User characteristic containing the Segmentation Header field with First Segment set to ‘1’, Last Segment set to ‘1’ and Rolling Segment Counter set to a valid value and the Registered User Data structure with the Flags field set to 0x00 and the Registered User Index field set to the valid value received at step 1.
6. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for ‘success’ (0x01) with the Response Parameter set to 0x01.

- Expected Outcome

  Pass verdict

  Within 30 seconds from receiving the Write Request from step 2, the IUT sends a Write Response to acknowledge the write, followed by one indication of the User Control Point characteristic with the values from step 3.

  Within 30 seconds from receiving the Write Request from step 4, the IUT sends a Write Response to acknowledge the write, followed by one indication of the Registered User characteristic containing valid contents for the user registered by the Lower Tester.

  The IUT, after sending all indications of the Registered User characteristic, sends one indication of the User Control Point characteristic with the values from step 6.

4.11 Characteristic Write Long

- Test Purpose

  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 4.9, using this generic test procedure.

- Reference

  [3] 3.1.1

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.
  - If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.
  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - The test procedure UDS/SR/SPU/BV-03-C [Consent] is used prior to accessing the user data.

- Test Case Configuration

Test Case	Value (Requirements)
UDS/SR/CWL/BV-01-C [Characteristic Write Long – First Name]	Defined in [6]. ([3] 3.1.1)
UDS/SR/CWL/BV-02-C [Characteristic Write Long – Last Name]	Defined in [6]. ([3] 3.1.1)
UDS/SR/CWL/BV-03-C [Characteristic Write Long – Email Address]	Defined in [6]. ([3] 3.1.1)
UDS/SR/CWL/BV-04-C [Characteristic Write Long – Preferred Units]	Defined in [6].
UDS/SR/CWL/BV-05-C [Characteristic Write Long – Middle Name]	Defined in [6].

Table 4.9: Characteristic Write Long Value test cases

- Test Procedure

  1. The Lower Tester executes the GATT Write Long Characteristic Values sub-procedure.
  2. Verify that the characteristic value meets the requirements of the service.

- Expected Outcome

  Pass verdict

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

4.11.1 Service Procedure – General Error Handling

Verify compliant operation when the Lower Tester uses User Control Point procedure and an error result.

UDS/SR/SPE/BI-01-C [Op Code Not Supported]

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes an unsupported Op Code to the User Control Point.

- Reference

  [3] 3.4.3

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes an Op Code Value of 0x00 to the User Control Point without Parameter Value.
  3. Verify that the IUT response meets the requirements of the service.
  4. The Lower Tester writes an Op Code value from the Reserved for Future Use range other than 0x00 to the User Control Point without Parameter Value.
  5. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  In steps 3 and 5, the IUT sends a Write Response followed by an indication of the User Control Point characteristic with the Response Code Op Code (0x20), the Request Op Code (i.e., 0x00 for step 2

and the RFU value written for step 4) followed by the Response Value for ‘Op Code not supported’ (0x02) and without a Response Parameter.

UDS/SR/SPE/BI-02-C [Invalid Parameter]

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes a supported Op Code followed by an invalid Parameter Value to the User Control Point.

- Reference

  [3] 3.4.3

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes the Register New User Op Code (0x01) to the User Control Point with an invalid Parameter Value (e.g., Consent Code value sent as a Parameter is out of the supported range or its size is different than 4 bytes).
  3. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends a Write Response followed by an indication of the User Control Point characteristic with the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for ‘Invalid Parameter’ (0x03) and without a Response Parameter.

UDS/SR/SPE/BI-03-C [No User Consent]

- Test Purpose

  Verify that the IUT responds appropriately when a Client writes a supported Op Code to the User Control Point for which it is not authorized.

- Reference

  [3] 3.4.3

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes the Delete User Data Op Code (0x03) to the User Control Point without a Parameter Value.
  3. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends a Write Response followed by an indication of the User Control Point characteristic with the Response Code Op Code (0x20), the Request Op Code (0x03) followed by the Response Value for ‘User Not Authorized’ (0x05) and without a Response Parameter.

UDS/SR/SPE/BI-04-C [Client Characteristic Configuration Descriptor Improperly Configured]

- Test Purpose

  Verify that the IUT responds appropriately when a Client attempts to perform a User Control Point procedure with a Client Characteristic Configuration descriptor that is improperly configured.

- Reference

  [3] 3.4.3

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester resets to 0 the Client Characteristic Configuration descriptor of the User Control Point characteristic.
  3. The Lower Tester writes a valid Op Code to the User Control Point.
  4. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT rejects the Write Request by sending an Error Response with an Attribute Protocol Error Code set to Client Characteristic Configuration Descriptor Improperly Configured (0xFD).

UDS/SR/SPE/BI-05-C [Procedure Already In Progress]

- Test Purpose

  Verify that the IUT responds appropriately when a Client attempts to perform a User Control Point procedure when a procedure is already in progress.

- Reference

  [3] 3.4.3

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester sets to 0x0002 the Client Characteristic Configuration descriptor of the User Control Point characteristic.

3. The Lower Tester writes a valid Op Code (e.g., by executing test case UDS/SR/SPU/BV-01-C [Register New User] or by other means) to the User Control Point.
4. The Lower Tester receives one Indication of the User Control Point to acknowledge the first request. The Lower Tester does not send any Confirmation to acknowledge this Indication.
5. The Lower Tester sends five consecutive write requests all with valid Op Code to the User Control Point.
6. There are two alternatives:
    a. The Lower Tester receives an Error Response with an Attribute Protocol Application Error Code set to 'Procedure Already In Progress' (0xFE).
    b. The Lower Tester receives five indications of the User Control Point to acknowledge each request sent by Lower Tester in step 5. To receive the five indications, the Lower Tester sends a confirmation after receiving each indication.
7. Verify that the IUT response(s) meet the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT acknowledges the first write request with appropriate Response Value.

  The IUT successfully performs one of the following alternatives (a or b):

    a. Rejects a Write Request in step 5 by sending an Error Response with an Attribute Protocol Application Error Code set to Procedure Already In Progress (0x80).
    b. Acknowledges all five write requests with appropriate Response Values.

UDS/SR/SPE/BI-06-C [User Control Point Procedure Timeout]

- Test Purpose

  Verify that the IUT stops sending indications related to the operation after an ATT Transaction Timeout.

- Reference

  [3] 3.4.4

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.

- Test Procedure

1. A connection is established between the Lower Tester and IUT.
2. The Lower Tester writes the Register New User Op Code (0x01) to the User Control Point with a Parameter Value of 0x04D2 which represents the Consent Code "1234".
3. The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for 'success' (0x01) with an appropriate Response Parameter.
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the User Control Point characteristic handle and value.

5. The Lower Tester receives the indication but does not send a *Handle Value Confirmation* for an ATT Transaction Timeout plus several seconds.
6. After the ATT Transaction Timeout, and if the Lower Tester is still connected to the IUT, the Lower Tester performs a GATT procedure (e.g., GATT Read procedure to read a UDS characteristic value). The IUT does not send any response and considers the procedure to have failed.

- Expected Outcome

  Pass verdict

  The IUT stops sending any further response to the GATT procedure initiated by the IUT after the ATT Transaction Timeout.

  The IUT returns to a stable state and may disconnect based on implementation.

UDS/SR/SPE/BI-07-C [Consent Procedure Failed – Incorrect Consent Code]

- Test Purpose

  Verify that the IUT responds appropriately when a Client attempts to use the Consent procedure with an incorrect Consent Code.

- Reference

  [3] 3.4.3

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - Perform the test case UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes the Consent Op Code (0x02) to the User Control Point with a Parameter Value that contains the User Index received from the IUT when executing the test case UDS/SR/SPU/BV-01-C [Register New User] followed by 0x162E which represents the Consent Code “5678”.
  3. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT sends a Write Response followed by an indication of the User Control Point characteristic with the Response Code Op Code (0x20), the Request Op Code (0x02) followed by the Response Value for ‘User Not Authorized’ (0x05) and without a Response Parameter.

UDS/SR/SPE/BI-08-C [Consent Procedure Failed – Maximum Consent Tries Reached]

- Test Purpose

  Verify that the IUT responds appropriately when a Client reaches the maximum number of consent attempts with a wrong Consent Code.

- Reference

  [3] 3.4.3

- Initial Condition

  - Enable the IUT for use with the User Control Point by performing the preamble described in Section 4.2.3.
  - Perform the test case UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.

- Test Procedure

  1. A connection is established between the Lower Tester and IUT.
  2. The Lower Tester writes the Consent Op Code (0x02) to the User Control Point with a Parameter Value that contains the User Index received from the IUT when executing the test case UDS/SR/SPU/BV-01-C [Register New User] followed by 0x162E which represents the Consent Code “5678”. This step is repeated the maximum number of authorized attempts supported by the IUT as defined in the IXIT [7].
  3. The Lower Tester writes the Consent Op Code (0x02) to the User Control Point with a Parameter Value that contains the User Index received from the IUT when executing the test case UDS/SR/SPU/BV-01-C [Register New User] followed by 0x162E which represents the Consent Code “5678”.
  4. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  Step 2:

  Each time the Lower Tester writes the Consent Op Code to the User Control Point, the IUT sends a Write Response followed by an indication of the User Control Point characteristic with the Response Code Op Code (0x20), the Request Op Code (0x02) followed by the Response Value for ‘User Not Authorized’ (0x05) and without a Response Parameter.

  Step 3:

  The IUT sends a Write Response followed by an indication of the User Control Point characteristic with the Response Code Op Code (0x20), the Request Op Code (0x02) followed by the Response Value for ‘Operation Failed’ (0x04) and without a Response Parameter.

4.11.1.1 Op Code Not Supported – Optional Procedures

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the IUT responds appropriately when a Client writes an unsupported optional Op Code to the User Control Point. The verification is performed one value at a time, as enumerated in the test cases in Table 4.10 below, using this generic test procedure.

- Reference

  [8] 3.4.1

- Initial Condition
  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.
  - The IUT does not have any registered users.
- Test Case Configuration

Test Case	Value
UDS/SR/SPE/BI-09-C [Op Code Not Supported – List All Users]	0x04 (see [8] 3.4.1)
UDS/SR/SPE/BI-10-C [Op Code Not Supported – Delete Users]	0x05 (see [8] 3.4.1)

Table 4.10: Op Code Not Supported – Optional Procedures test cases

- Test Procedure
  1. The Lower Tester writes the opcode value from Table 4.10 to the User Control Point characteristic.
  2. The Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code from Table 4.10 followed by the Response Value for 'Op Code Not Supported' (0x02) and no Response Parameter field.
- Expected Outcome

  Pass verdict

  The IUT, after sending a Write Response to acknowledge the write, sends one indication of the User Control Point characteristic with the values from step 2.

UDS/SR/SPE/BI-11-C [Procedure Already In Progress – List All Users]

- Test Purpose

  Verify that the IUT responds with Procedure Already in Progress when a Client initiates another procedure while the List All Users procedure is in progress.
- Reference

  [8] 3.4.2.4
- Initial Condition
  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.
  - The IUT is in a mode that allows the registration of a new user and does not have any users already registered.
- Test Procedure
  1. Perform steps 2–5 from UDS/SR/SPU/BV-01-C [Register New User] to register a new user in the IUT.
  2. Perform UDS/SR/SPU/BV-03-C [Consent] prior to writing the First Name and/or Last Name characteristics.
  3. If the First Name characteristic is supported and/or the Last Name characteristic is supported, the Lower Tester writes the First Name characteristic value by performing the procedure UDS/SR/CW/BV-01-C [Characteristic Write – First Name] and/or the Last Name characteristic value by performing the procedure UDS/SR/CW/BV-02-C [Characteristic Write – Last Name]. The

resulting Registered User Name is a random string value of a length in the range of 1 to (ATT_MTU – 6).
4. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.
5. Within 30 seconds, the Lower Tester expects an indication of the Registered User characteristic containing the Registered User Data structure but does not send any confirmation.
6. Repeat step 4.
7. The Lower Tester expects to receive an Error Response with an Attribute Protocol Application Error Code set to 'Procedure Already in Progress' (0xFE).
8. The Lower Tester sends the confirmation and expects one Registered User indication.
9. Within 30 seconds, the Lower Tester expects an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for 'success' (0x01) with the Response Parameter set to 0x01.

- Expected Outcome

  Pass verdict

  The IUT acknowledges the first write request with an appropriate Response Value.

  The IUT rejects a Write Request in step 6 by sending an Error Response with an Attribute Protocol Application Error Code set to 'Procedure Already in Progress' (0xFE).

  The IUT sends a Registered User indication for the registered user and the User Control Point indication with the values in step 9.

UDS/SR/SPE/BI-12-C [Registered User Name Client Characteristic Configuration Descriptor Improperly Configured]

- Test Purpose

  Verify that the IUT responds appropriately when a Client attempts to perform a List All Users procedure when the Registered Users Client Characteristic Configuration is improperly configured.

- Reference

  [8] 3.4.3

- Initial Condition

  - Enable the IUT for use with the User Control Point and Registered User characteristic by performing the preamble described in Section 4.2.4.

- Test Procedure

  1. The Lower Tester resets to 0 the Client Characteristic Configuration descriptor of the Registered User Name characteristic.
  2. The Lower Tester writes the List All Users Op Code (0x04) to the User Control Point characteristic.

- Expected Outcome

  Pass verdict

  The IUT rejects the Write Request by sending an Error Response with an Attribute Protocol Application Error Code set to 'Client Characteristic Configuration Descriptor Improperly Configured' (0xFD).

5 Test case mapping

The Test Case Mapping Table (TCMT) maps test cases to specific requirements in the ICS. The IUT will 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 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 UDS [4].

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

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. Further details about the function of the TCMT are elaborated in [1].

For the purpose and structure of the ICS/IXIT, refer to [1].

Item	Feature	Test Case(s)
UDS 4/1	Database Change Increment	UDS/SR/CR/BV-27-C UDS/SR/CW/BV-27-C UDS/SR/CW/BI-27-C
UDS 2/1 OR UDS 2/2	Discover User Data Service	UDS/SR/SGGIT/SER/BV-01-C
UDS 2/1	User Data Service – SDP Record	UDS/SR/SGGIT/SDP/BV-01-C
UDS 4/4	First Name Characteristic	UDS/SR/SGGIT/CHA/BV-01-C UDS/SR/CR/BV-01-C UDS/SR/CR/BI-01-C UDS/SR/CW/BV-01-C UDS/SR/CW/BI-01-C
UDS 4/4 AND UDS 3/2	First Name Characteristic – Read Long and Write Long sub-procedure support	UDS/SR/CRL/BV-01-C UDS/SR/CWL/BV-01-C
UDS 4/5	Last Name Characteristic	UDS/SR/SGGIT/CHA/BV-02-C UDS/SR/CR/BV-02-C UDS/SR/CR/BI-02-C UDS/SR/CW/BV-02-C UDS/SR/CW/BI-02-C
UDS 4/5 AND UDS 3/2	Last Name Characteristic – Read Long and Write Long sub-procedure support	UDS/SR/CRL/BV-02-C UDS/SR/CWL/BV-02-C
UDS 4/6	Email Address Characteristic	UDS/SR/SGGIT/CHA/BV-03-C UDS/SR/CR/BV-03-C UDS/SR/CR/BI-03-C UDS/SR/CW/BV-03-C UDS/SR/CW/BI-03-C
UDS 4/6 AND UDS 3/2	Email Address Characteristic – Read Long and Write Long sub-procedure support	UDS/SR/CRL/BV-03-C UDS/SR/CWL/BV-03-C

Item	Feature	Test Case(s)
UDS 4/7	Age Characteristic	UDS/SR/SGGIT/CHA/BV-04-C UDS/SR/CR/BV-04-C UDS/SR/CR/BI-04-C UDS/SR/CW/BV-04-C UDS/SR/CW/BI-04-C
UDS 4/8	Gender Characteristic	UDS/SR/SGGIT/CHA/BV-05-C UDS/SR/CR/BV-05-C UDS/SR/CR/BI-05-C UDS/SR/CW/BV-05-C UDS/SR/CW/BI-05-C
UDS 4/9	Weight Characteristic	UDS/SR/SGGIT/CHA/BV-06-C UDS/SR/CR/BV-06-C UDS/SR/CR/BI-06-C UDS/SR/CW/BV-06-C UDS/SR/CW/BI-06-C
UDS 4/10	Height Characteristic	UDS/SR/SGGIT/CHA/BV-07-C UDS/SR/CR/BV-07-C UDS/SR/CR/BI-07-C UDS/SR/CW/BV-07-C UDS/SR/CW/BI-07-C
UDS 4/11	VO2 Max Characteristic	UDS/SR/SGGIT/CHA/BV-08-C UDS/SR/CR/BV-08-C UDS/SR/CR/BI-08-C UDS/SR/CW/BV-08-C UDS/SR/CW/BI-08-C
UDS 4/12	Heart Rate Max Characteristic	UDS/SR/SGGIT/CHA/BV-09-C UDS/SR/CR/BV-09-C UDS/SR/CR/BI-09-C UDS/SR/CW/BV-09-C UDS/SR/CW/BI-09-C
UDS 4/13	Resting Heart Rate Characteristic	UDS/SR/SGGIT/CHA/BV-10-C UDS/SR/CR/BV-10-C UDS/SR/CR/BI-10-C UDS/SR/CW/BV-10-C UDS/SR/CW/BI-10-C
UDS 4/14	Maximum Recommended Heart Rate Characteristic	UDS/SR/SGGIT/CHA/BV-11-C UDS/SR/CR/BV-11-C UDS/SR/CR/BI-11-C UDS/SR/CW/BV-11-C UDS/SR/CW/BI-11-C
UDS 4/15	Aerobic Threshold Characteristic	UDS/SR/SGGIT/CHA/BV-12-C UDS/SR/CR/BV-12-C UDS/SR/CR/BI-12-C UDS/SR/CW/BV-12-C UDS/SR/CW/BI-12-C

Item	Feature	Test Case(s)
UDS 4/16	Anaerobic Threshold Characteristic	UDS/SR/SGGIT/CHA/BV-13-C UDS/SR/CR/BV-13-C UDS/SR/CR/BI-13-C UDS/SR/CW/BV-13-C UDS/SR/CW/BI-13-C
UDS 4/17	Sport Type for Aerobic and Anaerobic Thresholds Characteristic	UDS/SR/SGGIT/CHA/BV-14-C UDS/SR/CR/BV-14-C UDS/SR/CR/BI-14-C UDS/SR/CW/BV-14-C UDS/SR/CW/BI-14-C
UDS 4/18	Date of Threshold Assessment Characteristic	UDS/SR/SGGIT/CHA/BV-15-C UDS/SR/CR/BV-15-C UDS/SR/CR/BI-15-C UDS/SR/CW/BV-15-C UDS/SR/CW/BI-15-C
UDS 4/19	Waist Circumference Characteristic	UDS/SR/SGGIT/CHA/BV-16-C UDS/SR/CR/BV-16-C UDS/SR/CR/BI-16-C UDS/SR/CW/BV-16-C UDS/SR/CW/BI-16-C
UDS 4/20	Hip Circumference Characteristic	UDS/SR/SGGIT/CHA/BV-17-C UDS/SR/CR/BV-17-C UDS/SR/CR/BI-17-C UDS/SR/CW/BV-17-C UDS/SR/CW/BI-17-C
UDS 4/21	Fat Burn Heart Rate Lower Limit Characteristic	UDS/SR/SGGIT/CHA/BV-18-C UDS/SR/CR/BV-18-C UDS/SR/CR/BI-18-C UDS/SR/CW/BV-18-C UDS/SR/CW/BI-18-C
UDS 4/22	Fat Burn Heart Rate Upper Limit Characteristic	UDS/SR/SGGIT/CHA/BV-19-C UDS/SR/CR/BV-19-C UDS/SR/CR/BI-19-C UDS/SR/CW/BV-19-C UDS/SR/CW/BI-19-C
UDS 4/23	Aerobic Heart Rate Lower Limit Characteristic	UDS/SR/SGGIT/CHA/BV-20-C UDS/SR/CR/BV-20-C UDS/SR/CR/BI-20-C UDS/SR/CW/BV-20-C UDS/SR/CW/BI-20-C
UDS 4/24	Aerobic Heart Rate Upper Limit Characteristic	UDS/SR/SGGIT/CHA/BV-21-C UDS/SR/CR/BV-21-C UDS/SR/CR/BI-21-C UDS/SR/CW/BV-21-C UDS/SR/CW/BI-21-C

Item	Feature	Test Case(s)
UDS 4/25	Anaerobic Heart Rate Lower Limit Characteristic	UDS/SR/SGGIT/CHA/BV-22-C UDS/SR/CR/BV-22-C UDS/SR/CR/BI-22-C UDS/SR/CW/BV-22-C UDS/SR/CW/BI-22-C
UDS 4/26	Anaerobic Heart Rate Upper Limit Characteristic	UDS/SR/SGGIT/CHA/BV-23-C UDS/SR/CR/BV-23-C UDS/SR/CR/BI-23-C UDS/SR/CW/BV-23-C UDS/SR/CW/BI-23-C
UDS 4/27	Five Zone Heart Rate Limits Characteristic	UDS/SR/SGGIT/CHA/BV-24-C UDS/SR/CR/BV-24-C UDS/SR/CR/BI-24-C UDS/SR/CW/BV-24-C UDS/SR/CW/BI-24-C
UDS 4/28	Three Zone Heart Rate Limits Characteristic	UDS/SR/SGGIT/CHA/BV-25-C UDS/SR/CR/BV-25-C UDS/SR/CR/BI-25-C UDS/SR/CW/BV-25-C UDS/SR/CW/BI-25-C
UDS 4/29	Two Zone Heart Rate Limit Characteristic	UDS/SR/SGGIT/CHA/BV-26-C UDS/SR/CR/BV-26-C UDS/SR/CR/BI-26-C UDS/SR/CW/BV-26-C UDS/SR/CW/BI-26-C
UDS 4/30	Date of Birth Characteristic	UDS/SR/SGGIT/CHA/BV-31-C UDS/SR/CR/BV-29-C UDS/SR/CR/BI-28-C UDS/SR/CW/BV-28-C UDS/SR/CW/BI-28-C
UDS 4/31	Language	UDS/SR/SGGIT/CHA/BV-32-C UDS/SR/CR/BV-30-C UDS/SR/CR/BI-29-C UDS/SR/CW/BV-29-C UDS/SR/CW/BI-29-C
UDS 4/1 AND NOT UDS 3/3	Database Change Increment Characteristic with no support for notification	UDS/SR/SGGIT/CHA/BV-27-C
UDS 4/1 AND UDS 3/3	Database Change Increment Characteristic with support for notification	UDS/SR/SGGIT/CHA/BV-28-C UDS/SR/CON/BV-01-C UDS/SR/CN/BV-01-C
UDS 4/1 AND UDS 3/1	Multiple Clients Support	UDS/SR/CN/BV-02-C
UDS 4/2	User Index Characteristic	UDS/SR/SGGIT/CHA/BV-29-C UDS/SR/CR/BV-28-C

Item	Feature	Test Case(s)
UDS 4/3	User Control Point Characteristic	UDS/SR/SGGIT/CHA/BV-30-C UDS/SR/CON/BV-02-C UDS/SR/SPU/BV-01-C UDS/SR/SPU/BV-02-C UDS/SR/SPU/BV-03-C UDS/SR/SPU/BV-04-C UDS/SR/SPE/BI-01-C UDS/SR/SPE/BI-02-C UDS/SR/SPE/BI-03-C UDS/SR/SPE/BI-04-C UDS/SR/SPE/BI-05-C UDS/SR/SPE/BI-06-C UDS/SR/SPE/BI-07-C UDS/SR/SPE/BI-08-C
UDS 4/32	Registered User Characteristic	UDS/SR/SGGIT/CHA/BV-33-C UDS/SR/CON/BV-03-C UDS/SR/SPE/BI-12-C
UDS 3/4	List All Users Procedure – No Users	UDS/SR/SPU/BV-07-C
UDS 3/4 AND (UDS 4/4 OR UDS 4/5)	List All Users Procedure – Already In Progress	UDS/SR/SPE/BI-11-C
UDS 3/4 AND (NOT UDS 3/6)	List All Users Procedure – User Name Not Present	UDS/SR/SPU/BV-05-C
UDS 3/6 AND (UDS 4/4 OR UDS 4/5)	Expose User Names Feature	UDS/SR/SPU/BV-06-C UDS/SR/SPU/BV-08-C
UDS 3/5	Delete Users Procedure	UDS/SR/SPU/BV-09-C UDS/SR/SPU/BV-10-C UDS/SR/SPU/BV-11-C
UDS 0/2 AND NOT UDS 3/4	List All Users Procedure Not Supported	UDS/SR/SPE/BI-09-C
UDS 0/2 AND NOT UDS 3/5	Delete Users Procedure Not Supported	UDS/SR/SPE/BI-10-C
UDS 4/33	Preferred Units Characteristic	UDS/SR/SGGIT/CHA/BV-34-C UDS/SR/CR/BV-31-C UDS/SR/CR/BI-30-C UDS/SR/CW/BV-30-C UDS/SR/CW/BI-30-C
UDS 4/33 AND UDS 3/2	Preferred Units Characteristic – Read Long and Write Long sub-procedure support	UDS/SR/CRL/BV-04-C UDS/SR/CWL/BV-04-C
UDS 4/34	High Resolution Height Characteristic	UDS/SR/SGGIT/CHA/BV-35-C UDS/SR/CR/BV-32-C UDS/SR/CR/BI-31-C UDS/SR/CW/BV-31-C UDS/SR/CW/BI-31-C

Item	Feature	Test Case(s)
UDS 4/35	Middle Name Characteristic	UDS/SR/SGGIT/CHA/BV-36-C UDS/SR/CR/BV-33-C UDS/SR/CR/BI-32-C UDS/SR/CW/BV-32-C UDS/SR/CW/BI-32-C
UDS 4/35 AND UDS 3/2	Middle Name Characteristic – Read Long and Write Long sub-procedure support	UDS/SR/CRL/BV-05-C UDS/SR/CWL/BV-05-C
UDS 4/36	Stride Length Characteristic	UDS/SR/SGGIT/CHA/BV-37-C UDS/SR/CR/BV-34-C UDS/SR/CR/BI-33-C UDS/SR/CW/BV-33-C UDS/SR/CW/BI-33-C
UDS 4/37	Handedness Characteristic	UDS/SR/SGGIT/CHA/BV-38-C UDS/SR/CR/BV-35-C UDS/SR/CR/BI-34-C UDS/SR/CW/BV-34-C UDS/SR/CW/BI-34-C
UDS 4/38	Device Wearing Position Characteristic	UDS/SR/SGGIT/CHA/BV-39-C UDS/SR/CR/BV-36-C UDS/SR/CR/BI-35-C UDS/SR/CW/BV-35-C UDS/SR/CW/BI-35-C
UDS 4/39	Four Zone Heart Rate Limits Characteristic	UDS/SR/SGGIT/CHA/BV-40-C UDS/SR/CR/BV-37-C UDS/SR/CR/BI-36-C UDS/SR/CW/BV-36-C UDS/SR/CW/BI-36-C
UDS 4/40	High Intensity Exercise Threshold Characteristic	UDS/SR/SGGIT/CHA/BV-41-C UDS/SR/CR/BV-38-C UDS/SR/CR/BI-37-C UDS/SR/CW/BV-37-C UDS/SR/CW/BI-37-C
UDS 4/41	Activity Goal Characteristic	UDS/SR/SGGIT/CHA/BV-42-C UDS/SR/CR/BV-39-C UDS/SR/CR/BI-38-C UDS/SR/CW/BV-38-C UDS/SR/CW/BI-38-C
UDS 4/42	Sedentary Interval Notification Characteristic	UDS/SR/SGGIT/CHA/BV-43-C UDS/SR/CR/BV-40-C UDS/SR/CR/BI-39-C UDS/SR/CW/BV-39-C UDS/SR/CW/BI-39-C

Item	Feature	Test Case(s)
UDS 4/43	Caloric Intake Characteristic	UDS/SR/SGGIT/CHA/BV-44-C UDS/SR/CR/BV-41-C UDS/SR/CR/BI-40-C UDS/SR/CW/BV-40-C UDS/SR/CW/BI-40-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2014-06-10	Adopted by Bluetooth SIG Board of Directors.
	1.0.1r00	2015-10-01	TSE 6569: Removed TP/CR/BI-27-C in Section 4.7.1 and Section 5.
1	1.0.1	2015-12-22	Prepared for TCRL 2015-2 publication.
	1.0.2r00	2016-05-26	Converted to new Test Case ID conventions as defined in TSTO v4.1.
2	1.0.2	2016-07-14	Prepared for TCRL 2016-1 publication.
3	1.0.3r00	2019-04-25	TSE 11188 (rating 4): Updated the template for this doc. Added “Service Characteristic – Database Change Increment” section, which incorporates existing test case UDS/SR/CN/BV-01-C and new test case UDS/SR/CN/BV-02-C; updated the TCMT accordingly.
	1.1.0r00–r04	2019-07-12 – 2019-09-26	Incorporated UDS 1.1 CR to account for new features specified in the User Data Service 1.1 Specification. New features: ○ Registered User Characteristic ○ User Control Point – List All Users procedure ○ User Control Point – Delete User(s) procedure Added test cases UDS/SR/DEC/BV/33-C, UDS/SR/DES/BV-03-C, UDS/SR/CON/BV-03-C, UDS/SR/SPE/BI-09-C – -12-C, and UDS/SR/SPU/BV-05-C – -11-C; updated TCMT accordingly. In TCMT UDS/SR/DES/BV-33-C replaced with UDS/SR/DES/BV-03-C. TSE 12734: Updates in TCMT.
	1.1.0r04	2019-10-06	Approved by BTI.
	1.1.0	2019-10-15	UDS 1.1 specification adopted by the Board of Directors.
4	1.1.0	2019-10-22	Prepared for publication.
	p5r00	2020-11-25	TSE 13105 (rating 4): Added a reference to the GATT Specification Supplement; added new TCs UDS/SR/DEC/BV-34-C – -44-C to Characteristics Declarations test case table; added new TCs UDS/SR/CR/BV-31-C – -41-C to Characteristic Read Value test case table; added new TCs UDS/SR/CR/BI-30-C – -40-C to Characteristic Read – Without User Consent test case table; added new TCs UDS/SR/CRL/BV-04-C – -06-C to Characteristic Read Long test case table; added new TCs UDS/SR/CW/BV-30-C – -40-C to Characteristic Write test case table; added new TCs UDS/SR/CW/BI-30-C – -40-C to Characteristic Write – Without User Consent test case table; added new TCs

Publication Number	Revision Number	Date	Comments
			UDS/SR/CWL/BV-04-C – -06-C to Characteristic Write Long test case table. Updated TCMT accordingly. Made many template-related editorials, including adding Publication Number column and setting previous v1.1.0 to p4, updating logo in footer, adding Heading 8 and 9 styles and updating TCIDs and TOC accordingly, updating Conformance and Pass/Fail Verdict sections' text, moving Test Case tables to the appropriate location in the test per the latest template.
5	p5	2020-12-22	Approved by BTI on 2020-12-02. Prepared for TCRL 2020-1 publication.
	p6r00	2021-03-29	TSE 15514 (rating 2): Addressed an issue with SPU test cases by updating step numbers, adding a test step, and/or performing minor editorials for TCs UDS/SR/SPU/BV-05-C, 06-C, 08-C – 11-C, and /BI-11-C. TSE 16225 (rating 2): Removed TCs UDS/SR/CRL/BV-06-C and UDS/SR/CWL/BV-06-C because "long" operations testing isn't required for uint8. Updated TCMT accordingly.
6	p6	2021-07-13	Approved by BTI on 2021-06-03. Prepared for TCRL 2021-1 publication.
	p7r00–r01	2022-03-16 – 2022-05-04	TSE 17272 (rating 2): Converted tests to GGIT: the new GGIT TCIDs are UDS/SR/SGGIT/CHA/BV-01-C – -44-C, UDS/SR/SGGIT/SDP/BV-01-C, and UDS/SR/SGGIT/SER/BV-01-C, and the deleted TCIDs are UDS/SR/SD/BV-01-C and -02-C, UDS/SR/DEC/BV-01-C – -44-C, and UDS/SR/DES/BV-01-C – -03-C. Updated the "Test groups" section and added the GGIT material to the TCID conventions section. Updated cross-references to point to the new GATT Integrated Tests section globally. Updated the TCMT accordingly. TSE 18440 (rating 1): Removed direct references to GATT test cases from: UDS/SR/CR/BV-01-C – -41-C, UDS/SR/CR/BI-01-C – -26-C and -28-C – -40-C, UDS/SR/CRL/BV-01-C – -05-C, UDS/SR/CW/BV-01-C – -40-C, UDS/SR/CW/BI-01-C – -40-C, UDS/SR/CWL/BV-01-C – -05-C, and UDS/SR/CON/BV-01-C – -03-C. Removed direct references to the GATT TS in the ATT Bearer preambles. TSE 18726 (rating 1): Editorials to align the document with the latest TS template in anticipation of a future .Z release. Performed template-related formatting fixes. Aligned copyright page with v2 of the DNMD. Fixed broken cross-reference in Sections 4.10.2 and 4.11.
7	p7	2022-06-28	Approved by BTI on 2022-05-31. Prepared for TCRL 2022-1 publication.

Acknowledgments

Name	Company
Alexandru Andreescu	Bluetooth SIG, Inc.
Dejan Berec	Bluetooth SIG, Inc.
Jawid Mirani	Bluetooth SIG, Inc.
Florin Toma	Bluetooth SIG, Inc.
Bob Hughes	Intel
Guillaume Schatz	Polar