Generic Health Sensor Profile (GHSP)

***Bluetooth*® Test Suite**

- **Revision:** GHSP.TS.p2
- **Revision Date:** 2025-02-18
- **Prepared By:** Medical Devices Working Group
- **Published during TCRL:** TCRL.2025-1

Contents

1 Scope

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

2 References, definitions, and abbreviations

2.1 References

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

[1] Bluetooth Core Specification, Version 5.4 or later

[2] Test Strategy and Terminology Overview

[3] Generic Health Sensor Profile Specification, Version 1.0

[4] Generic Health Sensor Service Specification, Version 1.0

[5] Device Information Service Specification, Version 1.2 or later

[6] Elapsed Time Service Specification, Version 1.0

[7] Battery Service Specification, Version 1.0 or later

[8] Reconnection Configuration Service Specification, Version 1.0 or later

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

[10] Generic Health Sensor Service Test Suite, GHSS.TS

[11] ICS Proforma for Generic Health Sensor Profile

[12] IXIT Proforma for Generic Health Sensor Profile

[13] GATT Test Suite, GATT.TS

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 GHSP requires the presence of ATT, GAP, GATT, SDP (for BR/EDR), and SM (for LE). This is illustrated in Figure 3.1.

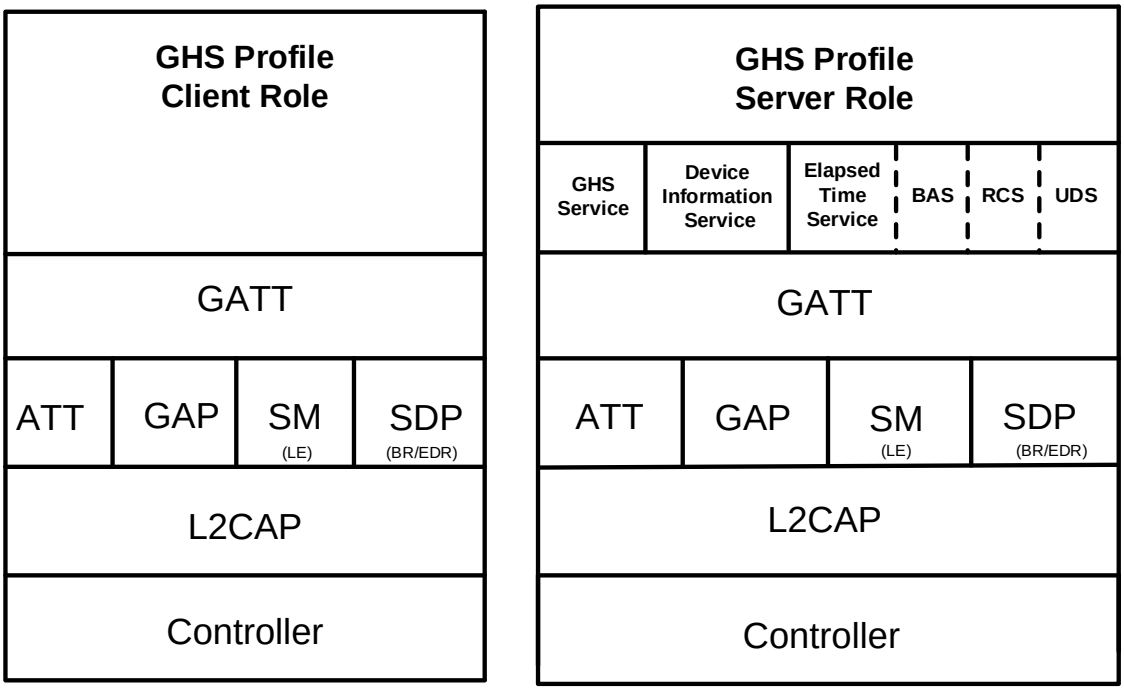

Figure 3.1: Generic Health Sensor test models

3.2 Test Strategy

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

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

This Test Suite relies on IXIT values that are described in the respective test cases that make use of the IXIT value.

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.

Certain tests in this Test Suite require two independent Lower Testers to be run concurrently against the IUT.

3.3 Test groups

The following test groups have been defined:

- Generic GATT Integrated Tests
- GHS Server Role Requirements
- Characteristic Read
- Characteristic and Characteristic Descriptor Write
- Configure Indication and Notification
- GHS Control Point Procedures
- User Data Service Procedures
- Receive Characteristics Indication and Notification
- Record Access Control Point (RACP) Procedures
- Elapsed Time Service (ETS) Procedures
- Battery Service (BAS) Procedures
- Service Error Handling
- GHS Server Time Management
- GHS Server Trusted Relationships

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

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

Additionally, testing of this specification includes tests from the GATT Test Suite [13] referred to as Generic GATT Integrated Tests (GGIT); when used, the test cases in GGIT are referred to through a TCID string using the following convention:
<spec abbreviation>/<IUT role>/<GGIT test group>/< GGIT class >/<xx>-<nn>-<y>.

Identifier Abbreviation	**Spec Identifier <spec abbreviation>**
GHSP	Generic Health Sensor Profile
Identifier Abbreviation	**Role Identifier <IUT role>**
CL	Client Role
SR	Server Role
Identifier Abbreviation	**Reference Identifier <GGIT test group>**
CGGIT	Client Generic GATT Integrated Tests
SGGIT	Server Generic GATT Integrated Tests
Identifier Abbreviation	**Reference Identifier <GGIT class>**
CHA	Characteristic
DES	Descriptor
SDPNF	SDP Record Not Found
SER	Service
Identifier Abbreviation	**Features and Behaviors Identifier <feat>**
BAS	Battery Service procedures
CDWR	Characteristic Descriptor Write and Read (Configure Indication and Notification)
CR	Characteristic Read
DW	Descriptor Write
ETS	Elapsed Time Service procedures
GCP	GHS Control Point
GHSF	GHS Features
GHST	GHS Trust Relationships
RAA	RACP Abort Operation procedure
RAC	RACP Combined Report procedure
RAD	RACP Delete Stored Records procedure
RAN	RACP Report Number of Stored Records procedure
SCI	Service Characteristic Indications
SCIN	Service Characteristic Indications or Notifications
SCN	Service Characteristic Notifications
SPE	Service Procedure – Error Handling

Identifier Abbreviation	Spec Identifier <spec abbreviation>
TM	Time Management
UDS	User Data Service procedures

Table 4.1: GHSP TC feature naming conventions

4.1.2 Conformance

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

The Bluetooth Qualification Program may employ tests to verify implementation robustness. The level of implementation robustness that is verified varies from one specification to another and may be revised for cause based on interoperability issues found in the market.

Such tests may verify:

- That claimed capabilities may be used in any order and any number of repetitions not excluded by the specification
- That capabilities enabled by the implementations are sustained over durations expected by the use case
- That the implementation gracefully handles any quantity of data expected by the use case
- That in cases where more than one valid interpretation of the specification exists, the implementation complies with at least one interpretation and gracefully handles other interpretations
- That the implementation is immune to attempted security exploits

A single execution of each of the required tests is required to constitute a Pass verdict. However, it is noted that to provide a foundation for interoperability, it is necessary that a qualified implementation consistently and repeatedly pass any of the applicable tests.

In any case, where a member finds an issue with the test plan generated by the Bluetooth SIG qualification tool, with the test case as described in the Test Suite, or with the test system utilized, the member is required to notify the responsible party via an erratum request such that the issue may be addressed.

4.1.3 Pass/Fail verdict conventions

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

The convention in this Test Suite is that, unless there is a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon as one of the pass criteria conditions cannot be met. If this occurs, then the outcome of the test is a Fail verdict.

4.2 Setup preambles

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

4.2.1 ATT Bearer on LE transport

- 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 an L2CAP channel (PSM 0x001F) between the IUT and the Lower Tester over that BR/EDR transport.

4.2.3 Start sending live observations

- Preamble Purpose

  This preamble procedure specifies how the IUT acting as a GHS Client enables the start of sending live observations in the GHS Server.

- Preamble Procedure

  1. The Upper Tester sends a command to the IUT to write the Start sending live observations opcode value (0x01) to the GHS Control Point characteristic.
  2. The IUT sends an ATT_WRITE_REQ PDU to the GHS Control Point characteristic of the Lower Tester, using the opcode provided by the Upper Tester in Step 1.
  3. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU indicating that it has accepted the opcode.
  4. The Lower Tester sends the IUT an ATT_HANDLE_VALUE_IND PDU of the GHS Control Point characteristic with code Success (0x80).
  5. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

4.2.4 Register New User by Lower Tester

- Preamble Purpose

  This preamble procedure specifies how the Lower Tester acting as a Client registers a new user in the GHS Server.

- Preamble Procedure

  1. The Lower Tester writes the User Control Point characteristic with the Register New User opcode value of 0x01 and a Consent Code parameter value.
  2. The IUT sends an ATT_WRITE_RSP PDU indicating that it has accepted the opcode.
  3. The IUT sends an indication of the User Control Point characteristic containing the Response Code opcode (0x20), the Request opcode (0x01) followed by the Response Value for Success (0x01) and Response parameter set to a value assigned by the IUT representing the User Index.

4.2.5 Register New User by IUT

- Preamble Purpose

  This preamble procedure specifies how the IUT acting as a Client registers a new user in the GHS Server.

- Preamble Procedure

  1. The Upper Tester sends a command to the IUT to write the Register New User opcode value of 0x01 and a Consent Code parameter value to the User Control Point characteristic.
  2. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU indicating that it has accepted the opcode.
  3. The Lower Tester sends the IUT an indication of the User Control Point characteristic containing the Response Code opcode (0x20), the Request opcode (0x01) followed by the Response Value for Success (0x01) and Response parameter set to a value assigned by the Lower Tester representing the User Index.

4.2.6 Consent by Lower Tester

- Preamble Purpose

  This preamble procedure specifies how the Lower Tester acting as a Client provides consent, for a registered user, to the GHS Server.

- Preamble Procedure

  1. The Lower Tester writes the User Control Point characteristic with the Consent opcode value of 0x02, and User Index and Consent Code parameter values for the registered user.
  2. The IUT sends an ATT_WRITE_RSP PDU indicating that it has accepted the opcode.
  3. The IUT sends an indication of the User Control Point characteristic containing the Response Code opcode (0x20), the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.

4.2.7 Consent by IUT

- Preamble Purpose

  This preamble procedure specifies how the IUT acting as a Client provides consent, for a registered user, to the GHS Server.

- Preamble Procedure

  1. The Upper Tester sends a command to the IUT to write the Consent opcode value of 0x02, User Index and Consent Code parameter values for the registered user, to the User Control Point characteristic.
  2. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU indicating that it has accepted the opcode.
  3. The Lower Tester sends the IUT an indication of the User Control Point characteristic containing the Response Code opcode (0x20), the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.

4.2.8 Client: Initiate Connection when ready to read or ready for indications or notifications

- Preamble Purpose

  This is a setup procedure for the Client IUT to initiate a connection to a GHS Server when it is ready to read a characteristic value, and receive indications or notifications.

- Reference

  [3] 5

- Initial Condition

  - The preamble procedure defined in Section 4.2.1 is used to set up the LE transport and L2CAP channel.
  - The Client IUT has been configured to accept commands from the Upper Tester to read a characteristic value, or request and receive live or temporarily stored observations or stored observations.

- Preamble Procedure

  1. The Upper Tester commands the IUT to initiate a connection.
  2. The Lower Tester is in GAP Undirected Connectable Mode and sends ADV_IND packets to the IUT.
  3. The Lower Tester waits for responses from the IUT.
  4. The IUT sends a SCAN_REQ PDU to the Lower Tester.
  5. The IUT sends a CONNECT_IND to the Lower Tester.

4.2.9 Client: Configure GHS Server for use with Control Points

- Preamble Purpose

  This preamble procedure enables the Client IUT to configure the Lower Tester for use with the <Control Point Characteristic> and <Corresponding Characteristic> described in Table 4.2.

- Preamble Procedure

  1. Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or in Section 4.2.2 if using a BR/EDR transport.
  2. The Lower Tester is acting as the GHS Server.
  3. If bonding is supported, then perform a bonding procedure. Once bonded, encryption is enabled, if not already enabled.
  4. The handle of the <Control Point Characteristic> and <Corresponding Characteristic> have been previously discovered by the Upper Tester during the test procedures in Section 4.3 or are known to the Lower Tester by other means.
  5. The handle of the Client Characteristic Configuration descriptor of the <Control Point Characteristic> and <Corresponding Characteristic> have been previously discovered by the Upper Tester during the test procedures in Section 4.3 or are known to the Upper Tester by other means.
  6. The required <Control Point Characteristic> is configured for indications, and <Corresponding Characteristic>, as required, is configured for indication or notification by the IUT as described in Table 4.2.

Control Point Characteristic	Corresponding Characteristic	Corresponding Characteristic configured for
GHS Control Point	Live Health Observations	Notification or Indication
Record Access Control Point (RACP)	Stored Health Observations	Notification or Indication
User Control Point	Database Change Increment	Notification
	Registered User	Indication

Table 4.2: Preamble for Control Points

4.2.10 Server: Configure GHS Server IUT for use with Control Points

- Preamble Purpose

  This preamble procedure enables the Server IUT for use with the required <Control Point Characteristic> and <Corresponding Characteristic> described in Table 4.2.

- Preamble Procedure

  1. Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or in Section 4.2.2 if using a BR/EDR transport.
  2. If bonding is supported, then perform a bonding procedure. Once bonded, encryption is enabled, if not already enabled.
  3. The handles of the required <Control Point Characteristic> and <Corresponding Characteristic>, as required, have been previously discovered by the Lower Tester during the test procedures in Section 4.3 of [10] or are known to the Lower Tester by other means.
  4. The handles of the Client Characteristic Configuration descriptor of the <Control Point Characteristic> and <Corresponding Characteristic>, as required, have been previously discovered by the Lower Tester during the test procedures in Section 4.3 of [10] or are known to the Lower Tester by other means.
  5. The required <Control Point Characteristic> is configured for indications, and <Corresponding Characteristic>, as required, is configured for indication or notification by the Lower Tester as described in Table 4.2.

4.3 Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in [13] in Section 6.3, Server test procedures (SGGIT), and Section 6.4, Client test procedures (CGGIT), using Table 4.3 below as input:

TCID	Service / Characteristic/ Descriptor	Reference	Properties	Value Length (Octets)	Type
GHSP/CL/CGGIT/SER/BV-01-C [Service GGIT – Generic Health Sensor]	Generic Health Sensor Service	[3] 4, 4.2	-	-	Primary Service
GHSP/CL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Health Sensor Features]	Health Sensor Features characteristic	[3] 4, 4.3	0x22 (Read, Indicate)	Skip	-
GHSP/CL/CGGIT/CHA/BV-03-C [Characteristic GGIT – Live Health Observations]	Live Health Observations characteristic	[3] 4, 4.3	0x30 (Indicate, Notify)	Skip	-
GHSP/CL/CGGIT/CHA/BV-04-C [Characteristic GGIT – Stored Health Observations]	Stored Health Observations characteristic	[3] 4, 4.3	0x30 (Indicate, Notify)	Skip	-
GHSP/CL/CGGIT/CHA/BV-05-C [Characteristic GGIT – Record Access Control Point]	Record Access Control Point characteristic	[3] 4, 4.3	0x28 (Write, Indicate)	Skip	-
GHSP/CL/CGGIT/CHA/BV-06-C [Characteristic GGIT – GHS Control Point]	GHS Control Point characteristic	[3] 4, 4.3	0x28 (Write, Indicate)	Skip	-
GHSP/CL/CGGIT/CHA/BV-07-C [Characteristic GGIT – Observation Schedule Changed]	Observation Schedule Changed characteristic	[3] 4, 4.3	0x20 (Indicate)	Skip	-
GHSP/CL/CGGIT/DES/BV-08-C [Characteristic GGIT – Observation Schedule]	Observation Schedule descriptor	[3] 4, 4.3	0x0A (Read, Write)	12	-
GHSP/CL/CGGIT/DES/BV-09-C [Characteristic GGIT – Valid Range and Accuracy]	Valid Range and Accuracy descriptor	[3] 4, 4.3	0x02 (Read)	14-18	-
GHSP/CL/CGGIT/SER/BV-10-C [Service GGIT – Device Information]	Device Information Service	[3] 4, 4.2	-	-	Primary Service
GHSP/CL/CGGIT/CHA/BV-11-C [Characteristic GGIT – Manufacturer Name String]	Manufacturer Name String characteristic	[3] 4, 4.3	0x02 (Read)	Skip	-
GHSP/CL/CGGIT/CHA/BV-12-C [Characteristic GGIT – Model Number String]	Model Number String characteristic	[3] 4, 4.3	0x02 (Read)	Skip	-

TCID	Service / Characteristic/ Descriptor	Reference	Properties	Value Length (Octets)	Type
GHSP/CL/CGGIT/CHA/BV-13-C [Characteristic GGIT – Serial Number String]	Serial Number String characteristic	[3] 4, 4.3	0x02 (Read)	Skip	-
GHSP/CL/CGGIT/CHA/BV-14-C [Characteristic GGIT – Firmware Revision String]	Firmware Revision String characteristic	[3] 4, 4.3	0x02 (Read)	Skip	-
GHSP/CL/CGGIT/CHA/BV-15-C [Characteristic GGIT – System ID]	System ID characteristic	[3] 4, 4.3	0x02 (Read)	8	-
GHSP/CL/CGGIT/CHA/BV-16-C [Characteristic GGIT – Hardware Revision String]	Hardware Revision String characteristic	[3] 4, 4.3	0x02 (Read)	Skip	-
GHSP/CL/CGGIT/CHA/BV-17-C [Characteristic GGIT – Software Revision String]	Software Revision String characteristic	[3] 4, 4.3	0x02 (Read)	Skip	-
GHSP/CL/CGGIT/CHA/BV-18-C [Characteristic GGIT – UDI for Medical Devices]	UDI for Medical Devices characteristic	[3] 4, 4.3	0x02 (Read)	Skip	-
GHSP/CL/CGGIT/SER/BV-19-C [Service GGIT – Elapsed Time]	Elapsed Time Service	[3] 4, 4.2	-	-	Not defined
GHSP/CL/CGGIT/CHA/BV-20-C [Characteristic GGIT – Current Elapsed Time]	Current Elapsed Time characteristic	[3] 4, 4.3	0x2A (Read, Indicate, Write)	11, Skip - Write	-
GHSP/CL/CGGIT/SER/BV-21-C [Service GGIT – Battery]	Battery Service	[3] 4, 4.2	-	-	Not defined
GHSP/CL/CGGIT/CHA/BV-22-C [Characteristic GGIT – Battery Level]	Battery Level characteristic	[3] 4, 4.3	0x12 (Read, Notify)	1	-
GHSP/CL/CGGIT/CHA/BV-23-C [Characteristic GGIT – Battery Level Status]	Battery Level Status characteristic	[3] 4, 4.3	0x33 (Read, Notify, Broadcast, Indicate)	3 - 7	-
GHSP/CL/CGGIT/CHA/BV-24-C [Characteristic GGIT – Battery Information]	Battery Information characteristic	[3] 4, 4.3	0x22 (Read, Indicate)	3 - 19	-
GHSP/CL/CGGIT/SER/BV-25-C [Service GGIT – User Data]	User Data Service	[3] 4, 4.2	-	-	Primary Service
GHSP/CL/CGGIT/CHA/BV-26-C [Characteristic GGIT – User Control Point]	User Control Point characteristic	[3] 4, 4.3	0x28 (Write, Indicate)	Skip	-

TCID	Service / Characteristic/ Descriptor	Reference	Properties	Value Length (Octets)	Type
GHSP/CL/CGGIT/CHA/BV-27-C [Characteristic GGIT – User Index]	User Index characteristic	[3] 4, 4.3	0x02 (Read)	Skip	-
GHSP/CL/CGGIT/CHA/BV-28-C [Characteristic GGIT – Registered User]	Registered User characteristic	[3] 4, 4.3	0x20 (Indicate)	Skip	-
GHSP/CL/CGGIT/CHA/BV-29-C [Characteristic GGIT – Database Change Increment]	Database Change Increment characteristic	[3] 4, 4.3	0x1A (Read, Write, Notify)	Skip	-
GHSP/SR/SGGIT/SDPNF/BV-30-C [Not discoverable over BR/EDR – Generic Health Sensor Service]	Generic Health Sensor Service	[3] 4, 4.2	-	-	-
GHSP/SR/SGGIT/SDPNF/BV-31-C [Not discoverable over BR/EDR – Device Information Service]	Device Information Service	[3] 4, 4.2	-	-	-
GHSP/SR/SGGIT/SDPNF/BV-32-C [Not discoverable over BR/EDR – Elapsed Time Service]	Elapsed Time Service	[3] 4, 4.2	-	-	-
GHSP/SR/SGGIT/SDPNF/BV-33-C [Not discoverable over BR/EDR – Battery Service]	Battery Service	[3] 4, 4.2	-	-	-
GHSP/SR/SGGIT/SDPNF/BV-34-C [Not discoverable over BR/EDR – User Data Service]	User Data Service	[3] 4, 4.2	-	-	-
GHSP/SR/SGGIT/SER/BV-35-C [Service GGIT – Generic Health Sensor]	Generic Health Sensor Service	[3] 3	-	-	Primary Service, Unique
GHSP/SR/SGGIT/SER/BV-36-C [Service GGIT – Device Information]	Device Information Service	[3] 3	-	-	Primary Service, Unique
GHSP/SR/SGGIT/CHA/BV-37-C [Characteristic GGIT – Serial Number String]	Serial Number String characteristic	[3] 3, 3.2	0x02 (Read)	Skip	-
GHSP/SR/SGGIT/CHA/BV-38-C [Characteristic GGIT – System ID]	System ID characteristic	[3] 3, 3.2	0x02 (Read)	8	-
GHSP/SR/SGGIT/CHA/BV-39-C [Characteristic GGIT – UDI for Medical Devices]	UDI for Medical Devices characteristic	[3] 3, 3.2	0x02 (Read)	Skip	-
GHSP/SR/SGGIT/SER/BV-40-C [Service GGIT – Elapsed Time]	Elapsed Time Service	[3] 3	-	-	Primary Service

TCID	Service / Characteristic/ Descriptor	Reference	Properties	Value Length (Octets)	Type
GHSP/SR/SGGIT/SER/BV-41-C [Service GGIT – Battery]	Battery Service	[3] 3	-	-	Primary Service
GHSP/SR/SGGIT/SER/BV-42-C [Service GGIT – Reconnection Configuration]	Reconnection Configuration Service	[3] 3	-	-	Primary Service
GHSP/SR/SGGIT/SER/BV-43-C [Service GGIT – User Data]	User Data Service	[3] 3	-	-	Primary Service
GHSP/SR/SGGIT/CHA/BV-44-C [Characteristic GGIT – First Name]	First Name characteristic	[3] 3	0x0A (Read, Write)	Skip	-
GHSP/SR/SGGIT/CHA/BV-45-C [Characteristic GGIT – Last Name]	Last Name characteristic	[3] 3	0x0A (Read, Write)	Skip	-
GHSP/SR/SGGIT/CHA/BV-46-C [Characteristic GGIT – LE GATT Security Levels]	LE GATT Security Levels characteristic	[3] 3.1.2	0x02 (Read)	Skip	-

Table 4.3: Input for the GGIT Client and Server test procedure

4.4 GHS Server Features

Verify the Server IUT implementation of the features defined in GHSP, and usage of the same features by a Client IUT.

GHSP/SR/GHSF/BV-01-C [GHS Service UUID in AD]

- Test Purpose

  Verify that the GHSS UUID is included in the Advertising Data (AD) from the GHS Server IUT.

- Reference

  [3] 3.1.1.1

- Initial Condition

  - The IUT is in GAP discoverable mode and induced to generate advertising packets.

- Test Procedure

  1. The Lower Tester scans for advertising packets with the GHSS UUID from the IUT.

- Expected Outcome

  Pass verdict

  At least one received advertising packet contains the defined Service UUID for «Generic Health Sensor service».

GHSP/SR/GHSF/BV-02-C [Service Data in AD Type]

- Test Purpose

  Verify that the Service UUID, Specialization Count, and Specialization Codes are included in the Service Data AD Type field of the AD from the GHS Server IUT.

- Reference

  [3] 3.1.1.2

- Initial Condition

  - The IUT is not paired or bonded with the Lower Tester.
  - The IUT has not assigned a User Index.
  - The IUT is in GAP discoverable mode and induced to generate advertising packets.

- Test Procedure

  1. The Lower Tester scans for advertising packets from the IUT.

- Expected Outcome

  Pass verdict

  The advertising packet includes in the Service Data AD Type field of the AD:

  - The Service UUID and Specialization Count
  - If the Specialization_Count field is > 0, then the Specialization Codes are present; otherwise, the field is absent

GHSP/SR/GHSF/BV-03-C [Service Data in AD Type with UDS]

- Test Purpose

  Verify that the Service UUID, Specialization Count, Specialization Codes, User Index Count, and the User Indices of advertised users are included in the Service Data AD Type field of the AD from the GHS Server IUT.

- Reference

  [3] 3.1.1.2

- Initial Condition

  - The IUT has paired and bonded previously with the Lower Tester.
  - The IUT has assigned at least two User Indices, User Index 1 and User Index 2.
  - The IUT has no new observations for User Index 1, but it has new observations for User Index 2.
  - The IUT is in GAP discoverable mode and induced to generate advertising packets.

- Test Procedure

  1. The Lower Tester scans for advertising packets from the IUT.
  2. Induce the IUT to generate new observations for User Index 1 and generate advertising packets.
  3. The Lower Tester scans for advertising packets from the IUT.

- Expected Outcome

  Pass verdict

  In Step 1, the advertising packet includes in the Service Data AD Type field of the AD:

  - The Service UUID, Specialization Count, and supported Specialization Codes
  - User Index Count equal to 1, and User Index 2

  In Step 3, the advertising packet includes in the Service Data AD Type field of the AD:

  - The Service UUID, Specialization Count, and supported Specialization Codes
  - User Index Count equals 2, and User Index 1 and User Index 2

GHSP/SR/GHSF/BV-04-C [Local Name]

- Test Purpose

  Verify that the Local Name is included in AD or Scan Response Data from the GHS Server IUT.

- Reference

  [3] 3.1.1.3

- Initial Condition

  - The IUT is in GAP discoverable mode and induced to generate advertising packets.

- Test Procedure

  1. The Lower Tester scans for advertising packets from the IUT.
  2. The Lower Tester receives an advertising packet from the IUT and sends a Scan Request to the IUT.
  3. The Lower Tester scans for Scan Response Data from the IUT.

- Expected Outcome

  Pass verdict

  The IUT sends AD and Scan Response Data.

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

GHSP/SR/GHSF/BV-05-C [LE GATT Security Levels characteristic]

- Test Purpose

  Verify that the GHS Server IUT properly implements the LE GATT Security Levels characteristic.

- Reference

  [3] 3.1.2

- Initial Condition

  - An ATT Bearer connection has been established between the IUT and the Lower Tester as described in Section 4.2.1.
  - The IUT is not bonded or paired with the Lower Tester.

- Test Procedure

  1. The Lower Tester performs a GATT Service Discovery for the GAP Service.
  2. The Lower Tester receives a GATT Service Discovery Response with the list of handles from the IUT.
  3. The Lower Tester performs the GATT Read Using Characteristic UUID sub-procedure using the handle range for the service discovered in Step 2, and the LE GATT Security Levels characteristic UUID.
  4. Based on the IUT response, perform either alternative 4A or 4B:
     Alternative 4A (The IUT responds with an ATT_READ_BY_TYPE_RSP PDU):
     - 4A.1. The Lower Tester receives an ATT_READ_BY_TYPE_RSP PDU with an Attribute Handle and Attribute Value that is a sequence of one or more Security Level Requirements.

     Alternative 4B (The IUT responds with an ATT_ERROR_RSP PDU):
     - 4B.1. The Lower Tester receives an ATT_ERROR_RSP PDU with an Error Code parameter set to Attribute Not Found (0x0A).
     - 4B.2. The Lower Tester repeats Steps 1–4A.1 for the GHSS Service.

- Expected Outcome

  Pass verdict

  The IUT returns an Attribute Value that is a sequence of one or more Security Level Requirements.

  Each Security Level Requirement consists of a Security Mode field followed by a Security Level field.

GHSP/SR/GHSF/BV-06-C [Patient field value and User Index value]

- Test Purpose

  Verify that the GHS Server IUT reported User Index value is the same as the Patient field value included in the Health Observation Body.

- Reference

  [3] 3.6

- Initial Condition

  - An ATT Bearer connection has been established between the IUT and the Lower Tester as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The IUT includes one instantiation of the GHS Service [4].
  - The IUT includes one instantiation of the User Data Service [9].
  - The Lower Tester has discovered supported services on the IUT.
  - The User Control Point characteristic has been configured for indication.
  - The Live Health Observations characteristic has been configured for indication or notification.
  - The IUT has been configured to send Live Health Observations characteristic values to the Lower Tester (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).
  - The IUT has one new user registered (e.g., by running procedures included in Section 4.2.4). The user is referred to below as “User A”.

- Test Procedure

  1. The Lower Tester provides consent for User A (e.g., by running procedures included in Section 4.2.6).
  2. Perform an action on the IUT that will induce it to generate one or more live observations or temporarily stored observations for User A.
  3. The Lower Tester receives one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) from the IUT containing the Live Health Observation characteristic handle and value.
  4. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  5. The Lower Tester reads the value of the User Index characteristic for User A.

- Expected Outcome

  Pass verdict

  The IUT reported Patient field value in Step 3, in the Health Observation Body segment of the Live Health Observation characteristic, is the same as the User Index value.

GHSP/SR/GHSF/BV-07-C [GHS Server with Multiple Users]

- Test Purpose

  Verify that the GHS Server IUT, which supports multiple users, sends Live Health Observations characteristic indications or notifications only to a user that has given consent.

- Reference

  [3] 3.6

- Initial Condition

  - An ATT Bearer connection has been established between the IUT and the Lower Tester as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The IUT includes one instantiation of the GHS Service [4].
  - The IUT includes one instantiation of the User Data Service [9].
  - The Lower Tester has discovered supported services on the IUT.
  - The IUT has been configured to send Live Health Observations characteristic values to the Lower Tester (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).
  - The IUT has two new users registered (e.g., by running procedures included in Section 4.2.4). These users are referred to below as “User A” and “User B”.
  - The Lower Tester has:
    - Enabled indications or notifications of the Live Health Observations characteristic
    - Enabled indications of the User Control Point characteristic

- Test Procedure

  1. The Lower Tester provides consent for User A (e.g., by running procedures included in Section 4.2.6).
  2. Perform an action on the IUT that will induce it to generate one or more live observations or temporarily stored observations for User A and User B.
  3. The Lower Tester receives one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) from the IUT containing the Live Health Observation characteristic handle and value.
  4. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  5. The Lower Tester monitors indications or notifications of the Live Health Observation characteristic for an additional 30 seconds.

- Expected Outcome

  Pass verdict

  In Steps 3 and 5, the IUT sends Live Health Observation indications or notifications for User A and not for User B.

GHSP/CL/GHSF/BV-01-C [Client Pairing and Bonding]

- Test Purpose

  Verify that the Client IUT successfully pairs and bonds with the GHS Server.

- Reference

  [3] 6.1, 6.3

- Initial Condition

  - An ATT Bearer connection has been established between the IUT and the Lower Tester as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The IUT has discovered the GHS Service and has saved its handle range (e.g., by executing test case GHSP/CL/CGGIT/SER/BV-01-C [Service GGIT – Generic Health Sensor]).
  - The IUT is not paired or bonded with the Lower Tester.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to initiate pairing.
  2. Perform either alternative 2A or 2B depending on the transport:
     Alternative 2A (LE transport):
       2A.1. The IUT initiates pairing using Security Mode 1 and either Security Level 2 or 3, or LE Security Mode 1 Level 4.
     Alternative 2B (BR/EDR transport):
       2B.1. The IUT initiates pairing using Security Mode 4 (service-level enforced security).
  3. The Lower Tester responds to the pairing request using one of the allowed security configurations and indicates the required bonding.
  4. The IUT concludes the pairing process.

- Expected Outcome

  Pass verdict

  The IUT successfully completes pairing and bonding.

4.5 Read characteristics

Verify the IUT's ability to read characteristics exposed by a GHS Server (Lower Tester).

GHSP/CL/CR/BV-01-C [Read Health Sensor Features characteristic]

- Test Purpose

  Verify that the Client IUT can read the Health Sensor Features characteristic from a GHS Server.

- Reference

  [3] 4.4.12.1

- Initial Condition

  - An ATT Bearer connection has been established between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the GHS Service [5].
  - The IUT has previously executed the GHSP/CL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Health Sensor Features] procedure and it has the handle/value pairs for the characteristic.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to read the Health Sensor Features characteristic.
  2. The IUT executes the Read Characteristic Value sub-procedure.

- Expected Outcome

  Pass verdict

  The IUT reads the Health Sensor Features characteristic and reports its value to the Upper Tester.

GHSP/CL/CR/BV-02-C [Read Long Health Sensor Features characteristic]

- Test Purpose

  Verify that the Client IUT can read, using the Read Long Characteristic Values sub-procedure, the Health Sensor Features characteristic with a size beyond (ATT_MTU – 3).

- Reference

  [3] 4.4.12.1

- Initial Condition

  - An ATT Bearer connection has been established between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the GHS Service [5].
  - The IUT has previously executed the GHSP/CL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Health Sensor Features] procedure and has the handle/value pairs for the characteristic.
  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.
  - The default ATT_MTU size is used, and the length of the Health Sensor Features characteristic used in this test case is such that its value can be read using the Read Long Characteristic Values sub-procedure.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to read the Health Sensor Features characteristic.
  2. The IUT executes the Read Long Characteristic Values sub-procedure.

- Expected Outcome

  Pass verdict

  The IUT reads the Health Sensor Features characteristic and reports its value to the Upper Tester.

4.5.1 Read Device Information Service characteristics

- Test Purpose

  Verify that the Client IUT can read the supported Device Information Service characteristics, listed in Table 4.4, from a GHS Server.

- Reference

  [3] 4.8

- Initial Condition
  - An ATT Bearer connection has been established between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Device Information Service [5].
  - The IUT has previously executed the procedures in Section 4.3, and has the handle/value pairs for the characteristics listed in Table 4.4.
- Test Case Configuration

Test Case
GHSP/CL/CR/BV-03-C [Read Manufacturer Name String characteristic]
GHSP/CL/CR/BV-04-C [Read Model Number String characteristic]
GHSP/CL/CR/BV-05-C [Read Serial Number String characteristic]
GHSP/CL/CR/BV-06-C [Read Firmware Revision String characteristic]
GHSP/CL/CR/BV-07-C [Read Hardware Revision String characteristic]
GHSP/CL/CR/BV-08-C [Read Software Revision String characteristic]
GHSP/CL/CR/BV-09-C [Read UDI for Medical Devices characteristic]

Table 4.4: Read Device Information Service characteristics test cases

- Test Procedure
  1. The Upper Tester sends a command to the IUT to read the characteristic listed in Table 4.4.
  2. The IUT sends an ATT_READ_REQ PDU to the characteristic of the Lower Tester.
  3. The Lower Tester sends an ATT_READ_RSP PDU to the IUT.
  4. The IUT receives the ATT_READ_RSP PDU and reports the values to the Upper Tester.
- Expected Outcome

  Pass verdict

  The IUT reads each characteristic listed in Table 4.4 and reports its value to the Upper Tester.

4.6 Write characteristics and characteristic descriptors

Verify the IUT's ability to write to the characteristic descriptors exposed by a GHS Server (Lower Tester).

GHSP/CL/DW/BV-01-C [Write Observation Schedule descriptor]

- Test Purpose

  Verify that the Client IUT can write to the Observation Schedule descriptor to update the schedule for a specified observation type.
- Reference

  [3] 4.4.12.3
- Initial Condition
  - An ATT Bearer connection has been established between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The IUT has previously executed the GHSP/CL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Health Sensor Features] and GHSP/CL/CGGIT/DES/BV-08-C [Characteristic GGIT –

Observation Schedule] procedures and it has the handle/value pairs for the characteristic and the handle for the descriptor.

- The Upper Tester knows the Observation Type, Measurement Period, and Update Interval values for the Observation Schedule descriptor.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write a new Measurement Period and Update Interval values for the Observation Type.
  2. The IUT sends an ATT_WRITE_REQ PDU with the values provided by the Upper Tester in Step 1.
  3. The Lower Tester sends an ATT_WRITE_RSP PDU to the IUT.

- Expected Outcome

  Pass verdict

  The IUT sends a correctly formatted ATT_WRITE_REQ PDU to the Lower Tester, containing the correct handle and the new values to be written as specified by the Upper Tester.

4.7 Configure characteristics for indications or notifications

- Test Purpose

  Verify that the Client IUT can configure a Lower Tester to indicate or to notify supported characteristics and reading of the CCCD value.

- Reference

  [3] 4

- Initial Condition

  - The handle of each characteristic value referenced in the test cases in Table 4.5 has been previously discovered by the IUT during the test procedure in Section 4.3 or is known to the IUT by other means.
  - The handle of the CCCD of each characteristic referenced in the test cases in Table 4.5 has been previously discovered by the IUT during the test procedure in Section 4.3 or is known to the IUT by other means.
  - An ATT Bearer connection has been established between the Lower Tester and the 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

TCID	Reference	Characteristic	Value
GHSP/CL/CDWR/BV-01-C [Configure Health Sensor Features Characteristic for Indication]	[3] 4.4.12.1	Health Sensor Features	0x0002
GHSP/CL/CDWR/BV-02-C [Configure Live Health Observations Characteristic for Indication]	[3] 4.4.5	Live Health Observations	0x0002
GHSP/CL/CDWR/BV-03-C [Configure Live Health Observations Characteristic for Notification]	[3] 4.4.5	Live Health Observations	0x0001

TCID	Reference	Characteristic	Value
GHSP/CL/CDWR/BV-04-C [Configure Stored Health Observations Characteristic for Indication]	[3] 4.4.6	Stored Health Observations	0x0002
GHSP/CL/CDWR/BV-05-C [Configure Stored Health Observations Characteristic for Notification]	[3] 4.4.6	Stored Health Observations	0x0001
GHSP/CL/CDWR/BV-06-C [Configure RACP Characteristic for Indication]	[3] 4.4.6	RACP	0x0002
GHSP/CL/CDWR/BV-07-C [Configure GHS Control Point Characteristic for Indication]	[3] 4.4.5	GHS Control Point	0x0002
GHSP/CL/CDWR/BV-08-C [Configure Observation Schedule Changed Characteristic for Indication]	[3] 4.4.12.3	Observation Schedule Changed	0x0002
GHSP/CL/CDWR/BV-09-C [Configure Current Elapsed Time Characteristic for Indication]	[3] 4.6	Current Elapsed Time	0x0002
GHSP/CL/CDWR/BV-10-C [Configure Battery Level Characteristic for Notification]	[3] 4.9	Battery Level	0x0001
GHSP/CL/CDWR/BV-11-C [Configure Battery Level Status Characteristic for Notification]	[3] 4.9	Battery Level Status	0x0001
GHSP/CL/CDWR/BV-12-C [Configure Battery Level Status Characteristic for Indication]	[3] 4.9	Battery Level Status	0x0002
GHSP/CL/CDWR/BV-13-C [Configure Battery Information Characteristic for Indication]	[3] 4.9	Battery Information	0x0002
GHSP/CL/CDWR/BV-14-C [Configure Database Change Increment Characteristic for Notification]	[3] 4.5.3	Database Change Increment	0x0001
GHSP/CL/CDWR/BV-15-C [Configure User Control Point Characteristic for Indication]	[3] 4.5.5	User Control Point	0x0002
GHSP/CL/CDWR/BV-16-C [Configure Registered User Characteristic for Indication]	[3] 4.5.4	Registered User	0x0002

Table 4.5: Configure characteristics for indications or notifications test cases

- Test Procedure

1. The Upper Tester commands the IUT to send a correctly formatted ATT_WRITE_REQ PDU with the handle of the CCCD and the value from Table 4.5.
2. The IUT receives an ATT_WRITE_RSP PDU from the Lower Tester.
3. The Upper Tester sends a command to the IUT to read the value of the CCCD.
4. The IUT sends an ATT_READ_REQ PDU to the Lower Tester.
5. The IUT receives an ATT_READ_RSP PDU from the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT successfully writes to the CCCD.

  The IUT successfully reads the value of the CCCD and reports the value to the Upper Tester.

4.8 GHS Control Point procedures

Verify that the Client IUT can properly handle the requirements of the GHS Control Point and Live Health Observations characteristics.

GHSP/CL/GCP/BV-01-C [GHS Control Point Service Procedures]

- Test Purpose

  Verify that the Client IUT can write opcodes to the GHS Control Point characteristic and verify the response.

- Reference

  [3] 4.4.5

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to GHS Control Point characteristic.
  - The Lower Tester has observations to report, but it is not configured to send the observations.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the Start sending live observations opcode value (0x01) to the GHS Control Point characteristic.
  2. The IUT sends an ATT_WRITE_REQ PDU to the GHS Control Point characteristic of the Lower Tester, using the opcode provided by the Upper Tester in Step 1.
  3. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU indicating that it has accepted the opcode.
  4. The Lower Tester sends the IUT an ATT_HANDLE_VALUE_IND PDU of the GHS Control Point characteristic with code Success (0x80).
  5. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
  6. The Lower Tester sends one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) to the IUT containing the Live Health Observations characteristic handle and value.
  7. For each indication, the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
  8. The Upper Tester sends a command to the IUT to write the Stop sending live observations opcode value (0x02) to the GHS Control Point characteristic.
  9. The IUT sends an ATT_WRITE_REQ PDU to the GHS Control Point characteristic of the Lower Tester, using the opcode provided by the Upper Tester in Step 8.
  10. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU indicating that it has accepted the opcode.
  11. The Lower Tester sends the IUT an ATT_HANDLE_VALUE_IND PDU of the GHS Control Point characteristic with code Success (0x80).
  12. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  In Step 2, the IUT writes a correctly formatted request to the GHS Control Point for starting live observations.

  In Step 4, the IUT receives an ATT_HANDLE_VALUE_IND PDU of the GHS Control Point characteristic with code Success (0x80) and reports it to the Upper Tester.

  In Step 8, the IUT writes a correctly formatted request to the GHS Control Point for stopping live observations.

  In Step 11, the IUT receives an ATT_HANDLE_VALUE_IND PDU of the GHS Control Point characteristic with code Success (0x80) and reports it to the Upper Tester.

4.9 User Data Service procedures

Verify that the Client IUT can properly handle the requirements of the User Control Point characteristic.

GHSP/CL/UDS/BV-01-C [User Control Point Service Procedures]

- Test Purpose

  Verify that the Client IUT can write opcodes to the User Control Point characteristic and verify the response.

- Reference

  [3] 4.5.5.1, 4.5.5.2.1, 4.5.5.2.2

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to User Control Point characteristic.
  - The Lower Tester is in a state that allows the registration of a new user.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the Register New User opcode value of 0x01 and a Consent Code parameter value of 0x04D2 to the User Control Point characteristic.
  2. The IUT sends an ATT_WRITE_REQ PDU to the User Control Point characteristic of the Lower Tester, using the parameters provided by the Upper Tester in Step 1.
  3. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU indicating that it has accepted the opcode and parameter.
  4. The Lower Tester sends the IUT an ATT_HANDLE_VALUE_IND PDU of the User Control Point characteristic containing the Response Code opcode (0x20), the Request opcode (0x01) followed by the Response Value for Success (0x01), and Response parameter set to a value assigned by the Lower Tester representing the User Index.
  5. The Upper Tester sends a command to the IUT to write the Consent opcode value of 0x02, the User Index parameter value received at Step 3, and a Consent Code parameter value of 0x04D2 to the User Control Point characteristic.
  6. The IUT sends an ATT_WRITE_REQ PDU to the User Control Point characteristic of the Lower Tester, using the parameters provided by the Upper Tester in Step 5.
  7. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU indicating that it has accepted the opcode and parameters.

8. The Lower Tester sends the IUT an ATT_HANDLE_VALUE_IND PDU of the User Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.
9. The Upper Tester sends a command to the IUT to write the Delete User Data Opcode value of 0x03 without a Parameter value to the User Control Point characteristic.
10. The IUT sends an ATT_WRITE_REQ PDU to the User Control Point characteristic of the Lower Tester, using the opcode provided by the Upper Tester in Step 9.
11. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU indicating that it has accepted the opcode.
12. The Lower Tester sends the IUT an ATT_HANDLE_VALUE_IND PDU of the User Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x03) followed by the Response Value for Success (0x01) without a Response parameter.

- Expected Outcome

  Pass verdict

  The IUT successfully writes the specified opcodes to the User Control Point with the correct parameter values.

GHSP/CL/UDS/BV-02-C [User Data Synchronization Feature]

- Test Purpose

  Verify that the Client IUT reads or updates the User Data Service characteristics on the GHS Server based on the comparison of the local and remote Database Change Increment characteristic.

- Reference

  [3] 4.5.7

- Initial Condition

  - An ATT Bearer connection has been established between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [9] including at least the characteristics supported by the IUT.
  - The Lower Tester does not support configuration of the Database Change Increment characteristic notification.
  - The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case GHSP/CL/CGGIT/SER/BV-25-C [Service GGIT – User Data]).
  - The IUT has registered a new user and provided consent (e.g., by running procedures included in Section 4.2.5 and Section 4.2.7).
  - The IUT has read and cached the supported User Data Service characteristics and the Database Change Increment characteristic.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to disconnect from the Lower Tester.
  2. The IUT terminates the connection with the Lower Tester.
  3. The Upper Tester sends a command to the IUT to update at least one cached User Data Service characteristic locally.
  4. The Upper Tester sends a command to the IUT to reconnect to the Lower Tester.
  5. If needed, the IUT enables indications for the User Control Point characteristic.

6. The Upper Tester sends a command to the IUT to provide consent for the registered user (e.g., by running procedures included in Section 4.2.7).
7. The IUT reads the Database Change Increment characteristic value.
8. The IUT updates the User Data Service characteristic values modified in Step 3 and increments the Database Change Increment characteristic value.
9. Repeat Steps 1 and 2.
10. The Lower Tester updates one of the User Data Service characteristics supported by the IUT and increments the Database Change Increment characteristic value.
11. Repeat Steps 4–7.
12. The IUT reads the supported User Data Service characteristic values.

- Expected Outcome

  Pass verdict

  In Steps 7 and 11, the IUT successfully reads the Database Change Increment value.

  In Step 8, the IUT successfully writes the updated User Data Service characteristics.

  In Step 12, the IUT successfully reads the supported User Data Service characteristics.

GHSP/CL/UDS/BV-03-C [List All Users with Registered User Name Present in a Single Message Registered User Data]

- Test Purpose

  Verify that the Client IUT can perform the List All Users procedure and correctly process the Segmentation Header and Registered User Data contained in a single message indication.

- Reference

  [3] 4.5.5.2.4

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to User Control Point characteristic.
  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.
  - The Lower Tester contains two registered users, User 1 and User 2. For each user, the Registered User Data length is less than ATT_MTU – 4.

- Test Procedure

1. The Upper Tester sends a command to the IUT to write the List All Users opcode (0x04) to the User Control Point with no operand.
2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
3. The Lower Tester sends the IUT an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point.
4. The Lower Tester, within 30 seconds from the receipt of the ATT_WRITE_REQ PDU in Step 2, sends a first ATT_HANDLE_VALUE_IND PDU of the Registered User characteristic containing the Segmentation_Header field with the First Segment and Last Segment bit set to 1, the Rolling Segment Counter set to a valid value, and the Registered User Data with the Flags field bit 0 set to 1, bit 1 set to 0, User Index and Registered User Name matching User 1.
5. The IUT receives the first ATT_HANDLE_VALUE_IND PDU from the Lower Tester containing the Registered User characteristic handle and value and reports it to the Upper Tester.

6. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
7. Within 30 seconds from the receipt of the ATT_HANDLE_VALUE_CFM PDU from the IUT, the Lower Tester sends a second ATT_HANDLE_VALUE_IND PDU repeating Steps 4–6 for registered User 2.
8. Within 30 seconds from the receipt of the ATT_HANDLE_VALUE_CFM PDU from the IUT, the Lower Tester sends an ATT_HANDLE_VALUE_IND PDU of the User Control Point characteristic containing the Response Code opcode (0x20), the Request opcode (0x04) followed by the Response Value for Success (0x01) with the Response parameter having a value of 2 (Number of users).
9. The IUT receives an ATT_HANDLE_VALUE_IND PDU from the Lower Tester containing the User Control Point characteristic handle and value and reports it to the Upper Tester.
10. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT writes a correctly formatted opcode to the User Control Point containing the values specified in the test case.

  The IUT reports the information received in Step 5–7 and 9 to the Upper Tester.

  The Number of users response parameter reported to the Upper Tester matches the number of users contained in the Lower Tester.

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

4.9.1 Delete User Data and Delete User(s) procedures

- Test Purpose

  Verify that the Client IUT can perform the selected procedure with the described opcode and, if applicable, the Parameter value described in Table 4.6.

- Reference

  [3] 4.5.5.1

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to User Control Point characteristic.
  - Multiple users have previously been registered by following the procedure included in Section 4.2.5, and for each user, the Upper Tester knows the assigned User Index (e.g., User Index of User A and User Index of User B).
  - Perform the Consent procedure included in Section 4.2.7 so that consent has been granted with respect to the user having the User Index of User B.
  - For the purposes of running GHSP/CL/UDS/BV-04-C [Delete User Data], maintain the connection.

- Test Case Configuration

Test Case ID	Reference	Opcode	Parameter	Requirement
GHSP/CL/UDS/BV-04-C [Delete User Data]	[3] 4.5.5.2.3	0x03	N/A	Delete user data for registered user with User Index of User B.
GHSP/CL/UDS/BV-05-C [Delete Single User]	[3] 4.5.5.2.5	0x05	User Index of User A	Delete registered user with User Index of User A.
GHSP/CL/UDS/BV-06-C [Delete All Users]	[3] 4.5.5.2.5	0x05	0xFF	Delete all registered users.

Table 4.6: Delete User Data and Delete User(s) procedures test cases

- Test Procedure

1. The Upper Tester sends a command to the IUT to write the procedure opcode <Opcode> to the User Control Point with, if applicable, a Parameter Value having a value set to the <Parameter> described in Table 4.6.
2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
3. The Lower Tester, after sending an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point, sends an ATT_HANDLE_VALUE_IND PDU of the User Control Point characteristic containing the Response Code opcode (0x20), the Request opcode <Opcode> followed by the Response Value for Success (0x01) to the IUT, and if applicable, with the Response parameter having a value set to the <Parameter> described in Table 4.6.
4. The IUT receives an ATT_HANDLE_VALUE_IND PDU from the Lower Tester containing the User Control Point characteristic handle and value and reports it to the Upper Tester.
5. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

Pass verdict

The IUT writes a correctly formatted opcode and parameter, as described in Table 4.6, to the User Control Point.

The IUT receives an ATT_HANDLE_VALUE_IND PDU of the User Control Point characteristic handle and value and reports it to the Upper Tester. If applicable, the indication includes a Response parameter having a value set to the <Parameter> value described in Table 4.6.

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

4.9.1.1 Read User Index characteristic and Read or Write Database Change Increment characteristic

- Test Purpose

Verify that the Client IUT can perform the selected sub-procedure, described in Table 4.7, on the <Characteristic> contained in the GHS Server.

- Reference

[3] 4.5.2, 4.5.3

- Initial Condition
  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to User Control Point characteristic.
  - A user with the User Index of User A has previously been registered by following the procedure included in Section 4.2.5.
  - Perform the Consent procedure included in Section 4.2.7 so that consent has been granted with respect to the user having the User Index value of User A.
  - The Upper Tester knows the handle of each <Characteristic> listed in Table 4.7 and contained in the Lower Tester.
- Test Case Configuration

Test Case ID	Sub-procedure	Characteristic	ATT Command	ATT Response
GHSP/CL/UDS/BV-07-C [Read User Index characteristic]	Read Characteristic Value	User Index characteristic	ATT_READ_REQ PDU with the handle	ATT_READ_RSP PDU with the characteristic value
GHSP/CL/UDS/BV-08-C [Read Database Change Increment characteristic]	Read Characteristic Value	Database Change Increment characteristic	ATT_READ_REQ PDU with the handle	ATT_READ_RSP PDU with the characteristic value
GHSP/CL/UDS/BV-09-C [Write Database Change Increment characteristic]	Write Characteristic Value	Database Change Increment characteristic	ATT_WRITE_REQ PDU with the handle and value	ATT_WRITE_RSP PDU

Table 4.7: Read User Index characteristic and Read or Write Database Change Increment characteristic test cases

- Test Procedure
  1. The Upper Tester sends a command to the IUT to perform the <Sub-procedure> to a <Characteristic> contained in the Lower Tester.
  2. The IUT sends the <ATT Command>, of the <Characteristic>, to the Lower Tester.
  3. The Lower Tester responds with an <ATT Response>.
  4. The IUT receives the <ATT Response> from the Lower Tester and sends the response to the Upper Tester.
- Expected Outcome

  Pass verdict

  The IUT sends a correctly formatted <ATT Command>, of the <Characteristic>, to the Lower Tester. The handle is as specified by the Upper Tester.

  The IUT receives the <ATT Response> from the Lower Tester and sends the response to the Upper Tester.

GHSP/CL/UDS/BV-10-C [Receive Database Change Increment Characteristic Notification]

- Test Purpose

  Verify the Client IUT behavior on receipt of a notification of the Database Change Increment characteristic from a GHS Server.

- Reference

  [3] 4.5.3

- Initial Condition

  - The preamble procedure defined in Section 4.2.8 is used to initiate a connection to a GHS Server.
  - The IUT has been connected to the Lower Tester, and the UDS characteristics as well as the Database Change Increment are set to the same value in both devices.
  - The IUT has executed the applicable procedures included in Section 4.3, and the Database Change Increment is configured for notifications.

- Test Procedure

  1. The Lower Tester changes the value of at least one of the UDS characteristics and increments the value of the Database Change Increment characteristic.
  2. The Lower Tester sends a notification of the Database Change Increment characteristic to the IUT.
  3. The IUT reads all supported UDS characteristics.

- Expected Outcome

  Pass verdict

  The IUT receives the notification of the Database Change Increment characteristic from the Lower Tester.

  The IUT reads all supported UDS characteristics after the notification is received.

4.9.1.2 Read or Write UDS characteristic

- Test Purpose

  Verify that the Client IUT can perform the selected <Sub-procedure>, described in Table 4.8, for each characteristic of the User Data Service supported by the IUT.

- Reference

  [3] 4.5.1

- Initial Condition

  - The preamble procedure defined in Section 4.2.8 is used to initiate a connection to a GHS Server.
  - The Lower Tester includes one instantiation of the User Data Service [9] including all defined characteristics.
  - The IUT has previously executed the procedures included in Section 4.3 and it has the handle/value pairs for the characteristics of the User Data Service exposed by the Lower Tester that are supported by the IUT.
  - The Consent procedure has been performed, and the IUT is authorized to access the User Data Service characteristics.

- The test values used for UTF-8-based characteristics include character values outside the ASCII printable range.
- The default ATT_MTU size is used, and the applicable sub-procedure can be read or written in its entirety in a GATT Read or Write transaction.

- Test Case Configuration

Test Case ID	Sub-procedure
GHSP/CL/UDS/BV-11-C [Read UDS characteristic]	Read Characteristic Value
GHSP/CL/UDS/BV-12-C [Write UDS characteristic]	Write Characteristic Value

Table 4.8: Read or Write UDS characteristic test cases

- Test Procedure

  If the test case in Table 4.8 is for reading:

  1. The Upper Tester issues a command to the IUT to perform the selected Read Characteristic Value sub-procedure for each characteristic of the User Data Service for which the IUT supports reading.
  2. For each characteristic of the User Data Service supported by the IUT, the IUT executes the Read Characteristic Value sub-procedure.

  Or, if the test case in Table 4.8 is for writing:

  1. The Upper Tester issues a command to the IUT to write a new value to a UDS characteristic supported by the IUT, e.g., writing a new value for the ‘First Name’ or ‘Last Name’ UDS characteristic.
  2. The IUT executes the Write Characteristic Value sub-procedure.

- Expected Outcome

  Pass verdict

  If the test case in Table 4.8 is for reading, then for each characteristic contained in the Lower Tester’s instantiation of the User Data Service supported by the IUT, the IUT reports the characteristic value correctly to the Upper Tester.

  If the test case in Table 4.8 is for writing, then for the selected UDS characteristic, for which the IUT supports writing, the IUT writes the characteristic value(s) correctly to the Lower Tester.

  The reporting or writing includes:

  - For string-based characteristics, any printable or non-printable ASCII values
  - For a numeric-based characteristic, any values in the range of the characteristic
  - For a date-based characteristic, any values in the range of the characteristic

4.9.1.3 Read Long or Write Long UDS characteristic

- Test Purpose

  Verify that a Client IUT can perform the selected <Sub-procedure>, described in Table 4.9, for the applicable UDS characteristics.

- Reference

  [3] 4.5.1

- Initial Condition
  - The preamble procedure defined in Section 4.2.8 is used to initiate a connection to a GHS Server.
  - The Lower Tester includes one instantiation of the User Data Service [9] including all defined characteristics.
  - The IUT has previously executed the procedure included in Section 4.3, and it has the handle/value pairs for the characteristics of the User Data Service exposed by the Lower Tester that are supported by the IUT.
  - The Consent procedure has been performed, and the IUT is authorized to access the User Data Service characteristics.
  - The TSPX_supported_uds_read_long_characteristics_uuid_list and TSPX_supported_uds_write_long_characteristics_uuid_list are known from the IXIT [12].
  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.
  - The default ATT_MTU size is used, and the length of the UDS characteristic used in this test case is such that its value can be read or written using the Read Long or Write Long Characteristic Value sub-procedure.
- Test Case Configuration

Test Case ID	Sub-procedure	UDS Characteristic
GHSP/CL/UDS/BV-13-C [Read Long UDS characteristic]	Read Long Characteristic Values	The UDS characteristic for which the IUT supports Read Long Characteristic Values is known from the IXIT [12].
GHSP/CL/UDS/BV-14-C [Write Long UDS characteristic]	Write Long Characteristic Values	The UDS characteristic for which the IUT supports Write Long Characteristic Values is known from the IXIT [12].

Table 4.9: Read Long or Write Long UDS characteristic test cases

- Test Procedure

  If the test case in Table 4.9 is for reading:

  1. The Lower Tester exposes a UTF-8-based characteristic that is supported by the Client IUT. The length of the characteristic is greater than the capacity of the default ATT_MTU size. The UTF-8 string includes some character values outside the ASCII printable range.
  2. The Upper Tester issues a command to the IUT to read the characteristic referred to in Step 1.
  3. The IUT executes the Read Long Characteristic Values sub-procedure.

  Or, if the test case in Table 4.9 is for writing:

  1. The Upper Tester issues a command to the IUT to write a new value to a UDS characteristic supported by the IUT, e.g., writing a new value for the ‘First Name’ or ‘Last Name’ UDS characteristic.
  2. The IUT executes the Write Long Characteristic Values sub-procedure.

- Expected Outcome

  Pass verdict

  If the test case in Table 4.9 is for reading, then for each UDS characteristic using the UTF-8 format, for which support was declared in the IXIT [12], the IUT reports the characteristic value correctly, including all the printable and non-printable ASCII values.

  If the test case in Table 4.9 is for writing, then for the selected UDS characteristic using the UTF-8 format, for which support was declared in the IXIT [12], the IUT writes the characteristic value correctly to the Lower Tester including, for string-based characteristics, any printable or non-printable ASCII values.

4.10 Receive indication or notification

4.10.1 Receive indication or notification of live observations

- Test Purpose

  Verify that the Client IUT can receive indication or notification, from a GHS Server, of the Live Health Observations characteristic for the various Observation Class Types.

- Reference

  [3] 4.4.5

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to GHS Control Point characteristic.
  - The IUT is configured to expect indication or notification of the Live Health Observations characteristic (e.g., by running the procedure included in Section 4.2.3).
  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.

- Test Case Configuration

Test Case ID	Reference
GHSP/CL/SCI/BV-01-C [Receive Live Health Observations characteristic indication with Numeric observation]	[3] 4.4.3 [4] 3.2.1.15.1
GHSP/CL/SCN/BV-01-C [Receive Live Health Observations characteristic notification with Numeric observation]	[3] 4.4.3 [4] 3.2.1.15.1
GHSP/CL/SCI/BV-02-C [Receive Live Health Observations characteristic indication with Simple discrete observation]	[3] 4.4.3 [4] 3.2.1.15.2
GHSP/CL/SCN/BV-02-C [Receive Live Health Observations characteristic notification with Simple discrete observation]	[3] 4.4.3 [4] 3.2.1.15.2
GHSP/CL/SCI/BV-03-C [Receive Live Health Observations characteristic indication with String observation]	[3] 4.4.3 [4] 3.2.1.15.3
GHSP/CL/SCN/BV-03-C [Receive Live Health Observations characteristic notification with String observation]	[3] 4.4.3 [4] 3.2.1.15.3
GHSP/CL/SCI/BV-04-C [Receive Live Health Observations characteristic indication with Sample array observation]	[3] 4.4.3 [4] 3.2.1.15.4

Test Case ID	Reference
GHSP/CL/SCN/BV-04-C [Receive Live Health Observations characteristic notification with Sample array observation]	[3] 4.4.3 [4] 3.2.1.15.4
GHSP/CL/SCI/BV-05-C [Receive Live Health Observations characteristic indication with Compound observation]	[3] 4.4.3 [4] 3.2.1.15.5
GHSP/CL/SCN/BV-05-C [Receive Live Health Observations characteristic notification with Compound observation]	[3] 4.4.3 [4] 3.2.1.15.5
GHSP/CL/SCI/BV-06-C [Receive Live Health Observations characteristic indication with Compound Discrete Event observation]	[3] 4.4.3 [4] 3.2.1.15.6
GHSP/CL/SCN/BV-06-C [Receive Live Health Observations characteristic notification with Compound Discrete Event observation]	[3] 4.4.3 [4] 3.2.1.15.6
GHSP/CL/SCI/BV-07-C [Receive Live Health Observations characteristic indication with Compound State/Event observation (bit string)]	[3] 4.4.3 [4] 3.2.1.15.7
GHSP/CL/SCN/BV-07-C [Receive Live Health Observations characteristic notification with Compound State/Event observation (bit string)]	[3] 4.4.3 [4] 3.2.1.15.7
GHSP/CL/SCI/BV-08-C [Receive Live Health Observations characteristic indication with TLV-encoded observation]	[3] 4.4.3 [4] 3.2.1.15.8
GHSP/CL/SCN/BV-08-C [Receive Live Health Observations characteristic notification with TLV-encoded observation]	[3] 4.4.3 [4] 3.2.1.15.8
GHSP/CL/SCI/BV-09-C [Receive Live Health Observations characteristic indication with Observation bundle]	[3] 4.4.3 [4] 3.2.1.15.9
GHSP/CL/SCN/BV-09-C [Receive Live Health Observations characteristic notification with Observation bundle]	[3] 4.4.3 [4] 3.2.1.15.9

Table 4.10: Receive indication or notification of live observations test cases

- Test Procedure

  1. The Lower Tester generates one observation smaller than (ATT_MTU – 4) and sends one ATT_HANDLE_VALUE_IND PDU or ATT_HANDLE_VALUE_NTF PDU.
  2. If Step 1 is an ATT_HANDLE_VALUE_IND PDU, then the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
  3. The Lower Tester generates one observation greater than (ATT_MTU – 4) and sends two or more ATT_HANDLE_VALUE_IND PDUs or ATT_HANDLE_VALUE_NTF PDUs by performing the segmentation procedure described in Generic Health Sensor Service [4] Section 3.2.2.
  4. For each indication, the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT correctly reassembles the received segments by reversing the segmentation procedure described in Generic Health Sensor Service [4] Section 3.2.2.

  The IUT correctly reports the two observations to the Upper Tester.

4.10.2 Receive Health Sensor Features and Observation Schedule Changed Characteristic Indication

- Test Purpose

  Verify that the Client IUT can receive indications, from a GHS Server, of the Health Sensor Features and Observation Schedule Changed characteristics.

- Reference

  [3] 4.4.12.1, 4.4.12.3

- Initial Condition

  - A preamble procedure defined in Section 4.2.8 is used to initiate connection to a GHS Server.
  - The IUT is configured to expect Health Sensor Features and Observation Schedule Changed characteristic indication (e.g., by executing test case GHSP/CL/CDWR/BV-01-C [Configure Health Sensor Features Characteristic for Indication] and GHSP/CL/CDWR/BV-08-C [Configure Observation Schedule Changed Characteristic for Indication]).

- Test Case Configuration

Test Case ID
GHSP/CL/SCI/BV-19-C [Receive Health Sensor Features Characteristic Indication]
GHSP/CL/SCI/BV-20-C [Receive Observation Schedule Changed Characteristic Indication]

Table 4.11: Receive Health Sensor Features and Observation Schedule Changed Characteristic Indication test cases

- Test Procedure

  1. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU, of the characteristic value described in Table 4.11, to the IUT.
  2. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received indication values to the Upper Tester. The reported field values match the ones sent by the Lower Tester.

4.10.3 Time-out handling between indications or notifications of segments

Verify that the IUT behaves appropriately when a time-out occurs while receiving segments from a health observation.

GHSP/CL/SCIN/BI-01-C [Time-out between two consecutive indications or notifications within segments of a single live observation]

- Test Purpose

  Verify that the Client IUT behaves appropriately when a time-out occurs between two consecutive indications or notifications within segments of a single live observation.

- Reference

  [3] 4.4.1

- Initial Condition
  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to GHS Control Point characteristic.
  - The IUT is configured to expect indication or notification of the Live Health Observations characteristic (e.g., by running the procedure included in Section 4.2.9).
  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.
- Test Procedure
  1. The Lower Tester generates one observation greater than (ATT_MTU – 4) and sends two or more ATT_HANDLE_VALUE_IND PDUs or ATT_HANDLE_VALUE_NTF PDUs, by performing the segmentation procedure described in Generic Health Sensor Service [4] Section 3.2.2, where the time between two consecutive indications or notifications of segments that are part of one health observation is greater than 30 seconds.
  2. For each received indication, the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
  3. The IUT optionally reports to the Upper Tester that a time-out has occurred, and the IUT considers the procedure to have failed.
- Expected Outcome

  Pass verdict

  After completing the test procedure, the IUT returns to a stable state and can process commands normally.

GHSP/CL/SCIN/BI-02-C [RACP procedure time-out]

- Test Purpose

  Verify that the Client IUT behaves appropriately when the RACP procedure is considered to have timed out.
- Reference

  [3] 4.4.1
- Initial Condition
  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to RACP characteristic.
  - The IUT is configured to expect indication or notification of the Stored Health Observations characteristic (e.g., by running the procedure included in Section 4.2.9).
  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.
- Test Procedure
  1. The Upper Tester sends a command to the IUT to write the Combined Report opcode (0x07) to the RACP characteristic using the All records Operator.
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester generates one observation greater than (ATT_MTU – 4) and sends two or more ATT_HANDLE_VALUE_IND PDUs or ATT_HANDLE_VALUE_NTF PDUs of the Stored Health Observations characteristic, by performing the segmentation procedure described in

Generic Health Sensor Service [4] Section 3.3.2, where the time between two consecutive indications or notifications of segments that are part of one health observation is greater than 30 seconds.

4. The IUT optionally reports to the Upper Tester that a time-out has occurred and the IUT considers the procedure to have failed.
5. For each received indication, the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
6. The Lower Tester does not send an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic for at least a time longer than the procedure transaction time-out period.
7. The IUT optionally reports to the Upper Tester that a time-out has occurred and the IUT considers the procedure to have failed.

- Expected Outcome

  Pass verdict

  After the RACP procedure time-out, the IUT returns to a stable state and can process commands normally.

4.11 RACP procedures

Verify the Client IUT's ability to configure and interpret values of the RACP and Stored Health Observations characteristics.

4.11.1 Combined Report

- Test Purpose

  Verify that the Client IUT can perform the Combined Report procedure with the <Operator>, the applicable <Operand Filter Type>, and the <Operand Filter Value(s)> described in Table 4.12.

- Reference

  [3] 4.4.9.3

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to RACP characteristic.
  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
GHSP/CL/RAC/BV-10-C [Combined Report with Operator All records using indication]	All records	N/A	N/A
GHSP/CL/RAC/BV-11-C [Combined Report with Operator First record using indication or notification]	First record	N/A	N/A
GHSP/CL/RAC/BV-12-C [Combined Report with Operator Last record using indication or notification]	Last record	N/A	N/A

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
GHSP/CL/RAC/BV-13-C [Combined Report with Operator Greater than or equal to and Operand Record Number using notification]	Greater than or equal to	Record Number	<Min filter value>
GHSP/CL/RAC/BV-14-C [Combined Report with Operator Greater than or equal to and Operand Time Filter using indication or notification]	Greater than or equal to	Time Filter	<Min filter value>
GHSP/CL/RAC/BV-15-C [Combined Report with Operator Less than or equal to and Operand Record Number using indication or notification]	Less than or equal to	Record Number	<Max filter value>
GHSP/CL/RAC/BV-16-C [Combined Report with Operator Less than or equal to and Operand Time Filter using indication or notification]	Less than or equal to	Time Filter	<Max filter value>
GHSP/CL/RAC/BV-17-C [Combined Report with Operator Within range of (inclusive) and Operand Record Number using indication or notification]	Within range of (inclusive)	Record Number	<Min filter value>, <Max filter value>
GHSP/CL/RAC/BV-18-C [Combined Report with Operator Within range of (inclusive) and Operand Time Filter using indication or notification]	Within range of (inclusive)	Time Filter	<Min filter value>, <Max filter value>

Table 4.12: Combined Report test cases

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the Combined Report opcode (0x07) to the RACP characteristic using the selected <Operator>, applicable <Operand Filter Type>, and the <Operand Filter Value(s)> described in Table 4.12.
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester generates one observation smaller than (ATT_MTU – 4) and sends one ATT_HANDLE_VALUE_IND PDU or ATT_HANDLE_VALUE_NTF PDU.
  4. If Step 3 is an ATT_HANDLE_VALUE_IND PDU, then the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
  5. The Lower Tester generates one observation greater than (ATT_MTU – 4) and sends two or more ATT_HANDLE_VALUE_IND PDUs or ATT_HANDLE_VALUE_NTF PDUs by performing the segmentation procedure described in Generic Health Sensor Service [4] Section 3.3.2.
  6. For each indication, the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
  7. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Combined Report Response opcode (0x08), an operator of Null (0x00), and an operand representing the number of records sent (2).
  8. The IUT receives the ATT_HANDLE_VALUE_IND PDU from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  9. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  In Step 2, the IUT sends a correctly formatted RACP Combined Report procedure to the Lower Tester.

The IUT reports to the Upper Tester:

- The two Stored Health Observations
- The Combined Report Response with 2 as the number of stored records

4.11.2 Report Number of Stored Records

- Test Purpose

  Verify that the Client IUT can perform the Report Number of Stored Records procedure with the selected <Operator>, the applicable <Operand Filter Type>, and the <Operand Filter Value(s)> described in Table 4.13.

- Reference

  [3] 4.4.9.2

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to RACP characteristic.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
GHSP/CL/RAN/BV-10-C [Report Number of Stored Records with Operator All records]	All records	N/A	N/A
GHSP/CL/RAN/BV-11-C [Report Number of Stored Records with Operator First record]	First record	N/A	N/A
GHSP/CL/RAN/BV-12-C [Report Number of Stored Records with Operator Last record]	Last record	N/A	N/A
GHSP/CL/RAN/BV-13-C [Report Number of Stored Records with Operator Greater than or equal to and Operand Record Number]	Greater than or equal to	Record Number	<Min filter value>
GHSP/CL/RAN/BV-14-C [Report Number of Stored Records with Operator Greater than or equal to and Operand Time Filter]	Greater than or equal to	Time Filter	<Min filter value>
GHSP/CL/RAN/BV-15-C [Report Number of Stored Records with Operator Less than or equal to and Operand Record Number]	Less than or equal to	Record Number	<maximum filter value>
GHSP/CL/RAN/BV-16-C [Report Number of Stored Records with Operator Less than or equal to and Operand Time Filter]	Less than or equal to	Time Filter	<maximum filter value>
GHSP/CL/RAN/BV-17-C [Report Number of Stored Records with Operator Within range of (inclusive) and Operand Record Number]	Within range of (inclusive)	Record Number	<minimum filter value>, <maximum filter value>
GHSP/CL/RAN/BV-18-C [Report Number of Stored Records with Operator Within range of (inclusive) and Operand Time Filter]	Within range of (inclusive)	Time Filter	<minimum filter value>, <maximum filter value>

Table 4.13: Report Number of Stored Records test cases

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the Report Number of Stored Records opcode (0x04) to the RACP characteristic using the selected <Operator>, the applicable <Operand Filter Type>, and the <Operand Filter Value(s)> described in Table 4.13.
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Number of Stored Records Response opcode (0x05), an operator of Null (0x00), and an operand representing 5 records.
  4. The IUT receives the ATT_HANDLE_VALUE_IND PDU from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  5. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  In Step 2, the IUT sends a correctly formatted RACP Report Number of Stored Records procedure to the Lower Tester.

  The IUT reports 5 as the number of records to the Upper Tester.

4.11.3 Delete Stored Records

- Test Purpose

  Verify that the Client IUT can perform the Delete Stored Records procedure with the <Operator>, the applicable <Operand Filter Type>, and the <Operand Filter Value(s)> described in Table 4.14.

- Reference

  [3] 4.4.9.4

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to RACP characteristic.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
GHSP/CL/RAD/BV-10-C [Delete Stored Records with Operator All records]	All records	N/A	N/A
GHSP/CL/RAD/BV-11-C [Delete Stored Records with Operator First record]	First record	N/A	N/A
GHSP/CL/RAD/BV-12-C [Delete Stored Records with Operator Last record]	Last record	N/A	N/A
GHSP/CL/RAD/BV-13-C [Delete Stored Records with Operator Greater than or equal to and Operand Record Number]	Greater than or equal to	Record Number	<Min filter value>
GHSP/CL/RAD/BV-14-C [Delete Stored Records with Operator Greater than or equal to and Operand Time Filter]	Greater than or equal to	Time Filter	<Min filter value>

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
GHSP/CL/RAD/BV-15-C [Delete Stored Records with Operator Less than or equal to and Operand Record Number]	Less than or equal to	Record Number	<Max filter value>
GHSP/CL/RAD/BV-16-C [Delete Stored Records with Operator Less than or equal to and Operand Time Filter]	Less than or equal to	Time Filter	<Max filter value>
GHSP/CL/RAD/BV-17-C [Delete Stored Records with Operator Within range of (inclusive) and Operand Record Number]	Within range of (inclusive)	Record Number	<Min filter value>, <Max filter value>
GHSP/CL/RAD/BV-18-C [Delete Stored Records with Operator Within range of (inclusive) and Operand Time Filter]	Within range of (inclusive)	Time Filter	<Min filter value>, <Max filter value>

Table 4.14: Delete Stored Records test cases

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the Delete Stored Records opcode (0x02) to the RACP characteristic using the <Operator>, the applicable <Operand Filter Type>, and the <Operand Filter Value(s)> described in Table 4.14.
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Response Code opcode (0x06), an operator of Null (0x00), and an operand consisting of the Request opcode (0x02) followed by the Response Code Value for Success (0x01) to the IUT.
  4. The IUT receives the ATT_HANDLE_VALUE_IND PDU from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  5. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  In Step 2, the IUT sends a correctly formatted RACP Delete Stored Records procedure to the Lower Tester.

  The IUT reports the received control point response in Step 4 to the Upper Tester.

GHSP/CL/RAA/BV-01-C [Abort Operation]

- Test Purpose

  Verify that the Client IUT can perform the Abort Operation procedure when a Combined Report procedure is being executed by the Record Access Control Point characteristic.

- Reference

  [3] 4.4.9.5

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to RACP characteristic.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the Combined Report opcode (0x07) to the RACP characteristic using an operator of All records (0x01).
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester starts sending the ATT_HANDLE_VALUE_IND PDU or ATT_HANDLE_VALUE_NTF PDU of the Stored Health Observation characteristic.
  4. For each indication, the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
  5. The IUT receives one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) from the Lower Tester, containing the Stored Health Observation characteristic handle and values, and reports them to the Upper Tester.
  6. The Upper Tester sends a command to the IUT to write the Abort Operation opcode (0x03) to the RACP characteristic with an operator of Null (0x00) and no operand.
  7. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 6 to the Lower Tester.
  8. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Response Code opcode (0x06), an operator of Null (0x00), and an operand containing the Request opcode (0x03) followed by the Response Code Value for Success (0x01) to the IUT.
  9. The IUT receives an ATT_HANDLE_VALUE_IND PDU from the Lower Tester, containing the RACP characteristic handle and value, and reports it to the Upper Tester.
  10. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
  11. Verify that the Stored Health Observation characteristic indication or notifications stop.

- Expected Outcome

  Pass verdict

  In Step 7, the IUT sends a correctly formatted RACP Abort Operation procedure to the Lower Tester.

  The IUT reports the received control point response in Step 9 to the Upper Tester.

4.12 Elapsed Time Service procedures

Verify that the IUT can properly handle the requirements of the Elapsed Time Service.

GHSP/CL/ETS/BV-01-C [Write a new time value]

- Test Purpose

  Verify that the Client IUT can write to the Current Elapsed Time characteristic.

- Reference

  [3] 4.6

- Initial Condition

  - An ATT Bearer connection has been established between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Elapsed Time Service [6] and Current Elapsed Time characteristic.
  - The IUT has discovered the Elapsed Time Service and has saved its handle range (e.g., by executing test case GHSP/CL/CGGIT/SER/BV-19-C [Service GGIT – Elapsed Time]).
  - The IUT knows the features supported by the Lower Tester (e.g., by executing test case GHSP/CL/CGGIT/CHA/BV-20-C [Characteristic GGIT – Current Elapsed Time]).
  - Clock Needs To Be Set flag is 1.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write a Time_Value field value.
  2. The IUT sends an ATT_WRITE_REQ PDU with the value provided by the Upper Tester in Step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_WRITE_RSP PDU to the IUT.

- Expected Outcome

  Pass verdict

  The IUT sends a correctly formatted ATT_WRITE_REQ PDU to the Lower Tester.

GHSP/CL/ETS/BV-02-C [Receive indication of the Current Elapsed Time characteristic]

- Test Purpose

  Verify that the Client IUT can receive an indication of the Current Elapsed Time characteristic from a GHS Server.

- Reference

  [3] 4.6

- Initial Condition

  - The Lower Tester includes one instantiation of the Elapsed Time Service [6] and Current Elapsed Time characteristic.
  - The IUT has discovered the Elapsed Time Service and has saved its handle range (e.g., by executing test case GHSP/CL/CGGIT/SER/BV-19-C [Service GGIT – Elapsed Time]).
  - The IUT has discovered the features supported by the Lower Tester (e.g., by executing test case GHSP/CL/CGGIT/CHA/BV-20-C [Characteristic GGIT – Current Elapsed Time]).

- Test Procedure

  1. An ATT Bearer connection has been established between the Lower Tester and the 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 IUT enables indications of the Current Elapsed Time characteristic.
  3. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU containing the Current Elapsed Time characteristic handle and value to the IUT.
  4. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the ATT_HANDLE_VALUE_IND PDU containing the Current Elapsed Time characteristic handle and value to the Upper Tester.

4.13 Battery Service

Verify that the IUT can properly handle the requirements of the Battery Service.

4.13.1 Indications or notifications of Battery Service characteristics

- Test Purpose

  Verify that the Client IUT can receive indications or notifications of the Battery Service characteristic listed in Table 4.15.

- Reference

  [3] 4.9

- Test Configuration

Test Case ID
GHSP/CL/BAS/BV-01-C [Receive notification of the Battery Level characteristic]
GHSP/CL/BAS/BV-02-C [Receive notification of the Battery Level Status characteristic]
GHSP/CL/BAS/BV-03-C [Receive indication of the Battery Level Status characteristic]
GHSP/CL/BAS/BV-04-C [Receive indication of the Battery Information characteristic]

Table 4.15: Indications or notifications of Battery Service characteristics test cases

- Initial Condition
  - An ATT Bearer connection has been established between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The IUT has discovered the Battery Service and the characteristic listed in Table 4.15 by executing the test procedures in Section 4.3.
  - The IUT has enabled indications or notifications of the characteristic listed in Table 4.15.
- Test Procedure
  1. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU or ATT_HANDLE_VALUE_NTF PDU to the IUT containing the characteristic handle and value listed in Table 4.15.
  2. For each indication sent, the IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.
- Expected Outcome
- Pass verdict

  The IUT reports the ATT_HANDLE_VALUE_IND PDU or ATT_HANDLE_VALUE_NTF PDU containing the characteristic handle and value, listed in Table 4.15, to the Upper Tester.

4.14 Service Error Handling

Verify the IUT's compliant operation when an error is reported by the GHS Server.

4.14.1 Response to an indication of the User Control Point characteristic containing an error code

- Test Purpose

  Verify that the Client IUT behaves appropriately when it receives indications of the User Control Point characteristic with a Response Code Value error code in response to a Write Request.

- Reference

  [3] 4.10

- Initial Condition
  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to User Control Point characteristic.

- Test Case Configuration

Test Case ID	Opcode	Response Code Value
GHSP/CL/SPE/BI-01-C [Opcode Not Supported]	Optional Opcode	Opcode Not Supported (0x02)
GHSP/CL/SPE/BI-02-C [User not Authorized]	Register New User Opcode (0x01)	User Not Authorized (0x05)
GHSP/CL/SPE/BI-03-C [Operation Failed]	Register New User Opcode (0x01)	Operation Failed (0x04)

Table 4.16: Response to an indication of the User Control Point characteristic containing an error code test cases

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write to the User Control Point characteristic the Opcode described in Table 4.16 and the associated parameter value.
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester, after sending an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point, sends an ATT_HANDLE_VALUE_IND PDU of the User Control Point characteristic with the Response Code opcode (0x20), the Request opcode, and the <Response Code Value> specified in Table 4.16.
  4. The IUT receives an ATT_HANDLE_VALUE_IND PDU from the Lower Tester containing the User Control Point characteristic handle and value and reports it to the Upper Tester.
  5. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received control point response in Step 4 to the Upper Tester.

GHSP/CL/SPE/BI-04-C [User Data Access Not Permitted]

- Test Purpose

  Verify that the Client IUT behaves appropriately when it receives an Attribute Protocol Application Error Code parameter set to User Data Access Not Permitted.

- Reference

  [3] 4.10

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to User Control Point characteristic.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to attempt to read any supported UDS characteristic, using the procedure described in GHSP/CL/UDS/BV-11-C [Read UDS characteristic].
  2. The IUT attempts to execute the instruction from Step 1 by attempting to read any supported UDS characteristic from the Lower Tester.

3. The Lower Tester sends an ATT_ERROR_RSP PDU with Error Code parameter set to User Data Access Not Permitted (0x80).
4. The IUT receives an ATT_ERROR_RSP PDU from the Lower Tester and reports it to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received Attribute Protocol Application Error Code parameter set to User Data Access Not Permitted (0x80) to the Upper Tester.

  Verify that the IUT returns to stable state and can process commands normally.

GHSP/CL/SPE/BI-05-C [Procedure Already in Progress]

- Test Purpose

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

- Reference

  [3] 4.10

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write a valid opcode to the User Control Point characteristic (e.g., by executing the test case described in GHSP/CL/UDS/BV-01-C [User Control Point Service Procedures]).
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_ERROR_RSP PDU with the Error Code parameter set to Procedure Already In Progress (0xFE). The Lower Tester does not indicate the User Control Point characteristic (i.e., the Lower Tester simulates that a control point procedure was already in progress).
  4. The IUT receives an ATT_ERROR_RSP PDU from the Lower Tester and reports it to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received Attribute Protocol Application Error Code parameter set to Procedure Already In Progress (0xFE) to the Upper Tester.

  Verify that the IUT returns to a stable state and can process commands normally.

GHSP/CL/SPE/BI-06-C [Procedure Timeout]

- Test Purpose

  Verify that if the IUT does not receive a response to a User Control Point procedure, it times out after the procedure transaction timeout.

- Reference

  [3] 4.5.5.2.6

- Initial Condition
  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to User Control Point characteristic.
- Test Procedure
  1. The Upper Tester sends a command to the IUT to write a valid opcode to the User Control Point characteristic (e.g., by executing the test case described in GHSP/CL/UDS/BV-01-C [User Control Point Service Procedures]).
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester does not send an indication of the User Control Point characteristic for at least a time longer than the procedure transaction timeout period.
  4. After the specified timeout period, the IUT sends a notification of the Attribute Transaction Timeout to the Upper Tester, and the IUT considers the procedure to have failed.
- Expected Outcome

  Pass verdict

  After the procedure transaction timeout period, the IUT notifies the Upper Tester of the timeout.

4.14.2 Response to an indication of the RACP characteristic containing an error code

- Test Purpose

  Verify that the Client IUT behaves appropriately when it receives indications of the RACP characteristic with a Response Code Value error code in response to a Write Request.
- Reference

  [3] 4.4.10
- Initial Condition
  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to RACP characteristic.
  - The TSPX_ghs_racp_optional_operand_operator and TSPX_ghs_racp_optional_operand_operand_filter_type are known from the IXIT [12].
- Test Case Configuration

Test Case ID	Opcode, Operator, and Operand	Request Opcode, Response Code Value
GHSP/CL/SPE/BI-07-C [Operand not supported]	Opcode = 0x07 (Combined Report) Operator = Supported Operator Operand = Optional Operand Filter Type with appropriate Filter Parameters	Request Opcode = 0x07 (Combined Report) Response Code Value = 0x09 (Operand not supported)
GHSP/CL/SPE/BI-08-C [Procedure not completed]	Opcode = 0x07 (Combined Report) Operator = 0x01 (All records)	Request Opcode = 0x07 (Combined Report) Response Code Value = 0x08 (Procedure not completed)

Table 4.17: Response to an indication of the RACP characteristic containing an error code test cases

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write to the RACP characteristic the Opcode, Operator, and Operand Filter Type with the appropriate Filter Parameters described in Table 4.17.
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Response Code opcode (0x06), an operator of Null (0x00), and an operand consisting of the Request opcode followed by the Response Code Value specified in Table 4.17.
  4. The IUT receives an ATT_HANDLE_VALUE_IND PDU from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  5. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received control point response in Step 4 to the Upper Tester.

GHSP/CL/SPE/BI-09-C [Client Characteristic Configuration Descriptor Improperly Configured]

- Test Purpose

  Verify that the Client IUT responds appropriately when the IUT attempts to perform a User Control Point procedure and that the User Control Point characteristic has not been configured for indication.

- Reference

  [3] 4.10

- Initial Condition

  - The preamble procedure defined in Section 4.2.8 initiates connection to a GHS Server.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write a valid opcode to the User Control Point characteristic (e.g., by executing the test case described in GHSP/CL/UDS/BV-01-C [User Control Point Service Procedures]).
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_ERROR_RSP PDU with the Error Code parameter set to Client Characteristic Configuration Descriptor Improperly Configured (0xFD).
  4. The IUT receives an ATT_ERROR_RSP PDU from the Lower Tester and reports it to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received Attribute Protocol Application Error Code parameter set to Client Characteristic Configuration Descriptor Improperly Configured (0xFD) to the Upper Tester.

  Verify that the IUT returns to a stable state and can process commands normally.

GHSP/CL/SPE/BI-10-C [Server Busy]

- Test Purpose

  Verify that the Client IUT behaves appropriately when it receives a Response Code Value for Server Busy.

- Reference

  [3] 4.10

- Initial Condition

  - Perform the preamble described in Section 4.2.9 with the required <Control Point Characteristic> set to GHS Control Point and RACP.
  - The IUT is configured to expect indication or notification of the Live Health Observations characteristic (e.g., by running the procedure included in Section 4.2.3).

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the Combined Report opcode (0x07) to the RACP characteristic with an operator of All records (0x01).
  2. The IUT sends an ATT_WRITE_REQ PDU with the instruction from Step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Response Code opcode (0x06), an operator of Null (0x00), and an operand representing the Request opcode (0x07) followed by the Response Code Value for Server Busy (0x0A).
  4. The IUT sends an ATT_HANDLE_VALUE_CFM PDU to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received Response Code Value for Server Busy to the Upper Tester.

  Verify that the IUT returns to a stable state and can process commands normally.

GHSP/CL/SPE/BI-11-C [Out of Range]

- Test Purpose

  Verify that the Client IUT behaves appropriately when it receives an Attribute Protocol Application Error Code parameter set to Out of Range.

- Reference

  [3] 4.4.12.3

- Initial Condition

  - A preamble procedure defined in Section 4.2.8 is used to initiate connection to a GHS Server.
  - The Upper Tester knows the handle of the Observation Schedule Changed characteristic and Observation Schedule descriptor contained in the Lower Tester.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write to the Observation Schedule descriptor a new schedule.
  2. The IUT sends an ATT_WRITE_REQ PDU with the values provided by the Upper Tester in Step 1.

3. The Lower Tester sends an ATT_ERROR_RSP PDU with the Error Code parameter set to Out of Range (0xFF).
4. The IUT receives an ATT_ERROR_RSP PDU from the Lower Tester and reports it to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received Attribute Protocol Application Error Code parameter set to Out of Range (0xFF) to the Upper Tester.

  Verify that the IUT returns to a stable state and can process commands normally.

GHSP/CL/SPE/BI-12-C [Incorrect Time Format]

- Test Purpose

  Verify that the Client IUT behaves appropriately when it receives an Attribute Protocol Application Error Code parameter set to Incorrect Time Format.

- Reference

  [3] 4.6

- Initial Condition

  - An ATT Bearer connection has been established between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Elapsed Time Service [6] and Current Elapsed Time characteristic.
  - The IUT has discovered the Elapsed Time Service and has saved its handle range (e.g., by executing test case GHSP/CL/CGGIT/SER/BV-19-C [Service GGIT – Elapsed Time]).

- Test Procedure

1. The Upper Tester sends a command to the IUT to write a time value.
2. The IUT sends an ATT_WRITE_REQ PDU with the values provided by the Upper Tester in Step 1.
3. The Lower Tester sends an ATT_ERROR_RSP PDU with the Error Code parameter set to Incorrect Time Format (0x81).
4. The IUT receives an ATT_ERROR_RSP PDU from the Lower Tester and reports it to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received Attribute Protocol Application Error Code parameter set to Incorrect Time Format (0x81) to the Upper Tester.

  Verify that the IUT returns to a stable state and can process commands normally.

4.15 GHS Server Time Management

Test the GHS Server IUT implementation to verify that the Time Stamp value, in a Health Observation body, is set appropriately.

GHSP/SR/TM/BV-01-C [Time Stamp value and Time Value of Elapsed Time characteristic]

- Test Purpose

  Verify that the GHS Server IUT reported Time_Stamp field value matches the read Time_Value field value of the Elapsed Time characteristic increased by the natural progression of time.

- Reference

  [3] 3.3

- Initial Condition

  - Perform the preamble described in Section 4.2.10 with the required <Control Point Characteristic> set to GHS Control Point.
  - The IUT is configured to send Live Health Observations characteristic values to the Lower Tester (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).
  - The handle of the Current Elapsed Time characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.3 in [10] or is known to the Lower Tester by other means.

- Test Procedure

  1. Perform an action on the IUT that will induce it to generate one or more live observations or temporarily stored observations.
  2. The Lower Tester receives one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) from the IUT containing the characteristic handle and value.
  3. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  4. The Lower Tester sends an ATT_READ_REQ PDU to the IUT to read the Current Elapsed Time characteristic value.
  5. The IUT sends an ATT_READ_RSP PDU to the Lower Tester.

- Expected Outcome

- Pass verdict

  The IUT sends one or more indications or notifications of the Live Health Observations characteristic with observations that include a Time Stamp.

  The Time Stamp value in each Health Observation Body matches the Time Value of the Elapsed Time characteristic value, increased by the natural progression of time, read in Step 5.

  The Timestamp Is From The Current Timeline flag is set to 1.

GHSP/SR/TM/BV-02-C [Reported observations Time Stamp time value after TZ/DST Offset change]

- Test Purpose

  Verify that the GHS Server IUT, after a TZ/DST Offset update, does not change the Time Stamp time value of temporarily stored and stored observations from the current timeline.

- Reference

  [3] 3.3

- Initial Condition
  - Perform the preamble described in Section 4.2.10 with the required <Control Point Characteristic> set to GHS Control Point and RACP.
  - The IUT is configured to send Live Health Observations characteristic values to the Lower Tester (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).
  - The handle of the Current Elapsed Time characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.3 in [10] or is known to the Lower Tester by other means.
  - The Current Elapsed Time characteristic is configured for indication.
  - The Lower Tester has acquired the TZ/DST Offset by reading the Current Elapsed Time characteristic, and the Clock Needs To Be Set flag is 1.
  - Perform an action on the IUT that will induce it to generate temporarily stored observations and records with stored observations.
- Test Procedure
  1. The Upper Tester induces the IUT to change the TZ/DST Offset to a new value via a Current Elapsed Time characteristic write or via the IUT's UI.
  2. If the time update was made via the UI, then the IUT sends an ATT_HANDLE_VALUE_IND PDU containing the Current Elapsed Time characteristic handle and value to the Lower Tester.
  3. If in Step 2 the Lower Tester receives an ATT_HANDLE_VALUE_IND PDU, then the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  4. The IUT sends one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) to the Lower Tester containing the Live Health Observations characteristic handle and value. Each indication or notification contains a Segmentation_Header field and a partial or a whole Health_Observation_Body_Segment field as described in Section 3.2.1 of [4].
  5. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  6. The Lower Tester writes the Combined report opcode (0x07) to the RACP characteristic using an operator of All records (0x01).
  7. The IUT sends one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) of the Stored Health Observation characteristic to the Lower Tester. Each indication or notification contains a Segmentation_Header field and a partial or a whole Stored_Health_Observations_Segment field as described in Section 3.3.1 of [4].
  8. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  9. The IUT sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Combined report response opcode (0x08), an operator of Null (0x00), and an operand representing the number of records sent to the Lower Tester.
  10. The Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
- Expected Outcome

  Pass verdict

  In Step 1, the IUT updates the TZ/DST Offset to the new value.

  The TZ/DST Offset value reported in the Time_Stamp field value of each Health Observation Body in the Live Health Observations characteristic or Stored Health Observation characteristic is not changed from the value acquired in the initial condition.

GHSP/SR/TM/BV-03-C [Stored observations are updated on time change]

- Test Purpose

  Verify that the GHS Server IUT updates each stored observation's Time Stamp time value as described in Table 4.18.

- Reference

  [3] 3.3

- Initial Condition

  - Perform the preamble described in Section 4.2.10 with the required <Control Point Characteristic> set to GHS Control Point and RACP.
  - The handle of the Current Elapsed Time characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.3 in [10] or is known to the Lower Tester by other means.
  - The Current Elapsed Time characteristic is configured for indications.
  - The Lower Tester has acquired the Time_Value field value (Tstart) by reading the Current Elapsed Time characteristic.
  - After acquiring the time, the IUT has generated records with stored observations without any intermediate updates of the time.

- Test Procedure

  1. The Lower Tester writes the Combined Report opcode (0x07) to the RACP characteristic using an operator of All records (0x01).
  2. The IUT sends one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) of the Stored Health Observation characteristic to the Lower Tester. Each indication or notification contains a Segmentation_Header field and a partial or a whole Stored_Health_Observations_Segment field as described in Section 3.3.1 of [4].
  3. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  4. The IUT sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Combined Report Response opcode (0x08), an operator of Null (0x00), and an operand representing the number of records sent to the Lower Tester.
  5. The Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  6. The Upper Tester induces the IUT to change the Time Value of the Current Elapsed Time characteristic to a new value via a Current Elapsed Time characteristic write or via the IUT's UI.
  7. If the time update was made via the UI, the IUT sends an ATT_HANDLE_VALUE_IND PDU containing the Current Elapsed Time characteristic handle and value to the Lower Tester.
  8. The Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
     If the time can only be updated by causing a time fault and a disconnection of the client, then this is also fine, and the connection is established again after the time update.
  9. Repeat Steps 1–5.

- Expected Outcome

  Pass verdict

  For each reported stored observation received in Step 2, the Timestamp Is From The Current Timeline flag is set to 1.

  In Step 6, the IUT updates the Time Value of the Elapsed Time characteristic to a new value.

For each reported stored observation received in Step 9, the IUT applies an update policy, with the field and flag, described in Table 4.18.

Update policy	Description
Policy 1	• The Time_Stamp field is kept on the old timeline: ○ The Time Stamp time value matches the Time Value acquired in the initial condition adjusted for the natural progression of time when the observation was generated. ○ Timestamp Is From The Current Timeline flag is set to 0.
Policy 2	• The Time_Stamp field is adjusted to the new timeline: ○ The Time Stamp time value matches the updated Time Value adjusted for the natural progression of time when the observation was generated. ○ Timestamp Is From The Current Timeline flag is 1.

Table 4.18: Observations Time Stamp time update policies

GHSP/SR/TM/BV-04-C [Temporarily stored observations are updated on time change]

- Test Purpose

  Verify that the GHS Server IUT updates each temporarily stored observation's Time Stamp time value as described in Table 4.18.

- Reference

  [3] 3.3

- Initial Condition

  - Perform the preamble described in Section 4.2.10 with the required <Control Point Characteristic> set to GHS Control Point and RACP.
  - The handle of the Current Elapsed Time characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.3 in [10] or is known to the Lower Tester by other means.
  - The Current Elapsed Time characteristic is configured for indications.
  - The Lower Tester has acquired the Time_Value field value (Tstart) by reading the Current Elapsed Time characteristic.
  - After acquiring the time, the IUT has generated temporarily stored observations without any intermediate updates of the time.

- Test Procedure

  1. The Lower Tester configures the IUT to send Live Health Observations characteristic values (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).
  2. The Lower Tester receives one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) from the IUT containing the Live Health Observations characteristic handle and value. Each indication or notification contains a Segmentation_Header field and a partial or a whole Health_Observations_Body_Segment field as described in Section 3.2.1 of [4].
  3. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
  4. The Lower Tester disconnects from the IUT.
  5. The Upper Tester induces the IUT to generate one or more temporarily stored observations.

6. Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
7. The Upper Tester induces the IUT to change the Time Value of the Current Elapsed Time characteristic to a new value via a Current Elapsed Time characteristic write or via the IUT's UI.
8. If the time update was made via the UI, then the IUT sends an ATT_HANDLE_VALUE_IND PDU containing the Current Elapsed Time characteristic handle and value to the Lower Tester.
9. The Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
   If the time can only be updated by causing a time fault and a disconnection of the client, then this is also fine, and the connection is established again after the time update.
10. The Lower Tester configures the IUT to send Live Health Observations characteristic values (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).
11. The IUT sends one or more ATT_HANDLE_VALUE_IND PDU(s) or ATT_HANDLE_VALUE_NTF PDU(s) to the Lower Tester containing the Live Health Observations characteristic handle and value. Each indication or notification contains a Segmentation_Header field and a partial or a whole Health_Observations_Body_Segment field as described in Section 3.2.1 of [4].
12. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.

- Expected Outcome

  Pass verdict

  For each reported temporarily stored observation received in Step 2, the Timestamp Is From The Current Timeline flag is set to 1.

  In Step 7, the IUT updates the Time Value of the Elapsed Time characteristic to a new value.

  For each reported temporarily stored observation received in Step 11, the IUT applies an update policy, with the field and flag, described in Table 4.18.

4.16 GHS Server Trusted Relationships

Test the GHS Server IUT implementation to verify that it will send observations data only to the correct user.

GHSP/SR/GHST/BV-01-C [Multi-user GHS Server providing data to a single trusted Client with multiple users]

- Test Purpose

  Verify that the GHS Server IUT provides only the data that pertains to the correct user when different users utilize the same Client.

- Reference

  [3] 3.6, 4.5.8

- Initial Condition

  - There are at least two registered users already registered in the IUT and these were registered by the same Client (i.e., the Lower Tester). These users are referred to below as "User A" and "User B".
  - The IUT is configured to send Live Health Observations characteristic values to the Lower Tester (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).

- Test Procedure

  1. Perform the preamble described in Section 4.2.10 with the required <Control Point Characteristic> set to User Control Point characteristic.
  2. The Lower Tester initiates the Consent procedure and supplies the correct User Index and Consent Code parameters for User A.
  3. The IUT confirms that the Consent procedure was completed successfully.
  4. The Lower Tester reads the value of the User Index characteristic. The value is recorded for assessment.
  5. Induce the IUT to indicate or notify the Live Health Observations characteristic.
  6. Monitor indications or notifications sent by the IUT for 30 seconds.
  7. The Lower Tester initiates the Consent procedure and supplies the correct User Index and Consent Code parameters for User B.
  8. The IUT confirms that the Consent procedure was completed successfully.
  9. The Lower Tester reads the value of the User Index characteristic. The value is recorded for assessment.
  10. Induce the IUT to indicate or notify the Live Health Observations characteristic.
  11. Monitor indications or notifications sent by the IUT for a further 30 seconds.

- Expected Outcome

  Pass verdict

  At Step 3, the IUT, after sending an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.

  The value of the User Index characteristic recorded at Step 4 equals the value of the User Index for User A.

  The value of the User Index field within any indications or notifications of the Live Health Observations characteristic, received from the IUT during Steps 5–6, equals the value of the User Index for User A.

  At Step 7, the IUT, after sending an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.

  The value of the User Index characteristic recorded at Step 9 equals the value of the User Index for User B.

  The value of the User Index field within any indications or notifications of the Live Health Observations characteristic, received from the IUT during Steps 10–11, equals the value of the User Index for User B.

  No measurement data belonging to any user other than User A is received during Steps 1–6.

  No measurement data belonging to any user other than User B is received during Steps 8–11.

GHSP/SR/GHST/BV-02-C [Multi-user GHS Server providing data to multiple trusted Clients with sequential access]

- Test Purpose

  Verify that the GHS Server IUT provides only the data that pertains to the correct user when different users utilize different Clients, and these connect to the GHS Server IUT at different times.

- Reference

  [3] 3.6, 4.5.8

- Initial Condition

  - The IUT has two registered users registered by different Clients:
    - “User A” registered by Client A (Lower Tester 1).
    - “User B” registered by Client B (Lower Tester 2).
  - The IUT is configured to send Live Health Observations characteristic values to Lower Tester 1 emulating Client A and to Lower Tester 2 emulating Client B (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).

- Test Procedure

  1. Lower Tester 1 runs the preamble procedure defined in Section 4.2.10 to configure the IUT for use with the User Control Point.
  2. Lower Tester 1 initiates the Consent procedure and supplies the correct User Index and Consent Code parameters for User A.
  3. The IUT confirms that the Consent procedure was completed successfully.
  4. Lower Tester 1 configures the IUT to send Live Health Observations characteristic values (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10].
  5. Induce the IUT to indicate or notify the Live Health Observations characteristic for User A.
  6. Monitor indications or notifications sent by the IUT for 30 seconds.
  7. Lower Tester 1 terminates the connection with the IUT.
  8. Lower Tester 2 runs the preamble procedure defined in Section 4.2.10 to configure the IUT for use with the User Control Point.
  9. Lower Tester 2 initiates the Consent procedure and supplies the correct User Index and Consent Code parameters for User B.
  10. The IUT confirms that the Consent procedure was completed successfully.
  11. Lower Tester 2 configures the IUT to send Live Health Observations characteristic values (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10].
  12. Induce the IUT to indicate or notify the Live Health Observations characteristic for User B.
  13. Monitor indications or notifications sent by the IUT for 30 seconds.

- Expected Outcome

  Pass verdict

  At Step 3, the IUT, after sending an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.

  The value of the User Index field within any indications or notifications of the Live Health Observations characteristic, received from the IUT during Steps 5–6, equals the value of the User Index for User A.

At Step 10, the IUT, after sending an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.

The value of the User Index field within any indications or notifications of the Live Health Observations characteristic, received from the IUT during Steps 12–13, equals the value of the User Index for User B.

During Steps 1–6, Lower Tester 1 receives only measurement data that is applicable to User A.

During Steps 8–13, Lower Tester 2 receives only measurement data that is applicable to User B.

- Notes

  Lower Tester 1, emulating Client A, in this test case uses a different Bluetooth Address from Lower Tester 2, emulating Client B.

GHSP/SR/GHST/BV-03-C [Multi-user GHS Server providing data to multiple trusted Clients with one Client not supporting UDS]

- Test Purpose

  Verify that the GHS Server IUT provides only the Stored Health Observation data that pertains to the correct user when different users utilize different Clients with and without UDS support.

- Reference

  [3] 3.6, 4.5.8

- Initial Condition

  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.
  - The IUT has two registered users:
    - “User A” registered by Client A (Lower Tester 1).
    - Client C (Lower Tester 2), which does not use or support UDS.
  - The IUT contains Stored Health Observation records for “User A”, for which UDS is used, and for Client C, for which UDS is not used or not supported.

- Test Procedure

  1. Lower Tester 1, emulating Client A, runs the preamble procedure defined in Section 4.2.10 to configure the IUT for use with the User Control Point and RACP.
  2. Lower Tester 1 initiates the Consent procedure and supplies the correct User Index and Consent Code parameters for User A.
  3. The IUT confirms that the Consent procedure was completed successfully.
  4. Lower Tester 1 reads the value of the User Index characteristic. The value is recorded for assessment.
  5. Lower Tester 1 writes the Combined Report opcode (0x07) to the RACP characteristic using an operator of All records (0x01).
  6. Lower Tester 1 receives the ATT_HANDLE_VALUE_IND PDU or ATT_HANDLE_VALUE_NTF PDU of the Stored Health Observation characteristic, from the IUT, with the records associated with User A.
  7. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.

8. Lower Tester 1 receives an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Combined Report Response opcode (0x08), an operator of Null (0x00), and an operand representing the number of records sent, from the IUT, that are associated with User A.
9. Lower Tester 1 sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
10. Lower Tester 1 terminates the connection with the IUT.
11. Lower Tester 2, emulating Client C, runs the preamble procedure defined in Section 4.2.10 to configure the IUT for use with the RACP.
12. Lower Tester 2 writes the Combined Report opcode (0x07) to the RACP characteristic using an operator of All records (0x01).
13. Lower Tester 2 receives the ATT_HANDLE_VALUE_IND PDU or ATT_HANDLE_VALUE_IND PDU of the Stored Health Observation characteristic, from the IUT, with the records not associated with users supporting UDS.
14. For each received indication, the Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.
15. Lower Tester 2 receives an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Combined Report Response opcode (0x08), an operator of Null (0x00), and an operand representing the number of records sent, from the IUT, that are not associated with users supporting UDS.
16. The Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.

- Expected Outcome

  Pass verdict

  At Step 3, the IUT, after sending an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.

  The value of the User Index characteristic recorded at Step 4 equals the value of the User Index for User A.

  The value of the Patient field within any indications or notifications of the Stored Health Observation characteristic received, from the IUT, during Steps 6–9 equals the value of the User Index for User A.

  In Steps 5–10, Lower Tester 1 receives only Stored Health Observation records that are applicable to User A.

  In Steps 13–16, Lower Tester 2 receives Stored Health Observation records data not containing a Patient field or the Patient field value set to 0xFF.

  Each indication or notification of the Stored Health Observation characteristic has the Segmentation_Header field with the First Segment bit, Last Segment bit, and Rolling Segment Counter bits with appropriate values.

- Notes

  Lower Tester 1, emulating Client A, in this test case uses a different Bluetooth Address from the Lower Tester 2, emulating Client C.

GHSP/SR/GHST/BV-04-C [Multi-user GHS Server providing data to multiple trusted Clients with concurrent access]

- Test Purpose

  Verify that the GHS Server IUT provides only the data that pertains to the correct user to each Client when different users utilize different Clients, and two Clients connect to the GHS Server IUT concurrently.

- Reference

  [3] 3.6, 4.5.8

- Initial Condition

  - The IUT has two registered users by different Clients:
    - “User A” registered by Client A (Lower Tester 1).
    - “User B” registered by Client B (Lower Tester 2).
  - The IUT is configured to send Live Health Observations characteristic values to Lower Tester 1 and Lower Tester 2 (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).

- Test Procedure

  1. Lower Tester 1, emulating Client A, runs the preamble procedure defined in Section 4.2.10 to configure the IUT for use with the User Control Point.
  2. A second Lower Tester 2, emulating Client B, runs the preamble procedure defined in Section 4.2.10 to configure the IUT for use with the User Control Point.
  3. The IUT successfully establishes and maintains connections with both Lower Tester 1 and Lower Tester 2 concurrently.
  4. Lower Tester 1 initiates the Consent procedure and supplies the correct User Index and Consent Code parameters for User A.
  5. The IUT confirms to Lower Tester 1 that the Consent procedure was completed successfully.
  6. Lower Tester 2 initiates the Consent procedure and supplies the correct User Index and Consent Code parameters for User B.
  7. The IUT confirms to Lower Tester 2 that the Consent procedure was completed successfully.
  8. Lower Tester 1 reads the value of the User Index characteristic. The value is recorded for assessment.
  9. Lower Tester 2 reads the value of the User Index characteristic. The value is recorded for assessment.
  10. Induce the IUT to indicate or notify the Live Health Observations characteristic for User A and User B.
  11. Monitor indications or notifications sent by the IUT for 30 seconds.

- Expected Outcome

  Pass verdict

  At Step 5 and at Step 7, the IUT, after sending an ATT_WRITE_RSP PDU to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x02) followed by the Response Value for Success (0x01) without a Response parameter.

  The value of the User Index characteristic recorded at Step 8 equals the value of the User Index for User A.

The value of the User Index characteristic recorded at Step 9 equals the value of the User Index for User B.

The value of the Patient field within any indications or notifications, of the Live Health Observations characteristic, received from the IUT by Lower Tester 1 equals the value of the User Index for User A.

The value of the Patient field within any indications or notifications, of the Live Health Observations characteristic, received from the IUT by Lower Tester 2 equals the value of the User Index for User B.

Lower Tester 1 receives only measurement data that is applicable to User A.

Lower Tester 2 receives only measurement data that is applicable to User B.

GHSP/SR/GHST/BI-01-C [No records found]

- Test Purpose

  Verify that a multi-user GHS Server IUT responds appropriately to a Combined Report procedure when there are no records for the requesting Client, which does not use or support UDS, while there are records for one or more Clients supporting UDS.

- Reference

  [3] 3.6, 4.4.9.3

- Initial Condition

  - Perform the preamble described in Section 4.2.10 with the required <Control Point Characteristic> set to User Control Point and RACP.
  - There are at least two registered users already registered in the IUT, which were registered by the Lower Tester (i.e., the same Client registered all the users).
  - The IUT contains one or more Stored Health Observation records for each of the registered users, and there are no records for other users.
  - The Lower Tester has not initiated a Consent procedure.

- Test Procedure

  1. The Lower Tester writes the Combined Report opcode (0x07) to the RACP characteristic using an operator of All records (0x01).
  2. The Lower Tester receives an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Response Code opcode (0x06), an operator of Null (0x00), and an operand consisting of the Request opcode (0x07) followed by the Response Code Value for No records found (0x06).
  3. The Lower Tester sends an ATT_HANDLE_VALUE_CFM PDU to the IUT.

- Expected Outcome

  Pass verdict

  The IUT does not send any indication or notification of the Stored Health Observation characteristic.

  The IUT sends an indication of the RACP characteristic with the Response Code Value for No records found (0x06).

GHSP/SR/GHST/BI-02-C [Wrong Consent]

- Test Purpose

  Verify that a GHS Server IUT does not send any indications or notifications of the Live Health Observations characteristic to a Client that provided a Consent Code that was not accepted by the IUT.

- Reference

  [3] 3.6

- Initial Condition

  - Perform the preamble described in Section 4.2.10 with the required <Control Point Characteristic> set to User Control Point.
  - There are at least two registered users already registered in the GHS Server IUT, which were registered by the Lower Tester (i.e., the same Client registered all the users). Refer to GHSP/CL/UDS/BV-01-C [User Control Point Service Procedures] on how to register a user.
  - The IUT is configured to send Live Health Observations characteristic values to the Lower Tester (e.g., by executing test case GHSS/SR/GCP/BV-01-C [Start sending live observations] in [10]).

- Test Procedure

  1. The Lower Tester initiates the Consent procedure in respect of one of the validly registered users and supplies a correctly formatted but non-matching Consent Code.
  2. The Lower Tester receives an ATT_HANDLE_VALUE_IND PDU of the User Data Control Point characteristic containing the Response Code opcode (0x20) and the Request opcode (0x02) followed by the Response Value for User Not Authorized (0x05) without a Response parameter.
  3. Monitor indications or notifications sent by the IUT for 30 seconds.

- Expected Outcome

  Pass verdict

  The IUT sends an indication of the User Control Point characteristic with the Response Value for User Not Authorized (0x05) without a Response parameter.

  The Lower Tester does not receive any indications or notifications of the Live Health Observations characteristic from the IUT.

4.16.1 GHS Server – Deleting of Stored Health Observation with UDS

Test the GHS Server IUT implementation to verify that it can delete Stored Health Observation records for a registered user.

GHSP/SR/RAD/BV-01-C [Delete Stored Records procedure with UDS]

- Test Purpose

  Verify that, after receiving the UDS Consent Code, the GHS Server IUT can perform the Delete Stored Records procedure for Stored Health Observations with the User Index assigned to the designated Lower Tester.

- Reference

  [3] 4.4.9.4, 4.5.8

- Initial Condition
  - Perform the preamble described in Section 4.2.10 with the required <Control Point Characteristic> set to RACP and User Control Point characteristics, and applicable <Corresponding Characteristic>.
  - There are at least two registered users already registered in the GHS Server IUT and these were registered by the same Client (i.e., the Lower Tester). These users are referred to as “User A” and “User B”.
  - Perform an action on the GHS Server IUT that will induce it to generate at least three Stored Health Observation records for User A, and several (e.g., five or more) records for User B.
- Test Procedure
  1. The Lower Tester executes the Consent procedure for User B.
  2. The Lower Tester writes the Report Number of Stored Records opcode (0x04) to the RACP characteristic using an operator of All records (0x01).
  3. The IUT sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Number of Stored Records Response opcode (0x05) an operator of Null (0x00), and an operand representing the number of records that were found.
  4. The Lower Tester executes the Consent procedure for User A.
  5. The Lower Tester writes the Delete Stored Records opcode (0x02) to the RACP characteristic using an operator of All records (0x01).
  6. The IUT sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Response Code opcode (0x06), an operator of Null (0x00), and an operand representing the Request opcode (0x02) followed by the Response Code for Success (0x01) to the Lower Tester.
  7. The IUT receives an ATT_HANDLE_VALUE_CFM PDU from the Lower Tester.
  8. The Lower Tester writes the Report Number of Stored Records opcode (0x04) to the RACP characteristic using an operator of All records (0x01).
  9. The IUT sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Number of Stored Records Response opcode (0x05), an operator of Null (0x00), and an operand representing that no records were found (0x0000).
  10. The Lower Tester executes the Consent procedure for User B.
  11. The Lower Tester writes the Report Number of Stored Records opcode (0x04) to the RACP characteristic using an operator of All records (0x01).
  12. The IUT sends an ATT_HANDLE_VALUE_IND PDU of the RACP characteristic with the Number of Stored Records Response opcode (0x05), an operator of Null (0x00), and an operand representing the number of records found.
- Expected Outcome

  Pass verdict

  For User A, the IUT sends:
  - In Step 9, one indication of the RACP characteristic with the Number of Stored Records Response opcode (0x05) and an operand representing that no records were found (0x0000)

  For User B, the IUT sends:
  - In Step 12, one indication of the RACP characteristic with the Number of Stored Records Response opcode (0x05) and an operand representing the number of records that were found in Step 3

5 Test case mapping

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

The columns for the TCMT are defined as follows:

Item: Contains a logical expression based on specific entries from the associated ICS document. Contains a logical expression (using the operators AND, OR, NOT as needed) based on specific entries from the applicable ICS document(s). The entries are in the form of y/x references, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS document for GHSP [11].

If a test case is mandatory within the respective layer, then the y/x reference is omitted.

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

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

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

Item	Feature	Test Case(s)
GHSP 11/1	Generic Health Sensor Service	GHSP/CL/CGGIT/SER/BV-01-C
GHSP 12/1	Health Sensor Features characteristic	GHSP/CL/CGGIT/CHA/BV-02-C
GHSP 12/4	Live Health Observations characteristic	GHSP/CL/CGGIT/CHA/BV-03-C GHSP/CL/CDWR/BV-02-C GHSP/CL/CDWR/BV-03-C
GHSP 12/5	Stored Health Observations characteristic	GHSP/CL/CGGIT/CHA/BV-04-C GHSP/CL/CDWR/BV-04-C GHSP/CL/CDWR/BV-05-C
GHSP 12/6	Record Access Control Point characteristic	GHSP/CL/CGGIT/CHA/BV-05-C GHSP/CL/CDWR/BV-06-C GHSP/CL/RAC/BV-10-C GHSP/CL/RAC/BV-13-C GHSP/CL/RAN/BV-10-C GHSP/CL/RAN/BV-13-C GHSP/CL/SPE/BI-07-C GHSP/CL/SPE/BI-08-C
GHSP 12/7	GHS Control Point characteristic	GHSP/CL/CGGIT/CHA/BV-06-C GHSP/CL/CDWR/BV-07-C GHSP/CL/GCP/BV-01-C GHSP/CL/SPE/BI-09-C
GHSP 12/6 AND GHSP 12/7	Server Busy	GHSP/CL/SPE/BI-10-C
GHSP 12/8	Observation Schedule Changed characteristic	GHSP/CL/CGGIT/CHA/BV-07-C GHSP/CL/CDWR/BV-08-C GHSP/CL/SCI/BV-20-C
GHSP 12/2	Observation Schedule descriptor	GHSP/CL/CGGIT/DES/BV-08-C GHSP/CL/DW/BV-01-C GHSP/CL/SPE/BI-11-C

Item	Feature	Test Case(s)
GHSP 12/3	Valid Range and Accuracy descriptor	GHSP/CL/CGGIT/DES/BV-09-C
GHSP 11/2	Device Information Service and mandatory characteristics	GHSP/CL/CGGIT/SER/BV-10-C GHSP/CL/CGGIT/CHA/BV-11-C GHSP/CL/CGGIT/CHA/BV-12-C GHSP/CL/CGGIT/CHA/BV-13-C GHSP/CL/CGGIT/CHA/BV-14-C GHSP/CL/CGGIT/CHA/BV-15-C GHSP/CL/CR/BV-03-C GHSP/CL/CR/BV-04-C GHSP/CL/CR/BV-05-C GHSP/CL/CR/BV-06-C
GHSP 17/6	Hardware Revision String characteristic	GHSP/CL/CGGIT/CHA/BV-16-C GHSP/CL/CR/BV-07-C
GHSP 17/7	Software Revision String characteristic	GHSP/CL/CGGIT/CHA/BV-17-C GHSP/CL/CR/BV-08-C
GHSP 17/8	UDI for Medical Devices characteristic	GHSP/CL/CGGIT/CHA/BV-18-C GHSP/CL/CR/BV-09-C
GHSP 11/3	Elapsed Time Service	GHSP/CL/CGGIT/SER/BV-19-C
GHSP 18/1 AND GHSP 18/2	Current Elapsed Time characteristic	GHSP/CL/CGGIT/CHA/BV-20-C
GHSP 18/3	Configure Current Elapsed Time characteristic for indication	GHSP/CL/CDWR/BV-09-C
GHSP 11/4	Battery Service	GHSP/CL/CGGIT/SER/BV-21-C
GHSP 19/1 AND GHSP 19/4 AND GHSP 19/5	Battery Level characteristic	GHSP/CL/CGGIT/CHA/BV-22-C GHSP/CL/CDWR/BV-10-C
GHSP 19/2 AND GHSP 19/4 AND GHSP 19/5	Battery Level Status characteristic	GHSP/CL/CGGIT/CHA/BV-23-C GHSP/CL/CDWR/BV-11-C GHSP/CL/CDWR/BV-12-C
GHSP 19/3 AND GHSP 19/4 AND GHSP 19/5	Battery Information characteristic	GHSP/CL/CGGIT/CHA/BV-24-C GHSP/CL/CDWR/BV-13-C
GHSP 11/6	User Data Service	GHSP/CL/CGGIT/SER/BV-25-C GHSP/CL/SPE/BI-01-C GHSP/CL/SPE/BI-02-C GHSP/CL/SPE/BI-03-C
GHSP 21/1	User Control Point characteristic	GHSP/CL/CGGIT/CHA/BV-26-C GHSP/CL/CDWR/BV-15-C GHSP/CL/UDS/BV-01-C GHSP/CL/SPE/BI-05-C GHSP/CL/SPE/BI-06-C
GHSP 21/2	User Index characteristic	GHSP/CL/CGGIT/CHA/BV-27-C
GHSP 21/3	Registered User characteristic	GHSP/CL/CGGIT/CHA/BV-28-C GHSP/CL/CDWR/BV-16-C
GHSP 21/4	Database Change Increment characteristic	GHSP/CL/CGGIT/CHA/BV-29-C

Item	Feature	Test Case(s)
GHSP 22/7	Configure Database Change Increment Characteristic for Notification	GHSP/CL/CDWR/BV-14-C
GHSP 3/1 AND GHSP 2/2 AND NOT GHSP 2/1 AND GATT 1a/4	Not discoverable over BR/EDR – Generic Health Sensor Service	GHSP/SR/SGGIT/SDPNF/BV-30-C GHSP/SR/SGGIT/SDPNF/BV-31-C
GHSP 3/1 AND GHSP 2/2 AND NOT GHSP 2/1 AND GHSP 4/3 AND GATT 1a/4	Not discoverable over BR/EDR – Elapsed Time Service	GHSP/SR/SGGIT/SDPNF/BV-32-C
GHSP 3/1 AND GHSP 2/2 AND NOT GHSP 2/1 AND GHSP 4/4 AND GATT 1a/4	Not discoverable over BR/EDR – Battery Service	GHSP/SR/SGGIT/SDPNF/BV-33-C
GHSP 3/1 AND GHSP 2/2 AND NOT GHSP 2/1 AND GHSP 4/6 AND GATT 1a/4	Not discoverable over BR/EDR – User Data Service	GHSP/SR/SGGIT/SDPNF/BV-34-C
GHSP 3/1	Generic Health Sensor Service and Device Information Service	GHSP/SR/SGGIT/SER/BV-35-C GHSP/SR/SGGIT/SER/BV-36-C
GHSP 6/3 OR GHSP 6/4 OR GHSP 6/5	Serial Number String, System ID, or UDI for Medical Devices Characteristics	GHSP/SR/SGGIT/CHA/BV-37-C GHSP/SR/SGGIT/CHA/BV-38-C GHSP/SR/SGGIT/CHA/BV-39-C
GHSP 4/3	Elapsed Time Service	GHSP/SR/SGGIT/SER/BV-40-C
GHSP 4/4	Battery Service	GHSP/SR/SGGIT/SER/BV-41-C
GHSP 4/7	Reconnection Configuration Service	GHSP/SR/SGGIT/SER/BV-42-C
GHSP 4/6	User Data Service	GHSP/SR/SGGIT/SER/BV-43-C
GHSP 9/1	First Name Characteristic	GHSP/SR/SGGIT/CHA/BV-44-C
GHSP 9/2	Last Name Characteristic	GHSP/SR/SGGIT/CHA/BV-45-C
GHSP 5/1	GHS Service UUID in AD	GHSP/SR/GHSF/BV-01-C
GHSP 5/2	Service Data in AD Type, non-bonded case	GHSP/SR/GHSF/BV-02-C
GHSP 5/2 AND GHSP 4/6	Service Data in AD Type with UDS	GHSP/SR/GHSF/BV-03-C
GHSP 5/3	Local Name	GHSP/SR/GHSF/BV-04-C
GHSP 5/4 OR GHSP 5/16	LE GATT Security Levels characteristic	GHSP/SR/SGGIT/CHA/BV-46-C GHSP/SR/GHSF/BV-05-C
(GHSP 5/5 OR GHSP 5/6) AND GHSP 5/12	Patient field value and User Index value	GHSP/SR/GHSF/BV-06-C
GHSP 4/6 AND GHSP 5/10 AND GHSP 5/15	GHS Server with Multiple Users	GHSP/SR/GHSF/BV-07-C

Item	Feature	Test Case(s)
GHSP 24/2 OR (GHSP 24/3 AND GHSP 24/4)	Client Pairing and Bonding	GHSP/CL/GHSF/BV-01-C
GHSP 13/7	Read Health Sensor Features characteristic	GHSP/CL/CR/BV-01-C
GHSP 13/8	Read Long Health Sensor Features characteristic	GHSP/CL/CR/BV-02-C
GHSP 13/9	Configure Health Sensor Features Characteristic for Indication	GHSP/CL/CDWR/BV-01-C
GHSP 22/10	User Data Synchronization Feature	GHSP/CL/UDS/BV-02-C
GHSP 22/13	Delete User Data	GHSP/CL/UDS/BV-04-C
GHSP 22/14	List All Users	GHSP/CL/UDS/BV-03-C
GHSP 22/15	Delete User(s)	GHSP/CL/UDS/BV-05-C GHSP/CL/UDS/BV-06-C
GHSP 22/6	Read User Index characteristic	GHSP/CL/UDS/BV-07-C
GHSP 22/8	Read Database Change Increment characteristic	GHSP/CL/UDS/BV-08-C
GHSP 22/9	Write Database Change Increment characteristic	GHSP/CL/UDS/BV-09-C
GHSP 22/7	Receive Database Change Increment Characteristic Notification	GHSP/CL/UDS/BV-10-C
GHSP 22/1	Read UDS characteristic	GHSP/CL/UDS/BV-11-C GHSP/CL/SPE/BI-04-C
GHSP 22/2	Write UDS characteristic	GHSP/CL/UDS/BV-12-C
GHSP 22/3	Read Long UDS characteristic	GHSP/CL/UDS/BV-13-C
GHSP 22/4	Write Long UDS characteristic	GHSP/CL/UDS/BV-14-C
GHSP 13/1	Indications of live or temporarily stored observations	GHSP/CL/SCI/BV-01-C GHSP/CL/SCI/BV-02-C GHSP/CL/SCI/BV-03-C GHSP/CL/SCI/BV-04-C GHSP/CL/SCI/BV-05-C GHSP/CL/SCI/BV-06-C GHSP/CL/SCI/BV-07-C GHSP/CL/SCI/BV-08-C GHSP/CL/SCI/BV-09-C
GHSP 13/2	Notifications of live or temporarily stored observations	GHSP/CL/SCN/BV-01-C GHSP/CL/SCN/BV-02-C GHSP/CL/SCN/BV-03-C GHSP/CL/SCN/BV-04-C GHSP/CL/SCN/BV-05-C GHSP/CL/SCN/BV-06-C GHSP/CL/SCN/BV-07-C GHSP/CL/SCN/BV-08-C GHSP/CL/SCN/BV-09-C

Item	Feature	Test Case(s)
GHSP 12/4 OR GHSP 12/5	Time-out between two consecutive segments from a single health observation and RACP procedure time-out	GHSP/CL/SCIN/BI-01-C GHSP/CL/SCIN/BI-02-C
GHSP 13/8	Receive Health Sensor Features Characteristic Indication	GHSP/CL/SCI/BV-19-C
GHSP 15/8	Combined Report or Report Number of Stored Records with Operator First record	GHSP/CL/RAC/BV-11-C GHSP/CL/RAN/BV-11-C
GHSP 15/9	Combined Report or Report Number of Stored Records with Operator Last record	GHSP/CL/RAC/BV-12-C GHSP/CL/RAN/BV-12-C
GHSP 15/3	Combined Report or Report Number of Stored Records and Operator Greater than or equal to with Operand Time Filter	GHSP/CL/RAC/BV-14-C GHSP/CL/RAN/BV-14-C
GHSP 15/4	Combined Report or Report Number of Stored Records and Operator Less than or equal to with Operand Record Number	GHSP/CL/RAC/BV-15-C GHSP/CL/RAN/BV-15-C
GHSP 15/5	Combined Report or Report Number of Stored Records and Operator Less than or equal to with Operand Time Filter	GHSP/CL/RAC/BV-16-C GHSP/CL/RAN/BV-16-C
GHSP 15/6	Combined Report or Report Number of Stored Records and Operator Within range of (inclusive) with Operand Record Number	GHSP/CL/RAC/BV-17-C GHSP/CL/RAN/BV-17-C
GHSP 15/7	Combined Report or Report Number of Stored Records and Operator Within range of (inclusive) with Time Filter	GHSP/CL/RAC/BV-18-C GHSP/CL/RAN/BV-18-C
GHSP 14/3	Delete Stored Records with Operator All records	GHSP/CL/RAD/BV-10-C
GHSP 16/8	Delete Stored Records with Operator First record	GHSP/CL/RAD/BV-11-C
GHSP 16/9	Delete Stored Records with Operator Last record	GHSP/CL/RAD/BV-12-C
GHSP 16/2	Delete Stored Records with Operator Greater than or equal to and Operand Record Number	GHSP/CL/RAD/BV-13-C
GHSP 16/3	Delete Stored Records with Operator Greater than or equal to and Operand Time Filter	GHSP/CL/RAD/BV-14-C
GHSP 16/4	Delete Stored Records with Operator Less than or equal to and Operand Record Number	GHSP/CL/RAD/BV-15-C
GHSP 16/5	Delete Stored Records with Operator Less than or equal to and Operand Time Filter	GHSP/CL/RAD/BV-16-C

Item	Feature	Test Case(s)
GHSP 16/6	Delete Stored Records with Operator Within range of (inclusive) and Operand Record Number	GHSP/CL/RAD/BV-17-C
GHSP 16/7	Delete Stored Records with Operator Within range of (inclusive) and Operand Time Filter	GHSP/CL/RAD/BV-18-C
GHSP 14/4	Abort Operation	GHSP/CL/RAA/BV-01-C GHSP/CL/SPE/BI-12-C
GHSP 18/4	Write a new time value	GHSP/CL/ETS/BV-01-C
GHSP 18/3	Receive indication of the Current Elapsed Time characteristic	GHSP/CL/ETS/BV-02-C
GHSP 19/1 AND GHSP 19/5	Receive notification of the Battery Level characteristic	GHSP/CL/BAS/BV-01-C
GHSP 19/2 AND GHSP 19/5	Receive indication or notification of the Battery Level Status characteristic	GHSP/CL/BAS/BV-02-C GHSP/CL/BAS/BV-03-C
GHSP 19/3 AND GHSP 19/5	Receive indication of the Battery Information characteristic	GHSP/CL/BAS/BV-04-C
GHSP 5/8	Time Stamp value and Time Value of Elapsed Time characteristic	GHSP/SR/TM/BV-01-C
GHSP 5/8 AND (GHSP 7/1 OR GHSP 7/2 OR GHSP 7/3)	Observations Time Stamp time updates on time update	GHSP/SR/TM/BV-02-C GHSP/SR/TM/BV-03-C GHSP/SR/TM/BV-04-C
GHSP 4/6 AND (GHSP 5/5 OR GHSP 5/6) AND GHSP 5/10	Multi-User GHS Server with live or temporarily stored observations	GHSP/SR/GHST/BV-01-C GHSP/SR/GHST/BV-02-C GHSP/SR/GHST/BI-02-C
GHSP 4/6 AND GHSP 5/7 AND GHSP 5/10	Multi-User GHS Server with stored health observations	GHSP/SR/GHST/BV-03-C GHSP/SR/GHST/BI-01-C
GHSP 4/6 AND (GHSP 5/5 OR GHSP 5/6) AND GHSP 5/11	Multi-User GHS Server with Multiple Trusted Clients with Concurrent Access	GHSP/SR/GHST/BV-04-C
GHSP 4/1 AND GHSP 4/6 AND GHSP 5/7 AND GHSP 5/17	Delete Stored Records procedure with UDS	GHSP/SR/RAD/BV-01-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	p0	2023-06-13	Approved by BTI on 2023-05-28. GHSP v1.0 adopted by the BoD on 2023-06-13. Prepared for initial publication.
	p1r00–r01	2023-10-23 – 2024-03-20	TSE 23478 (rating 1): Converted -I tests to -C tests as appropriate; updated the TCMT and TCRL accordingly. TSE 25100 (rating 2): In the TCMT, replaced the reference to GHSP 7/3 with a reference to the newly added ILD (GHSP 5/17).
1	p1	2024-07-01	Approved by BTI on 2024-04-21. Prepared for TCRL 2024-1 publication.
	p2r00	2024-10-09	TSE 25322 (rating 4): Per E25117, added the test case identifier SCIN, Section 4.10.3, and test cases GHSP/CL/SCIN/BI-01-C and -02-C, and updated the TCMT accordingly.
2	p2	2025-02-18	Approved by BTI on 2024-12-23. Prepared for TCRL 2025-1 publication.

Acknowledgments

Name	Company
Jörg Brakensiek	Bluetooth SIG, Inc.
Ismail Mohamud	Bluetooth SIG, Inc.
Nathaniel Hamming	F. Hoffmann-La Roche AG
Erik Moll	Koninklijke Philips N.V.
Abdul Nabi	Koninklijke Philips N.V.
Leif-Alexandre Aschehoug	Nordic Semiconductor ASA