Blood Pressure Profile (BLP)

***Bluetooth*® Test Suite**

- **Revision:** BLP.TS.p11
- **Revision Date:** 2024-07-01
- **Prepared By:** Medical Devices Working Group
- **Published during TCRL:** TCRL.2024-1

Contents

1 Scope

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

2 References, definitions, and abbreviations

2.1 References

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

[1] Test Strategy and Terminology Overview

[2] Bluetooth Core Specification, Version 4.0 or later

[3] Blood Pressure Profile Specification, Version 1.0 or later

[4] ICS Proforma for Blood Pressure Profile, BLP.ICS

[5] GAP Test Suite, GAP.TS

[6] SM Test Suite, SM.TS

[7] GATT Test Suite, GATT.TS

[8] Blood Pressure Service Specification, Version 1.0 or later

[9] Device Information Service, Version 1.1

[10] Blood Pressure Service Test Suite, BLS.TS

[11] Blood Pressure Profile Implementation eXtra Information for Test, IXIT

[12] Blood Pressure Profile Specification, Version 1.1 or later

[13] Blood Pressure Service Specification, Version 1.1 or later

[14] User Data Service (UDS) Specification, Version 1.0 or later

[15] User Data Service (UDS) Specification, Version 1.0 or later

[16] User Data Service Test Suite, UDS.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 Blood Pressure Profile requires the presence of GAP, SM, and GATT. This is illustrated in Figure 3.1.

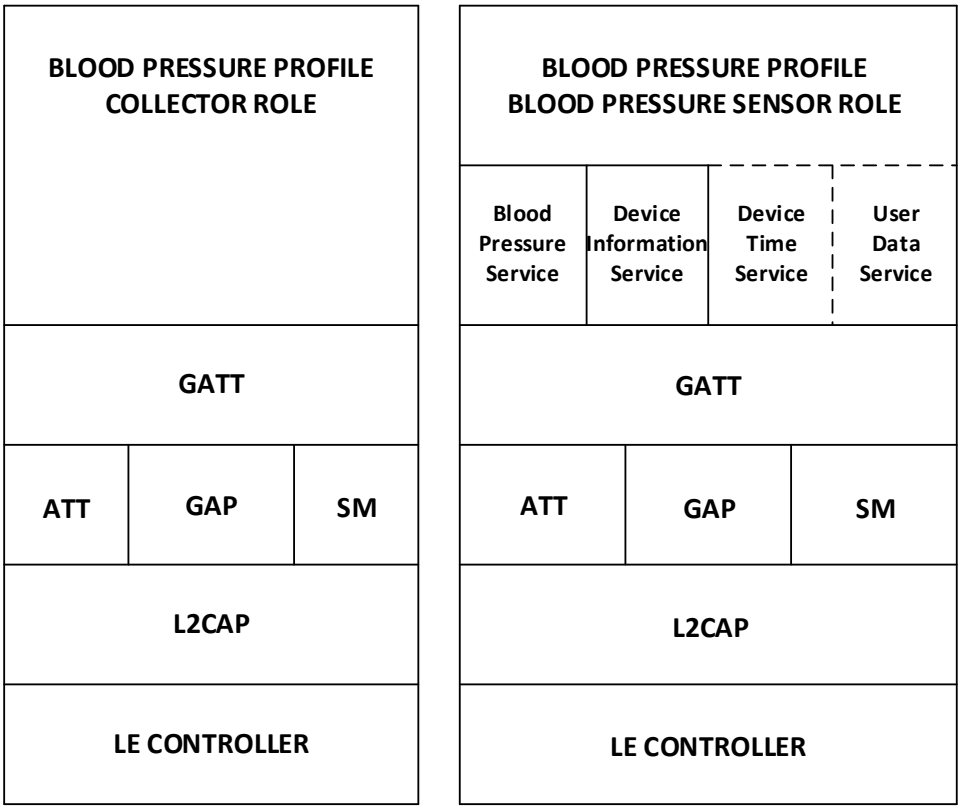

Figure 3.1: Blood Pressure test model

3.2 Test Strategy

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

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

This Test Suite contains Valid Behavior (BV) tests complemented with Invalid Behavior (BI) tests where required. The test coverage mirrored in the Test Suite Structure is the result of a process that started with catalogued specification requirements that were logically grouped and assessed for testability enabling coverage in defined test purposes.

3.3 Test groups

The following test groups have been defined:

- Generic GATT Integrated Tests
- Features
- Service Procedures
- Blood Pressure Sensor Trust Relationships and RACP procedures

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

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

Additionally, testing of this specification includes tests from the GATT Test Suite [7] 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>**
BLP	Blood Pressure Profile
Identifier Abbreviation	**Role Identifier <IUT role>**
COL	Collector Role
SEN	Sensor Role
Identifier Abbreviation	**Reference Identifier <GGIT test group>**
CGGIT	Client Generic GATT Integrated Tests
Identifier Abbreviation	**Reference Identifier <GGIT class>**
CHAR	Characteristic
ISFC	Indication Supported Features Characteristic
SDPNF	SDP Record Not Found
SER	Service
Identifier Abbreviation	**Feature and Behaviors Identifier <feat>**
BPD	Discovery of Services and Characteristics
BPF	Features
BPT	Blood Pressure Trust Relationships
RAA	RACP – Abort procedure
RAD	RACP – Delete Stored Records procedure
RAN	RACP – Report Number of Stored Records procedure
RAR	RACP – Report Stored Records procedure
SPE	Service Procedures Error
UDS	User Data Service Procedures

Table 4.1: BLP 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, 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 channels 0x0004 between the IUT and the Lower Tester over that LE transport.

4.2.2 Collector: Initiate Connection when ready for Indications or Notifications

- Preamble Purpose

  This is a setup procedure for the Collector IUT to initiate connection to a Blood Pressure Sensor when it is ready to receive indications or notifications.

- Reference

  [3] 5.2

  [2] GAP 9.3.3, 9.3.4

- Initial Condition

  A preamble procedure defined in Section 4.2.1 is used to set up the LE transport and L2CAP channel. The Collector IUT and the Lower Tester (Blood Pressure Sensor) may have bonded following GAP procedures.

  The Collector IUT is disconnected.

  The Collector IUT has been configured to accept commands from the Upper Tester to request and receive blood pressure measurements.

- Preamble Procedure

  1. The Upper Tester commands the IUT to initiate a connection.
  2. The Lower Tester sends to the IUT either using:
     - ALT 1: GAP Directed Connectable Mode (send ADV_DIRECT_IND packets)

       or

     - ALT 2: GAP Undirected Connectable Mode (send ADV_IND packets).
  3. The Lower Tester waits for responses from the IUT.
  4. The IUT sends a CONNECT_REQ and an optionally empty PDU to the Lower Tester.

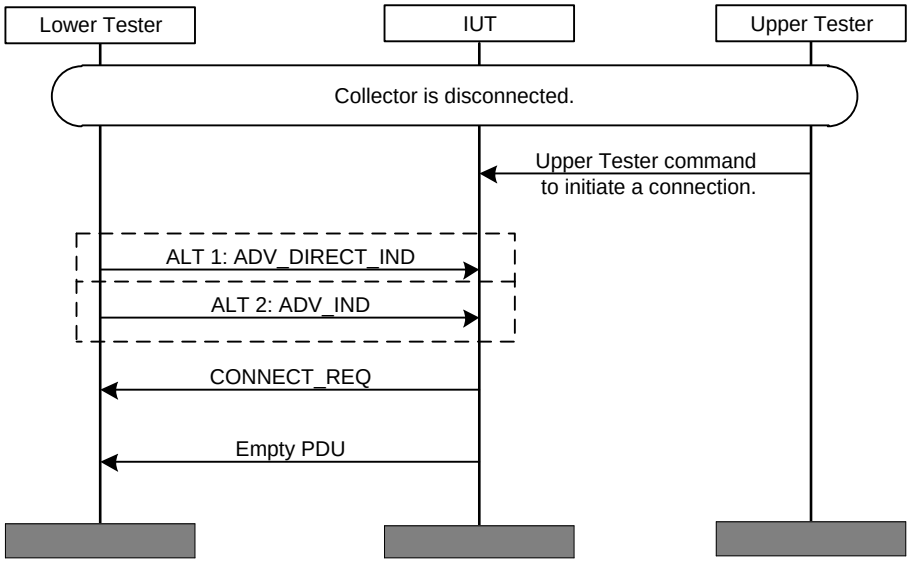

Figure 4.1: Collector: Initiate Connection when ready for Indications or Notifications preamble

4.2.3 Collector: Configure Blood Pressure Sensor for use with Control Points

- Preamble Purpose

  Follow this preamble procedure for the Collector IUT to configure the Blood Pressure Sensor (Lower Tester) with the required <Control Point Characteristic> and <Corresponding Characteristic>, as described in Table 4.2.

- Preamble Procedure

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

2. If bonding is supported, 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 Upper Tester during the test procedures in Section 4.3.1 or are known to the Upper 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 Upper Tester during the test procedures in Section 4.3.1 or are known to the Upper 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 as described in Table 4.2.
6. If the required <Control Point Characteristic> is the Record Access Control Point, then perform an action on the Lower Tester to delete all Blood Pressure records with stored Blood Pressure measurements.

Control Point Characteristic	Corresponding Characteristic	Corresponding Characteristic configured for
RACP	Blood Pressure Record	Notifications
User Control Point	Blood Pressure Measurement	Indications
	Enhanced Blood Pressure Measurement	Indications
	Intermediate Cuff Pressure	Notifications
	Enhanced Intermediate Cuff Pressure	Notifications
	Database Change Increment	Notifications
	Registered User	Indications

Table 4.2: Preamble for RACP, and User Data Control Point

4.2.4 Sensor: Configure Blood Pressure Sensor IUT for use with Control Points

- Preamble Purpose

  Follow this preamble procedure to enable the Blood Pressure Sensor IUT for use with the required <Control Point Characteristic> and <Corresponding Characteristic>, as described in Table 4.2.

- Preamble Procedure

1. Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1.
2. If bonding is supported, 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 Section 4.4 of [16] 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 Section 4.5 of [16] 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 as described in Table 4.2.

4.3 Generic GATT Integrated Tests

4.3.1 Client Generic GATT Integrated Tests (CGGIT)

Execute the Generic GATT Integrated Tests defined in Section 6.4, Client test procedures (CGGIT), in [7] using Table 4.3 below as input.

Test Case ID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Type
BLP/COL/CGGIT/SER/BV-01-C [Service GGIT – Blood Pressure]	Blood Pressure Service	[3] 4, 4.2.1	-	-	Primary Service
BLP/COL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Blood Pressure Measurement]	Blood Pressure Measurement Characteristic	[3] 4, 4.3.1.1	0x20 (Indicate)	Skip	-
BLP/COL/CGGIT/CHA/BV-03-C [Characteristic GGIT – Intermediate Cuff Pressure]	Intermediate Cuff Pressure Characteristic	[3] 4, 4.3.1.2	0x10 (Notify)	Skip	-
BLP/COL/CGGIT/CHA/BV-04-C [Characteristic GGIT – Blood Pressure Feature]	Blood Pressure Feature Characteristic	[3] 4, 4.3.1.3	0x22 (Read, Indicate)	2	-
BLP/COL/CGGIT/CHA/BV-05-C [Characteristic GGIT – Enhanced Blood Pressure Measurement]	Enhanced Blood Pressure Measurement Characteristic	[12] 4, 4.3.1.4	0x20 (Indicate)	Skip	-
BLP/COL/CGGIT/CHA/BV-06-C [Characteristic GGIT – Enhanced Intermediate Cuff Pressure]	Enhanced Intermediate Cuff Pressure Characteristic	[12] 4, 4.3.1.5	0x10 (Notify)	Skip	-
BLP/COL/CGGIT/CHA/BV-07-C [Characteristic GGIT – Record Access Control Point]	Record Access Control Point Characteristic	[12] 4, 4.3.1.7	0x28 (Write, Indicate)	Skip	-
BLP/COL/CGGIT/CHA/BV-08-C [Characteristic GGIT – Blood Pressure Record]	Blood Pressure Record Characteristic	[12] 4, 4.3.1.6	0x10 (Notify)	Skip	-
BLP/COL/CGGIT/SER/BV-02-C [Service GGIT – Device Information]	Device Information Service	[12] 4, 4.2.2	-	-	Primary Service

Test Case ID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Type
BLP/COL/CGGIT/CHA/BV-09-C [Characteristic GGIT – Manufacturer Name String]	Manufacturer Name String Characteristic	[12] 4.3.2, 4.7	0x02 (Read)	Variable	-
BLP/COL/CGGIT/CHA/BV-10-C [Characteristic GGIT – Model Number String]	Model Number String Characteristic	[12] 4.3.2, 4.7	0x02 (Read)	Variable	-
BLP/COL/CGGIT/CHA/BV-11-C [Characteristic GGIT – System ID]	System ID Characteristic	[12] 4.3.2, 4.7	0x02 (Read)	8	-
BLP/COL/CGGIT/SER/BV-03-C [Service GGIT – User Data]	User Data Service	[12] 4, 4.2.3	-	-	Primary Service
BLP/COL/CGGIT/CHA/BV-12-C [Characteristic GGIT – User Index]	User Index Characteristic	[12] 4.3.3	0x02 (Read)	Skip	-
BLP/COL/CGGIT/CHA/BV-13-C [Characteristic GGIT – Database Change Increment]	Database Change Increment Characteristic	[12] 4.3.3	0x1A (Read, Write, Notify)	Skip	-
BLP/COL/CGGIT/CHA/BV-14-C [Characteristic GGIT – User Control Point]	User Control Point Characteristic	[12] 4.3.3	0x28 (Write, Indicate)	Skip	-
BLP/COL/CGGIT/CHA/BV-15-C [Characteristic GGIT – Registered User]	Registered User Characteristic	[12] 4.3.3	0x20 (Indicate)	Skip	-
BLP/COL/CGGIT/CHA/BV-16-C [Characteristic GGIT – First Name]	First Name Characteristic	[12] 4.3.3	0x0A (Read, Write)	Skip	-
BLP/COL/CGGIT/CHA/BV-17-C [Characteristic GGIT – Last Name]	Last Name Characteristic	[12] 4.3.3	0x0A (Read, Write)	Skip	-
BLP/SEN/SGGIT/SDPNF/BV-01-C [Not discoverable over BR/EDR – Blood Pressure Service]	Blood Pressure Service	[3] 4, 4.2.1	-	-	-

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

4.3.2 Generic GATT Indication Supported Features characteristic

Execute the Generic GATT Indication Supported Features Characteristic tests defined in Section 6.4, Client test procedures (CGGIT), in [7] using Table 4.4 below as input:

TCID	Characteristic	Reference	TC Configuration
BLP/COL/CGGIT/ISFC/BV-01-C [Characteristic GGIT – Blood Pressure Feature indication]	Blood Pressure Feature	[3] 4.6	N/A

Table 4.4: GGIT Indication Supported Features Characteristic tests

4.3.3 Discover UDS characteristic

BLP/COL/BPD/BV-11-C [Discover Other UDS Characteristics]

- Test Purpose

  Verify that the Collector IUT can discover all UDS Characteristics of a User Data Service supported by the IUT.

- Reference

  [12] 4.3.3

- Initial Condition

  - TSPX_iut_supported_uds_characteristics_uuid_list in the IXIT [11] specifies all characteristics of the User Data Service supported by the IUT.
  - Run the preamble procedure included in Section 4.2.2 to enable the Collector to initiate connection to a Blood Pressure Sensor.
  - The Lower Tester includes one instantiation of the User Data Service [14], including all defined characteristics. This instantiation also contains two «future» characteristics. Each «future» characteristic has a 16-bit UUID randomly selected from unassigned UUIDs at the time of the test.
  - The IUT has executed the test procedure included in Section 4.3.1 and has saved the handle range for an instantiation of the User Data Service.

- Test Procedure

  1. The Upper Tester issues a command to the IUT to discover all characteristics of the User Data Service supported by the IUT.
  2. The IUT executes either alternative 2A or 2B:

     Alternative 2A (Discover All Characteristics of a Service sub-procedure):

     2A: Discover All Characteristics of a Service with the specified handle range, with the Lower Tester instantiating the database specified in the Initial Condition.

     Alternative 2B (Discover Characteristic by UUID sub-procedure):

     2B: Discover Characteristic by UUID using each of the UUIDs for the UDS Characteristics of the User Data Service supported by the IUT, with the Lower Tester instantiating the database specified in the Initial Condition.

- Expected Outcome

  Pass verdict

  For each UDS Characteristic supported by the IUT contained in the Lower Tester's instantiation of the User Data Service, the IUT reports an attribute handle/value pair for each characteristic specified in the IXIT [11] to the Upper Tester.

4.4 Blood Pressure Features

The procedures defined in this test group verify Blood Pressure Sensor IUT implementation of the Features defined in the Blood Pressure Profile Specification [3], [12] by a Blood Pressure Sensor IUT, and usage of the same features by a Collector IUT.

BLP/SEN/BPF/BV-01-C [Blood Pressure Service UUID in AD]

- Test Purpose

  Verify that the Blood Pressure Service UUID is included in AD (Advertising Data) from the Blood Pressure Sensor IUT when in GAP Discoverable Mode.

- Reference

  [3] 3.1.1

- Initial Condition

  - The IUT is induced to enter a GAP discoverable mode and generate Advertising Packets.

- Test Procedure

  The Lower Tester listens for Advertising Packets from the IUT.

- Expected Outcome

  Pass verdict

  At least one received Advertising Packet contains the defined Service UUID for «Blood Pressure Service».

BLP/SEN/BPF/BV-02-C [Local Name included in AD or Scan Response]

- Test Purpose

  Verify that the Local Name is included in AD (Advertising Data) or Scan Response data from the Blood Pressure Sensor IUT.

- Reference

  [3] 3.1.2

- Initial Condition

  - The IUT is induced to enter a GAP connectable mode and generate Advertising Packets.

- Test Procedure

  The Lower Tester listens for Advertising Packets from the IUT. When the Lower Tester receives an Advertising Packet from the IUT, it sends a Scan Request to the IUT. Then the Lower Tester listens for a Scan Response from the IUT.

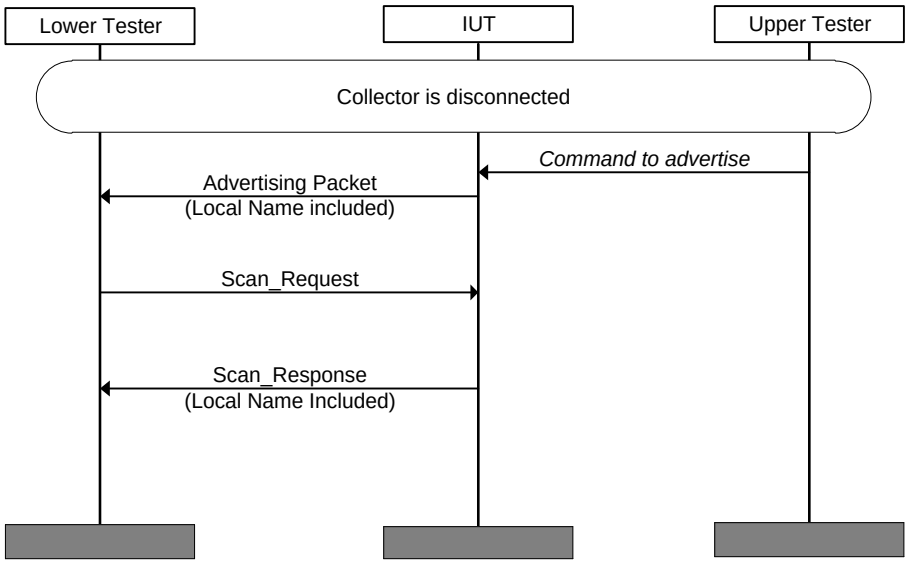

Figure 4.2: BLP/SEN/BPF/BV-02-C [Local Name included in AD or Scan Response]

- Expected Outcome

  Pass verdict

  The IUT sends an Advertising Packet and a Scan Response packet.

  The IUT includes the Local Name in either the Advertising Packet or Scan Response packet.

BLP/SEN/BPF/BV-03-C [Public Address in AD or Scan Response]

- Test Purpose

  Verify that a Blood Pressure Sensor that supports multiple bonds and supports a Target Address AD Type includes the Public Client address in the Public Target Address AD Type in Advertising or Scan Response data and the Multiple Bond Support bit is properly set.

- Reference

  [3] 3.1.4, 5.1.5

- Initial Condition

  - The Lower Tester has previously bonded to the IUT using a public address.
  - The IUT is induced to enter a GAP connectable mode and generate Advertising Packets.

- Test Procedure

  1. The Lower Tester listens for Advertising Packets from the IUT. When the Lower Tester receives an Advertising Packet from the IUT, the Lower Tester sends a Scan Request to the IUT. Then the Lower Tester listens for a Scan Response from the IUT.
  2. Run the preamble procedure included in Section 4.2.2 to enable the Collector to initiate connection to a Blood Pressure Sensor.
  3. The Lower Tester executes the procedure included in BLP/COL/CGGIT/SER/BV-01-C [Service GGIT – Blood Pressure] and saves the handle range for the Blood Pressure Service.
  4. Send a request from the Lower Tester to the IUT to read a Blood Pressure Feature characteristic.

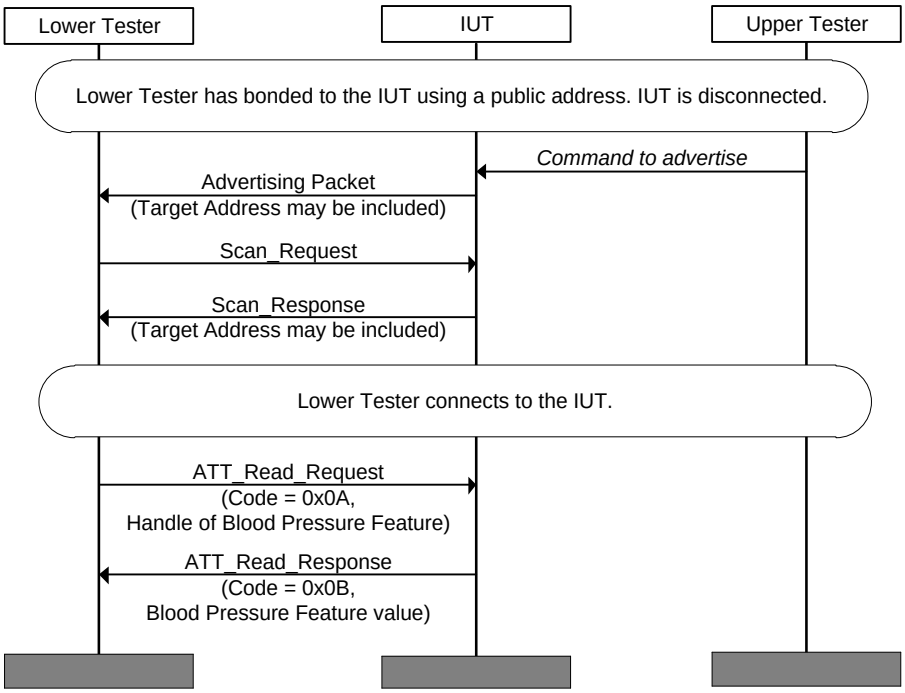

Figure 4.3: BLP/SEN/BPF/BV-03-C [Public Address in AD or Scan Response]

- Expected Outcome

  Pass verdict

  The value of the Multiple Bond Support bit of the Blood Pressure Feature characteristic is set to 1.

  The IUT includes a Target Address in either the Advertising packet or Scan Response packet or both.

  The Target Address is a Public Address and six octets in length.

BLP/SEN/BPF/BV-04-C [Private Random Address in AD or Scan Response]

- Test Purpose

  Verify that a Blood Pressure Sensor that supports multiple bonds and supports a Target Address AD Type includes the Private Random Client address in the Random Target Address AD Type in Advertising or Scan Response data and the Multiple Bond Support bit is properly set.

- Reference

  [3] 3.1.4, 5.1.5

- Initial Condition

  - The Lower Tester has previously bonded to the IUT using a private random address.
  - The IUT is induced to enter a GAP connectable mode and generate Advertising Packets.

- Test Procedure

  1. The Lower Tester listens for Advertising Packets from the IUT. When the Lower Tester receives an Advertising Packet from the IUT, the Lower Tester sends a Scan Request to the IUT. Then the Lower Tester listens for a Scan Response from the IUT.
  2. Run the preamble procedure included in Section 4.2.2 to enable the Collector to initiate connection to a Blood Pressure Sensor.

3. The Lower Tester executes the procedure included in BLP/COL/CGGIT/SER/BV-01-C [Service GGIT – Blood Pressure] and saves the handle range for the Blood Pressure Service.
4. Send a request from the Lower Tester to the IUT to read a Blood Pressure Feature characteristic.

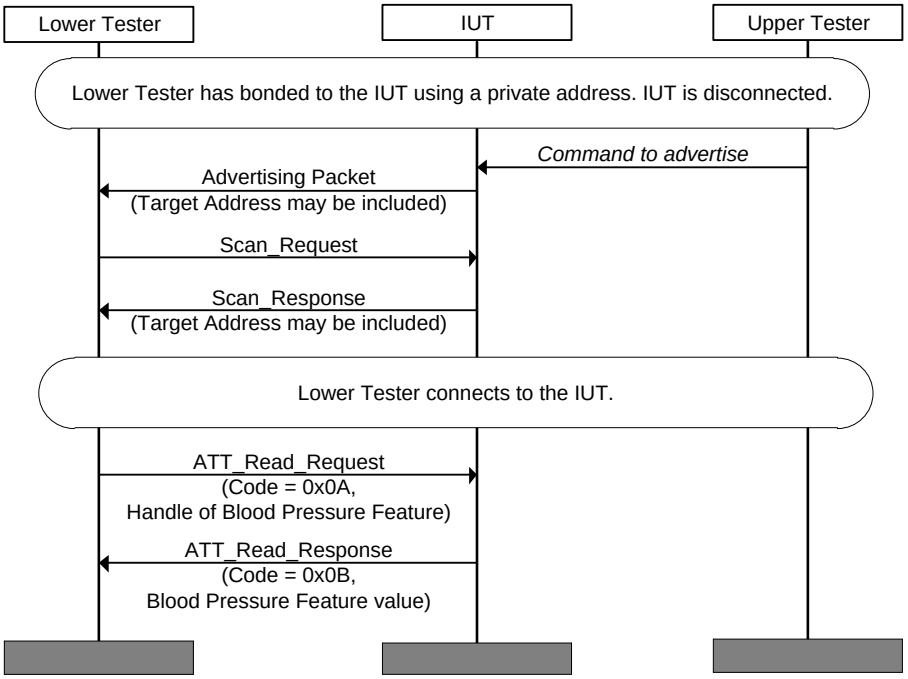

Figure 4.4: BLP/SEN/BPF/BV-04-C [Private Random Address in AD or Scan Response]

- Expected Outcome

  Pass verdict

  The value of the Multiple Bond Support bit of the Blood Pressure Feature characteristic is set to 1.

  The IUT includes a Target Address in either the Advertising Packet or Scan Response packet or both.

  The Target Address is a Private Random Address and six octets in length.

BLP/SEN/BPF/BV-05-C [Static Random Address in AD or Scan Response]

- Test Purpose

  Verify that a Blood Pressure Sensor that supports multiple bonds and supports a Target Address AD Type includes the Static Random Client address in the Random Target Address AD Type in Advertising or Scan Response data and the Multiple Bond Support bit is properly set.

- Reference

  [3] 3.1.4, 5.1.5

- Initial Condition

  - The Lower Tester has previously bonded to the IUT using a static random address.
  - The IUT is induced to enter a GAP connectable mode and generate Advertising Packets.

- Test Procedure

  1. The Lower Tester listens for Advertising Packets from the IUT. When the Lower Tester receives an Advertising Packet from the IUT, the Lower Tester sends a Scan Request to the IUT. Then the Lower Tester listens for a Scan Response from the IUT.
  2. Run the preamble procedure included in Section 4.2.2 to enable the Collector to initiate connection to a Blood Pressure Sensor.
  3. The Lower Tester executes the procedure included in BLP/COL/CGGIT/SER/BV-01-C [Service GGIT – Blood Pressure] and saves the handle range for the Blood Pressure Service.
  4. Send a request from the Lower Tester to the IUT to read a Blood Pressure Feature characteristic.

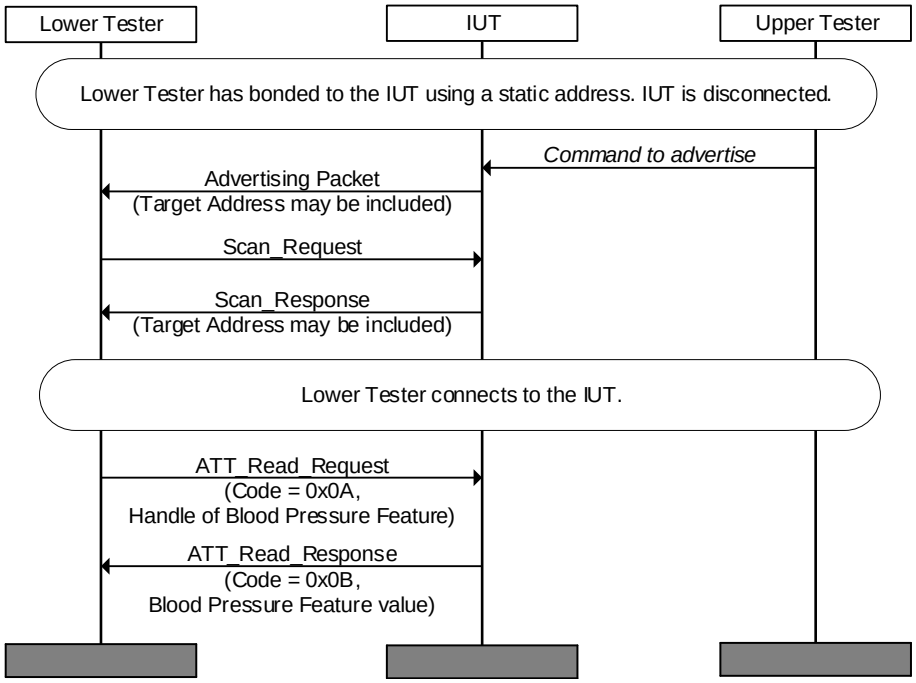

Figure 4.5: BLP/SEN/BPF/BV-05-C [Static Random Address in AD or Scan Response]

- Expected Outcome

  Pass verdict

  The value of the Multiple Bond Support bit of the Blood Pressure Feature characteristic is set to 1.

  The IUT includes a Target Address in either the Advertising Packet or Scan Response packet or both.

  The Target Address is a Static Random Address and six octets in length.

BLP/SEN/BPF/BV-06-C [No Target Address in AD or Scan Response – Multi-Bond]

- Test Purpose

  Verify that a Blood Pressure Sensor that supports multiple bonds and does not claim to support a Target Address AD Type does not include the Client address in a Target Address AD Type in Advertising or Scan Response data and the Multiple Bond Support bit is properly set.

- Reference

  [3] 3.1.4, 5.1.5

- Initial Condition
  - The Lower Tester has previously bonded to the IUT.
  - The IUT is induced to enter a GAP connectable mode and generate Advertising Packets.
- Test Procedure
  1. The Lower Tester listens for Advertising Packets from the IUT. When the Lower Tester receives an Advertising Packet from the IUT, the Lower Tester sends a Scan Request to the IUT. Then the Lower Tester listens for a Scan Response from the IUT.
  2. Run the preamble procedure included in Section 4.2.2 to enable the Collector to initiate connection to a Blood Pressure Sensor.
  3. The Lower Tester executes the procedure included in BLP/COL/CGGIT/SER/BV-01-C [Service GGIT – Blood Pressure] and saves the handle range for the Blood Pressure Service.
  4. Send a request from the Lower Tester to the IUT to read a Blood Pressure Feature characteristic.

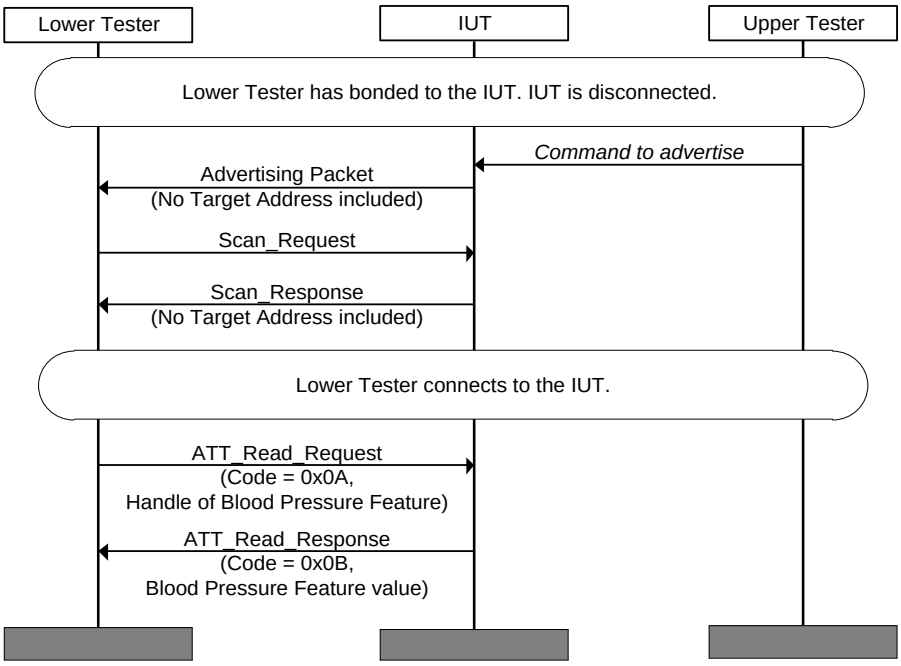

Figure 4.6: BLP/SEN/BPF/BV-06-C [No Target Address in AD or Scan Response – Multi-Bond]

- Expected Outcome

  Pass verdict

  The value of the Multiple Bond Support bit of the Blood Pressure Feature characteristic is set to 1.

  The IUT does not include the Client address in either the Advertising Packet or in a Scan Response packet.

BLP/SEN/BPF/BV-07-C [No Target Address in AD or Scan Response – Single-Bond]

- Test Purpose

  Verify that a Blood Pressure Sensor that does not support multiple bonds and does not claim to support a Target Address AD Type does not include the Client address in a Target Address AD Type in Advertising or Scan Response data and the Multiple Bond Support bit is properly set.

- Reference

  [3] 3.1.4

- Initial Condition

  - The Lower Tester has previously bonded to the IUT.
  - The IUT is induced to enter a GAP connectable mode and generate Advertising Packets.

- Test Procedure

  1. The Lower Tester listens for Advertising Packets from the IUT. When the Lower Tester receives an Advertising Packet from the IUT, the Lower Tester sends a Scan Request to the IUT. Then the Lower Tester listens for a Scan Response from the IUT.
  2. Run the preamble procedure included in Section 4.2.2 to enable the Collector to initiate connection to a Blood Pressure Sensor.
  3. The Lower Tester executes the procedure included in BLP/COL/CGGIT/SER/BV-01-C [Service GGIT – Blood Pressure] and saves the handle range for the Blood Pressure Service.
  4. Send a request from the Lower Tester to the IUT to read a Blood Pressure Feature characteristic.

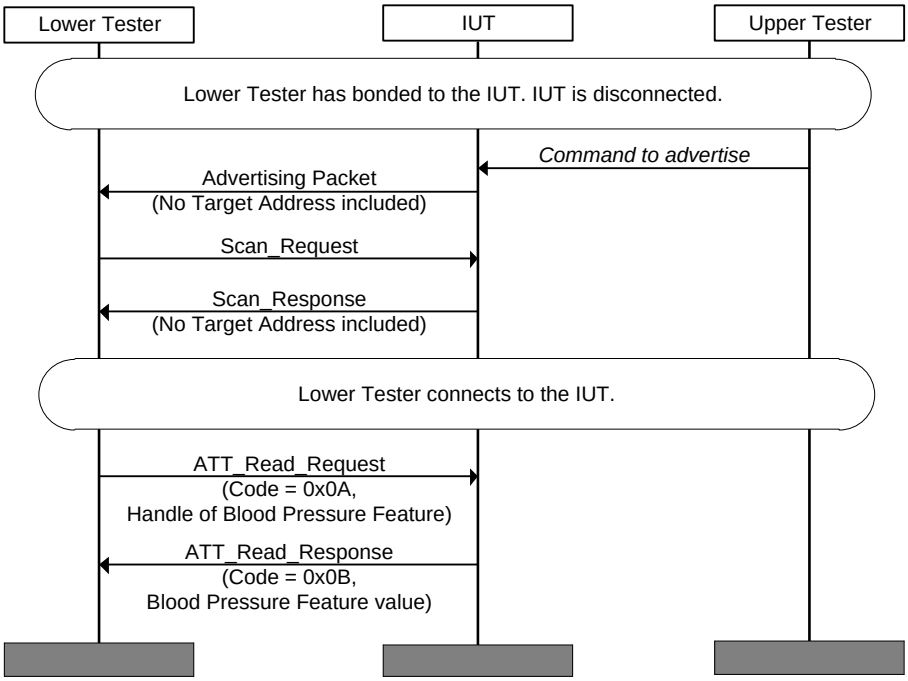

Figure 4.7: BLP/SEN/BPF/BV-07-C [No Target Address in AD or Scan Response – Single-Bond]

- Expected Outcome

  Pass verdict

  The value of the Multiple Bond Support bit of the Blood Pressure Feature characteristic is set to 0.

  The IUT does not include the Client address in either the Advertising Packet or in a Scan Response packet.

BLP/SEN/BPF/BV-08-C [Blood Pressure Service as Primary Service]

- Test Purpose

  Verify that a Blood Pressure Service is instantiated as a primary service.

- Reference

  [3] 3

- Initial Condition

  - Run the preamble procedure included in Section 4.2.2 to enable the Collector to initiate connection to a Blood Pressure Sensor.

- Test Procedure

  1. The Lower Tester executes the Discover Primary Services By Service UUID sub-procedure with type set to «Primary Service» and with the service UUID set to «Blood Pressure Service».
  2. Verify that one attribute handle range is returned, containing the starting handle and the ending handle of the service definition.
  3. Verify that the Blood Pressure Service is defined as a primary service.

- Expected Outcome

  Pass verdict

  The IUT has one instantiation of the Blood Pressure Service.

  The Blood Pressure Service is a primary service.

4.4.1 Configure Blood Pressure Characteristics for Indications

- Test Purpose

  For each selected test case in Table 4.5, verify that the Collector IUT can configure a Blood Pressure Sensor (Lower Tester) to Indicate Blood Pressure measurements.

- Reference

  [3] 4.4

  [12] 4.8

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT has executed the procedures included in Section 4.3.1, which return the handle of a Client Characteristic Configuration Descriptor for a Blood Pressure Measurement characteristic or an Enhanced Blood Pressure Measurement characteristic contained in the Lower Tester.

- Test Case Configuration

Test Case ID	Characteristic
BLP/COL/BPF/BV-09-C [Configure Blood Pressure Measurement Characteristic for Indications]	Blood Pressure Measurement
BLP/COL/BPF/BV-17-C [Configure Enhanced Blood Pressure Measurement Characteristic for Indications]	Enhanced Blood Pressure Measurement

Table 4.5: Configure Blood Pressure measurement characteristics for Indications

- Test Procedure

  For each selected test case in Table 4.5, the Upper Tester sends a command to the IUT to configure to receive Blood Pressure measurements.

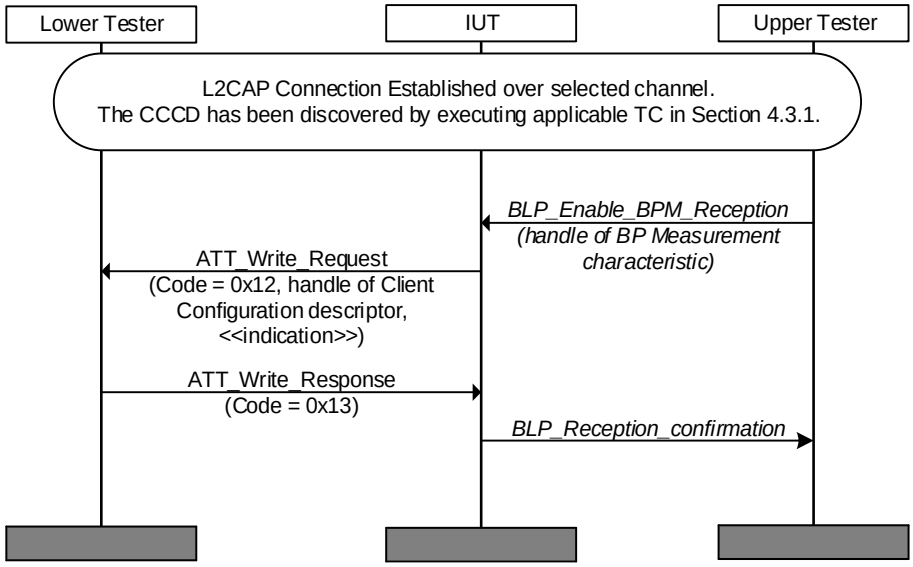

Figure 4.8: Configure Blood Pressure Characteristics for Indications

- Expected Outcome

  Pass verdict

  For each selected test case in Table 4.5, the IUT sends a correctly formatted ATT_Write_Request (0x12) to the Lower Tester, with the handle set to that of the Client Characteristic Configuration Descriptor for the <Characteristic>, and the value set to «indication».

BLP/COL/BPF/BV-10-C [Receive Blood Pressure Measurement Indications]

- Test Purpose

  Verify that the Collector IUT can receive indication of the Blood Pressure Measurement Characteristic value from a Blood Pressure Sensor for various field configurations.

- Reference

  [3] 4.4

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT is configured to expect Blood Pressure Measurement Indication, after executing the procedure included in BLP/COL/BPF/BV-09-C [Configure Blood Pressure Measurement Characteristic for Indications].
  - The IUT knows the handle of the Blood Pressure Measurement characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Indication containing a Blood Pressure Measurement characteristic value to the IUT.

This test is run for each value of each bit shown in Table 4.6:

Flag Field	Value	Pass Criteria (Reported in Blood Pressure Measurement characteristic)
bit 0	0	Blood pressure for Systolic, Diastolic and MAP is in units of mmHg
	1	Blood pressure for Systolic, Diastolic and MAP is in units of kPa
bit 1	0	Time Stamp field is not present
	1	Time Stamp field is present
bit 2	0	Pulse Rate field is not present
	1	Pulse Rate field is present
bit 3	0	User ID field is not present
	1	User ID field is present
bit 4	0	Measurement Status field is not present
	1	Measurement Status field is present

Table 4.6: Pass Criteria for Characteristics

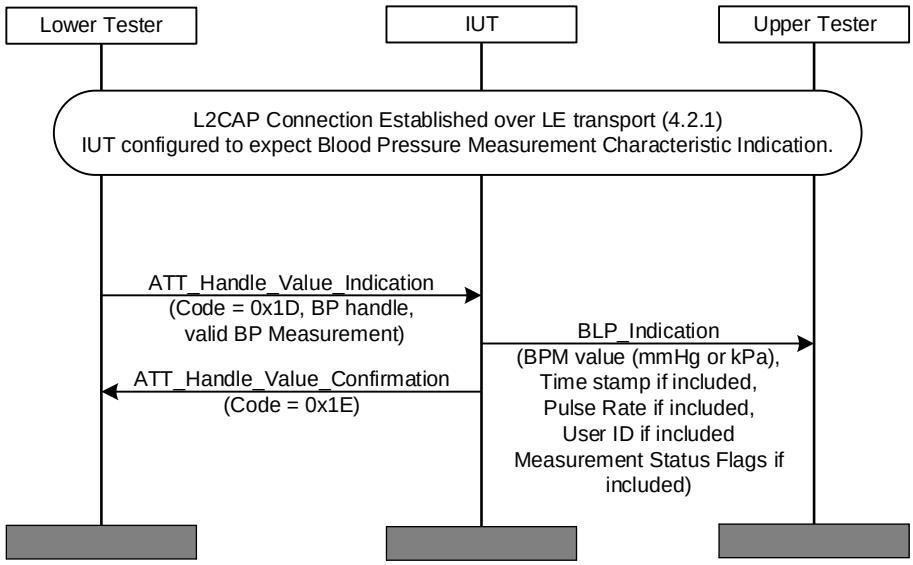

Figure 4.9: BLP/COL/BPF/BV-10-C [Receive Blood Pressure Measurement Indications]

- Expected Outcome

  Pass verdict

  IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester. IUT reports the received Blood Pressure measurement values in expected combinations to the Upper Tester using the pass criteria in Table 4.6. Note that an IUT may send the ATT_Handle_Value_Confirmation before or after it reports the received Blood Pressure Measurement to the Upper Tester.

BLP/COL/BPF/BI-01-C [Receive Blood Pressure Measurement Indications with reserved flags]

- Test Purpose

  Verify that the Collector IUT can receive indication of the Blood Pressure Measurement Characteristic value from a Blood Pressure Sensor in the presence of reserved flags.

- Reference

  [3] 4.4

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT is configured to expect Blood Pressure Measurement Indication, after executing the procedure included in BLP/COL/BPF/BV-09-C [Configure Blood Pressure Measurement Characteristic for Indications].
  - The IUT knows the handle of the Blood Pressure Measurement characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Indication containing a Blood Pressure Measurement characteristic value to the IUT.

  There are many combinations of reserved flag settings. For this test, use Flags = 0xFF (all 1s). Also, include valid uses of the other flags: Blood Pressure in kPa, time stamp, pulse rate, user id and measurement status. Any valid values for time stamp, pulse rate, user id, and measurement status may be sent by the Lower Tester.

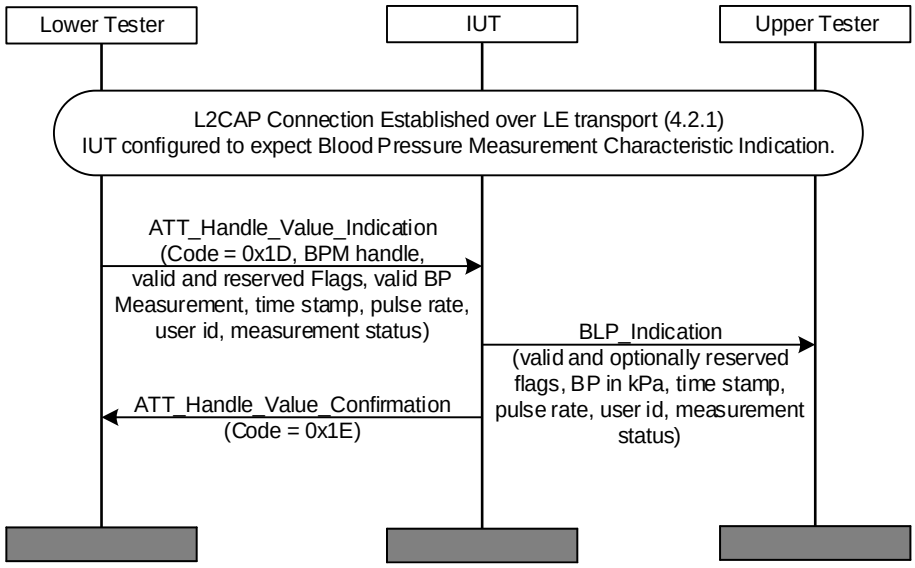

Figure 4.10: BLP/COL/BPF/BI-01-C [Receive Blood Pressure Measurement Indications with reserved flags]

- Expected Outcome

  Pass verdict

  IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

  IUT reports the received Blood Pressure measurement to the Upper Tester, e.g., BLP_Indication (kPa Blood Pressure Measurement value, time stamp, pulse rate, user id, and measurement status) optionally including the reserved bits of the Flags field. The reported field values match the ones sent by the Lower Tester.

BLP/COL/BPF/BI-02-C [Receive Blood Pressure Measurement Indications with reserved measurement status bits]

- Test Purpose

  Verify that the Collector IUT can receive indication of the Blood Pressure Measurement Characteristic value from a Blood Pressure Sensor including reserved bits of the measurement status field.

- Reference

  [3] 4.4

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT is configured to expect Blood Pressure Measurement Indication, after executing the procedure included in BLP/COL/BPF/BV-09-C [Configure Blood Pressure Measurement Characteristic for Indications].
  - The IUT knows the handle of the Blood Pressure Measurement characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Indication to the IUT containing a Blood Pressure Measurement characteristic value. That value contains flags = 0x12, valid mmHg Blood Pressure, valid time stamp, reserved measurement status bits (e.g., 0xFFFF).

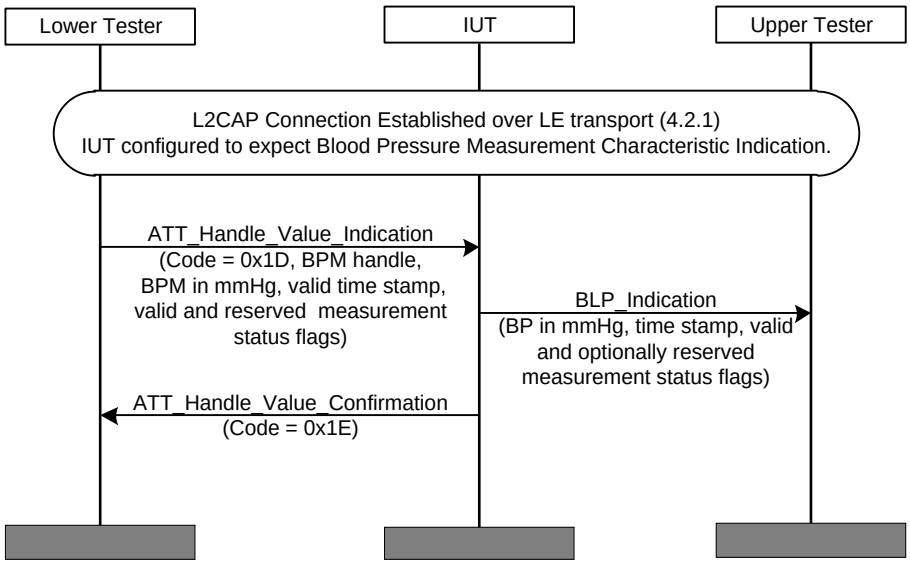

Figure 4.11: BLP/COL/BPF/BI-02-C [Receive Blood Pressure Measurement Indications with reserved measurement status bits]

- Expected Outcome

  Pass verdict

  IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

  IUT reports the received Blood Pressure measurement to the Upper Tester, e.g., BLP_Indication (Blood Pressure value in mmHg, time stamp, valid and optionally reserved measurement status bits). The reported field values match the ones sent by the Lower Tester.

BLP/COL/BPF/BI-03-C [Receive Blood Pressure Measurement Indications with additional octets not comprehended]

- Test Purpose

  Verify that the Collector IUT can receive indication of the Blood Pressure Measurement Characteristic value from a Blood Pressure Sensor including additional octets not comprehended by the Collector.

- Reference

  [3] 4.4

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT is configured to expect Blood Pressure Measurement Indication, after executing the procedure included in BLP/COL/BPF/BV-09-C [Configure Blood Pressure Measurement Characteristic for Indications].
  - The IUT knows the handle of the Blood Pressure Measurement characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Indication to the IUT containing a Blood Pressure Measurement characteristic value. That value contains flags = 0x7E, valid mmHg Blood Pressure, valid time stamp, valid pulse rate, valid user id and valid measurement status, two reserved Flags bits set, and at least two additional octets not comprehended by the Collector.

  The total number of octets does not exceed the maximum MTU size.

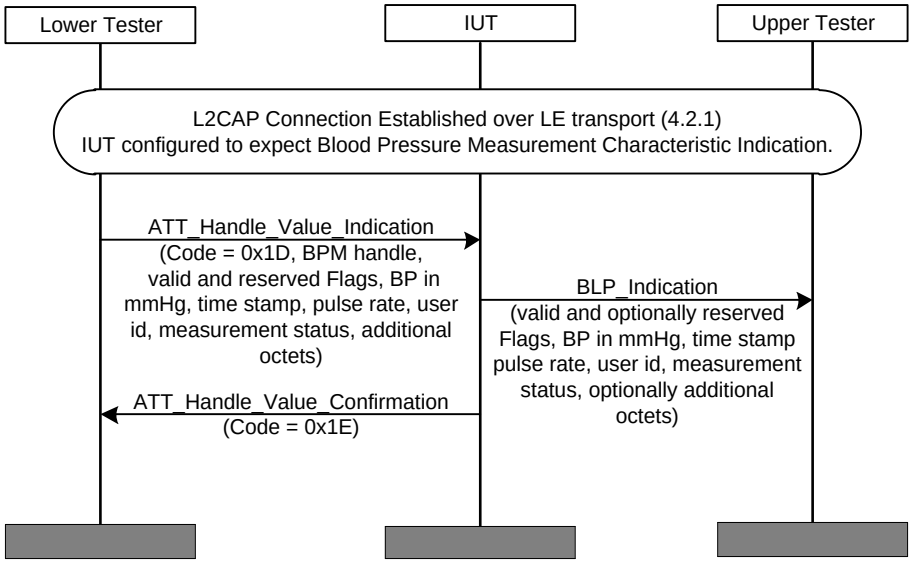

Figure 4.12: BLP/COL/BPF/BI-03-C [Receive Blood Pressure Measurement Indications with additional octets not comprehended]

- Expected Outcome

  Pass verdict

  IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

IUT reports the received Blood Pressure measurement to the Upper Tester, e.g., BLP_Indication (mmHg Blood Pressure value, time stamp, pulse rate, user id, measurement status, valid and optionally reserved Flags, optionally additional octets). The reported field values match the ones sent by the Lower Tester.

BLP/COL/BPF/BV-11-C [Receive multiple Blood Pressure Measurement Indications]

- Test Purpose

  Verify that the Collector IUT can receive a series of Blood Pressure Measurement characteristic indications.

- Reference

  [3] 4.4

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT is configured to expect Blood Pressure Measurement Indication, after executing the procedure included in BLP/COL/BPF/BV-09-C [Configure Blood Pressure Measurement Characteristic for Indications].
  - The IUT knows the handle of the Blood Pressure Measurement characteristic.

- Test Procedure

  The Lower Tester sends multiple (i.e., two or more) ATT_Handle_Value_Indications to the IUT; each contains a Blood Pressure Measurement characteristic value in mmHg with a time stamp, pulse rate, user id, and measurement status.

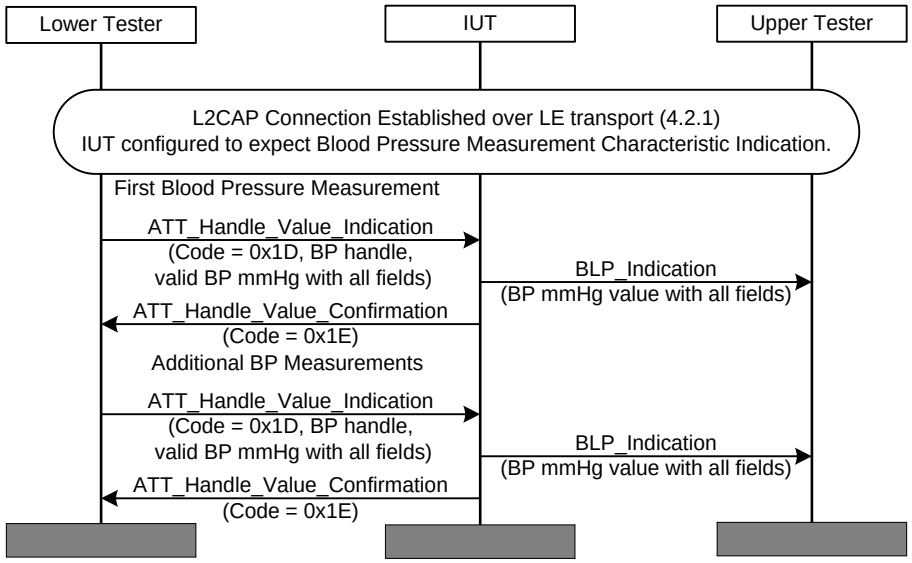

Figure 4.13: BLP/COL/BPF/BV-11-C [Receive multiple Blood Pressure Measurement Indications]

- Expected Outcome

  Pass verdict

  For each ATT_Handle_Value_Indication sent to the IUT:

  - The IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.
  - The IUT reports all of the received mmHg Blood Pressure measurement values to the Upper Tester, e.g., BLP_Indication (Blood Pressure value in mmHg, time stamp, pulse rate, user id, and measurement status) as specified in the flags field. The reported field values match the ones sent by the Lower Tester.

4.4.2 Configure Cuff Pressure Characteristics for Notifications

- Test Purpose

  For each selected test case in Table 4.7, verify that the Collector IUT can configure a Blood Pressure Sensor (Lower Tester) to Notify Cuff Pressure characteristics.

- Reference

  [3] 4.5

  [12] 4.9

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT has executed the procedures included in Section 4.3.1, which returns the handle of a Client Characteristic Configuration Descriptor for an Intermediate Cuff Pressure characteristic or an Enhanced Intermediate Cuff Pressure characteristic contained in the Lower Tester.

- Test Case Configuration

Test Case ID	Characteristic
BLP/COL/BPF/BV-12-C [Configure Intermediate Cuff Pressure Characteristic for Notifications]	Intermediate Cuff Pressure
BLP/COL/BPF/BV-18-C [Configure Enhanced Intermediate Cuff Pressure Characteristic for Notifications]	Enhanced Intermediate Cuff Pressure

Table 4.7: Configure Intermediate Cuff Pressure characteristics for Notifications

- Test Procedure

  For each selected test case in Table 4.7, the Upper Tester sends a command to the IUT to configure to receive Cuff Pressure characteristic notifications.

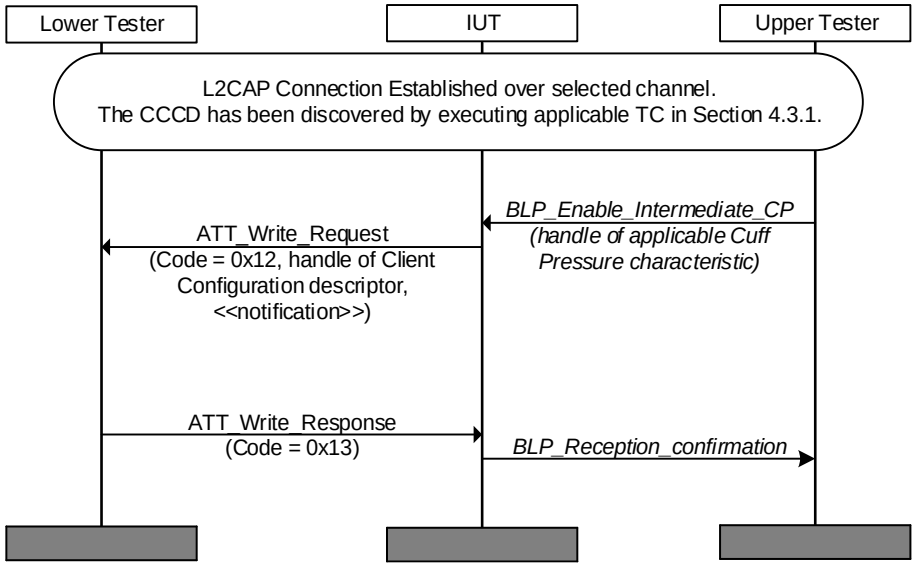

Figure 4.14: Configure Cuff Pressure Characteristics for Notifications

- Expected Outcome

  Pass verdict

  For each selected test case in Table 4.7, the IUT sends a correctly formatted ATT_Write_Request (0x12) to the Lower Tester, with the handle set to that of the Client Characteristic Configuration Descriptor for the <Characteristic>, and the value set to «notification».

BLP/COL/BPF/BV-13-C [Receive Intermediate Cuff Pressure Notifications]

- Test Purpose

  Verify that the Collector IUT can receive notifications of the Intermediate Cuff Pressure Characteristic for various field configurations.

- Reference

  [3] 4.5

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT has executed the procedure included in BLP/COL/BPF/BV-12-C [Configure Intermediate Cuff Pressure Characteristic for Notifications], which configures it to expect Intermediate Cuff Pressure Notification.
  - The IUT knows the handle of the Intermediate Cuff Pressure characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Notification containing an Intermediate Cuff Pressure characteristic value to the IUT.

This test is run for each value of each bit shown in Table 4.8:

Flag Field	Value	Pass Criteria (Reported in Intermediate Cuff Pressure Measurement characteristic)
bit 0	0	Intermediate Cuff Pressure in units of mmHg
	1	Intermediate Cuff Pressure in units of kPa
bit 1	0	Time Stamp field is not present
	1	Time Stamp field is present
bit 2	0	Pulse Rate field is not present
	1	Pulse Rate field is present
bit 3	0	User ID field is not present
	1	User ID field is present
bit 4	0	Measurement Status field is not present
	1	Measurement Status field is present

Table 4.8: Pass Criteria for Characteristics

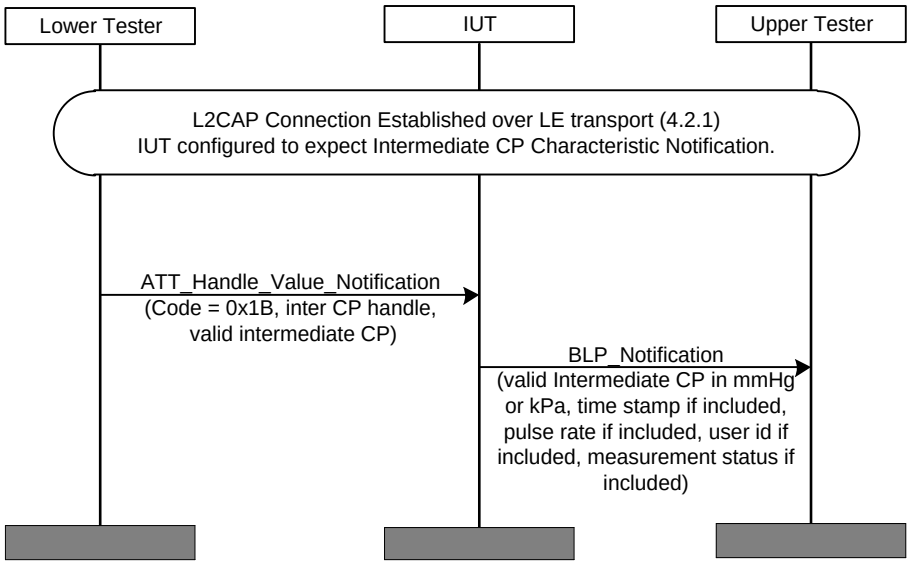

Figure 4.15: BLP/COL/BPF/BV-13-C [Receive Intermediate Cuff Pressure Notifications]

- Expected Outcome

  Pass verdict

  IUT sends notifications of Intermediate Cuff Pressure measurement values in expected combinations to the Upper Tester using the pass criteria in the table above.

  Verify that the two unused fields in the Intermediate Cuff Pressure Value field are set to special value NaN (0x07FF) in all cases.

  The reported field values and units match the ones sent by the Lower Tester.

BLP/COL/BPF/BI-04-C [Receive Intermediate Cuff Pressure Notifications with reserved flags]

- Test Purpose

  Verify that the Collector IUT can receive notifications of the Intermediate Cuff Pressure Characteristic from a Blood Pressure Sensor including reserved flags.

- Reference

  [3] 4.5

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT has executed the procedure included in BLP/COL/BPF/BV-12-C [Configure Intermediate Cuff Pressure Characteristic for Notifications], which configures it to expect Intermediate Cuff Pressure Notification.
  - The IUT knows the handle of the Intermediate Cuff Pressure characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Notification containing an Intermediate Cuff Pressure characteristic value to the IUT. There are many combinations of reserved flag settings. For this test, use Flags = 0xF0 (Blood Pressure in mmHg, no Time Stamp, no Pulse Rate, no User ID, Measurement Status). Any valid values for the Measurement Status field may be sent by the Lower Tester.

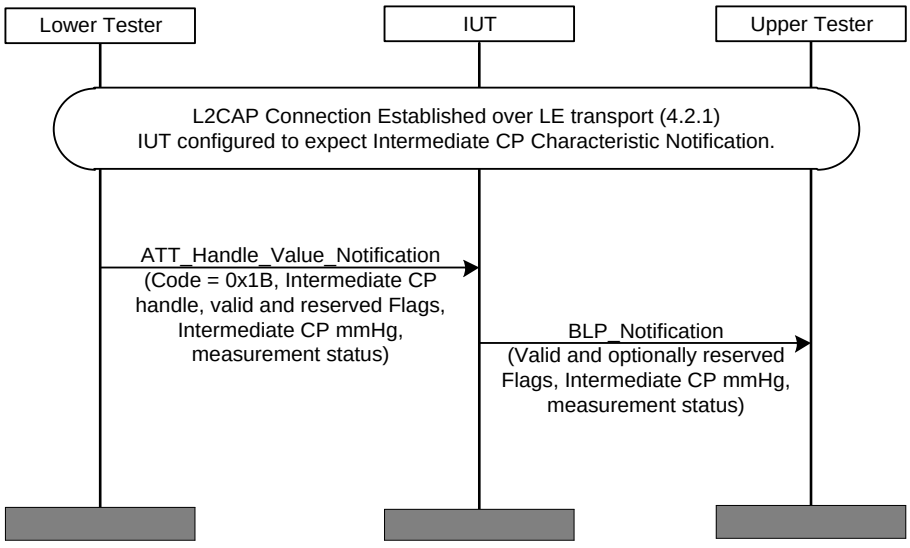

Figure 4.16: BLP/COL/BPF/BI-04-C [Receive Intermediate Cuff Pressure Notifications with reserved flags]

- Expected Outcome

  Pass verdict

  IUT reports the received mmHg Blood Pressure value to the Upper Tester, e.g., BLP_Notification (Intermediate Cuff Pressure). The reported field values match the ones sent by the Lower Tester optionally including the reserved bits of the Flags field.

BLP/COL/BPF/BI-05-C [Receive Intermediate Cuff Pressure Notifications with reserved measurement status bits]

- Test Purpose

  Verify that the Collector IUT can receive notifications of the Intermediate Cuff Pressure Characteristic from a Blood Pressure Sensor including reserved bits of the measurement status field.

- Reference

  [3] 4.5

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT has executed the procedure included in BLP/COL/BPF/BV-12-C [Configure Intermediate Cuff Pressure Characteristic for Notifications], which configures it to expect Intermediate Cuff Pressure Notification.
  - The IUT knows the handle of the Intermediate Cuff Pressure characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Notification containing an Intermediate Cuff Pressure characteristic value. That value contains flags = 0x10, valid mmHg Blood Pressure, measurement status bits (e.g., 0xFFFF)

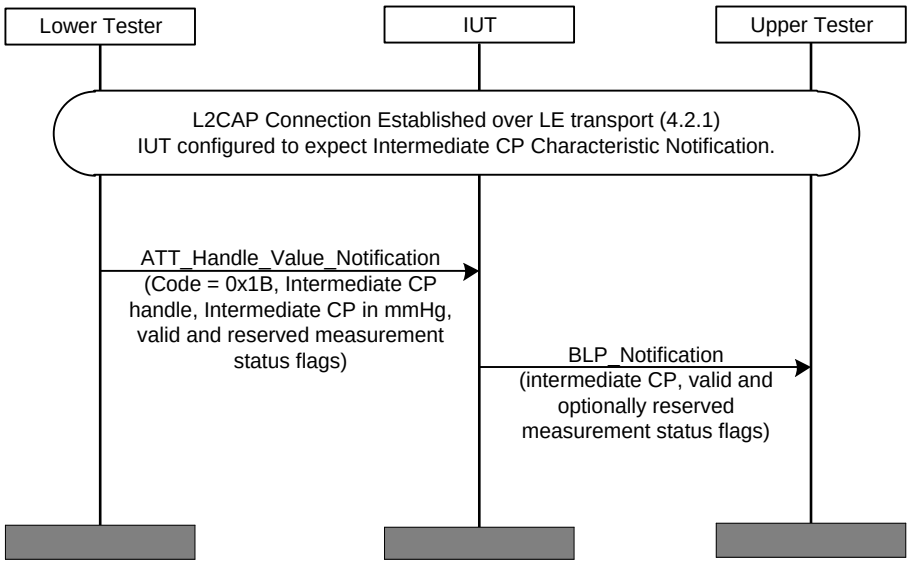

Figure 4.17: BLP/COL/BPF/BI-05-C [Receive Intermediate Cuff Pressure Notifications with reserved measurement status bits]

- Expected Outcome

  Pass verdict

  IUT reports the received mmHg Blood Pressure value to the Upper Tester, e.g., BLP_Notification (Intermediate Cuff Pressure in mmHg, valid and optionally reserved measurement status bits). The reported field values match the ones sent by the Lower Tester.

BLP/COL/BPF/BI-06-C [Receive Intermediate Cuff Pressure Notifications with additional octets not comprehended]

- Test Purpose

  Verify that the Collector IUT can receive notifications of the Intermediate Cuff Pressure Characteristic from a Blood Pressure Sensor including additional octets not comprehended.

- Reference

  [3] 4.5

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT has executed the procedure included in BLP/COL/BPF/BV-12-C [Configure Intermediate Cuff Pressure Characteristic for Notifications], which configures it to expect Intermediate Cuff Pressure Notification.
  - The IUT knows the handle of the Intermediate Cuff Pressure characteristic.

- Test Procedure

  The Lower Tester sends an ATT_Handle_Value_Notification containing an Intermediate Cuff Pressure characteristic value to the IUT. That value contains flags = 0x70, valid mmHg Blood Pressure, valid measurement status, two reserved Flags bits set, and at least two additional octets not comprehended by the Collector. The total number of octets does not exceed the maximum MTU size.

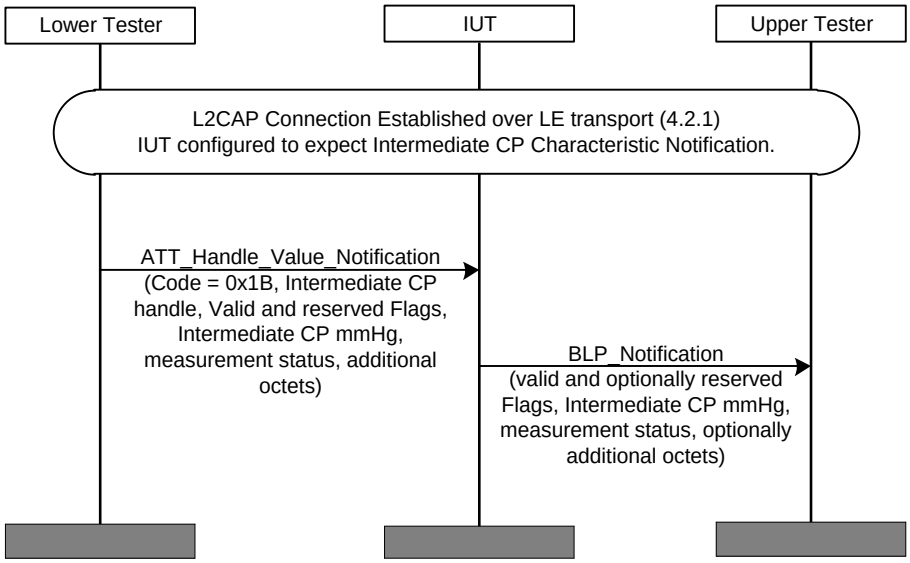

Figure 4.18: BLP/COL/BPF/BI-06-C [Receive Intermediate Cuff Pressure Notifications with additional octets not comprehended]

- Expected Outcome

  Pass verdict

  IUT reports the received mmHg Blood Pressure value to the Upper Tester, e.g., BLP_Notification (Intermediate Cuff Pressure, valid measurement status, valid and optionally reserved Flags, optionally additional octets). The reported field values match the ones sent by the Lower Tester.

BLP/COL/BPF/BV-14-C [Receive multiple Intermediate Cuff Pressure Notifications]

- Test Purpose

  Verify that the Collector IUT can receive multiple Intermediate Cuff Pressure notifications followed by a Blood Pressure Measurement indication.

- Reference

  [3] 4.4, 4.5

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The Lower Tester is configured to enable Blood Pressure Measurement Indication, by executing the procedure included in BLP/COL/BPF/BV-09-C [Configure Blood Pressure Measurement Characteristic for Indications].
  - The Lower Tester is configured to enable Intermediate Cuff Pressure Notification, by executing the procedure included in BLP/COL/BPF/BV-12-C [Configure Intermediate Cuff Pressure Characteristic for Notifications].

  The IUT knows the handle of the Blood Pressure Measurement characteristic.

  The IUT knows the handle of the Intermediate Cuff Pressure characteristic.

- Test Procedure

  1. The Lower Tester sends two or more ATT_Handle_Value_Notifications to the IUT; each contains the Intermediate Cuff Pressure characteristic value in mmHg.
  2. The Lower Tester sends an ATT_Handle_Value_Indication to the IUT, containing a Blood Pressure Measurement characteristic value in mmHg with a time stamp and a measurement status field.

- Expected Outcome

  Pass verdict

  For each ATT_Handle_Value_Notification sent to the IUT:

  - The IUT reports the received mmHg Blood Pressure value to the Upper Tester. The reported field values match the ones sent by the Lower Tester.

  For the ATT_Handle_Value_Indication sent to the IUT:

  - The IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.
  - The IUT reports the received mmHg Blood Pressure values to the Upper Tester, e.g., BLP_Indication (Blood Pressure value, measurement status) as specified in the flags field. The reported field values match the ones sent by the Lower Tester.

BLP/COL/BPF/BI-07-C [Read Blood Pressure Feature characteristic with reserved value]

- Test Purpose

  Verify that the Collector IUT can read the Blood Pressure Feature characteristic from a Blood Pressure Sensor and ignore reserved values.

- Reference

  [3] 4.6

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The Upper Tester knows the handle of a Blood Pressure Feature characteristic contained in the Lower Tester.

- Test Procedure

  1. Send a command from the Upper Tester to request that the IUT read a Blood Pressure Feature characteristic from the Lower Tester e.g., BLP_ReadRequest (handle).
  2. After receipt of the expected result by the Lower Tester from the IUT, send an ATT_Read_Response (0x0B) from the Lower Tester to the IUT containing a reserved value e.g., 0xFFFF.

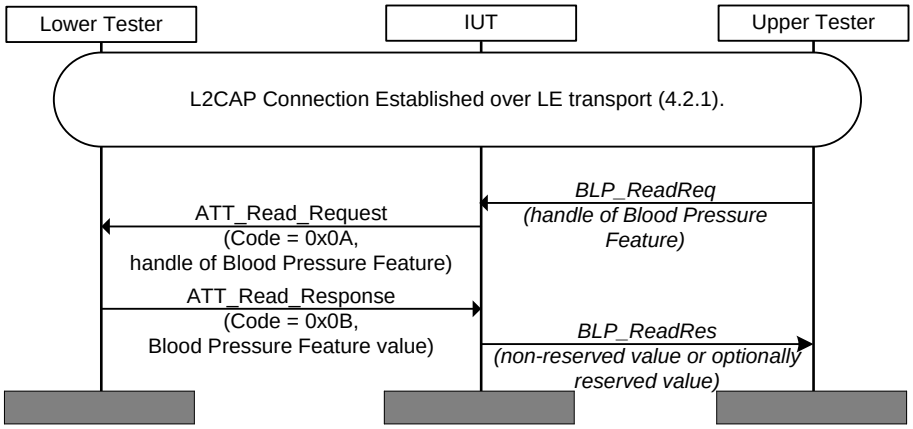

Figure 4.19: BLP/COL/BPF/BI-07-C [Read Blood Pressure Feature characteristic with reserved value]

- Expected Outcome

  Pass verdict

  The IUT sends a correctly formatted ATT_Read_Request (0x0A) to the Lower Tester, containing the handle specified by the Upper Tester.

  The IUT receives the response from the Lower Tester and ignores the reserved bits.

  The IUT reports the non-reserved values and optionally reports the reserved values to the Upper Tester.

BLP/COL/BPF/BV-16-C [Verify Bond Status on Reconnect]

- Test Purpose

  Verify that the Collector IUT starts encryption with a bonded Blood Pressure Sensor on reconnection.

- Reference

  [3] 5.2.2

- Initial Condition
  - The IUT and the Lower Tester are bonded.
  - The IUT has configured the Lower Tester to enable indications or notifications on one or more of the characteristics of the Lower Tester's Blood Pressure Service.
  - No connection is established between the IUT and Lower Tester.
- Test Procedure
  1. The Lower Tester begins advertising using a GAP connectable mode.
  2. The IUT establishes a connection to the Lower Tester.
  3. The Lower Tester does not send any indications or notifications to the IUT.
  4. The IUT starts encryption when the connection is established.
- Expected Outcome

  Pass verdict

  The IUT starts encryption when the connection is established.

BLP/SEN/BPF/BV-09-C [Blood Pressure Service UUID and User ID in AD]

- Test Purpose

  Verify that the Blood Pressure Service UUID and User ID List is included in AD (Advertising Data) from the Blood Pressure Sensor IUT when in GAP Undirected Connectable Mode.
- Reference

  [12] 3.1.5, 5.1.6
- Initial Condition
  - The IUT has assigned at least two User IDs, User ID 1 and User ID 2.
  - The IUT has no new measurements for User ID 1, but it has new measurements for User ID 2.
  - The IUT is induced to enter GAP Undirected Connectable Mode and generate Advertising Packets.
- Test Procedure
  1. The Lower Tester listens for Advertising Packets from the IUT.
  2. Induce the IUT to generate new measurements for User ID 1 and generate Advertising Packets.
  3. The Lower Tester listens for Advertising Packets from the IUT.
- Expected Outcome

  Pass verdict

  In step 1, the one or more received Advertising Packet contain the defined Service UUID for «Blood Pressure Service» and the User ID List contains the ID for User ID 2.

  In step 3, the one or more received Advertising Packet contain the defined Service UUID for «Blood Pressure Service» and the User ID List contains the IDs for User ID 1 and User ID 2.

BLP/COL/BPF/BV-19-C [Receive Enhanced Blood Pressure Measurement Indications]

- Test Purpose

  Verify that the Collector IUT can receive an indication of the Enhanced Blood Pressure Measurement Characteristic value, as described in Table 4.9.

- Reference

  [12] 4.8

- Initial Condition

  - The preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT knows the handle of the Enhanced Blood Pressure Measurement characteristic.
  - The IUT is configured to expect Enhanced Blood Pressure Measurement Indications.
  - The Flags Field and field values for the Enhanced Blood Pressure Measurement characteristic are configured as described in Table 4.9.

- Test Procedure

  This test is run for each value of each bit shown in Table 4.9:

  1. The Lower Tester sends an ATT_Handle_Value_Indication containing an Enhanced Blood Pressure Measurement characteristic handle and value to the IUT as described in Table 4.9.
  2. The IUT receives an ATT_Handle_Value_Indication from the Lower Tester containing an Enhanced Blood Pressure Measurement characteristic handle and value and reports it to the Upper Tester.
  3. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

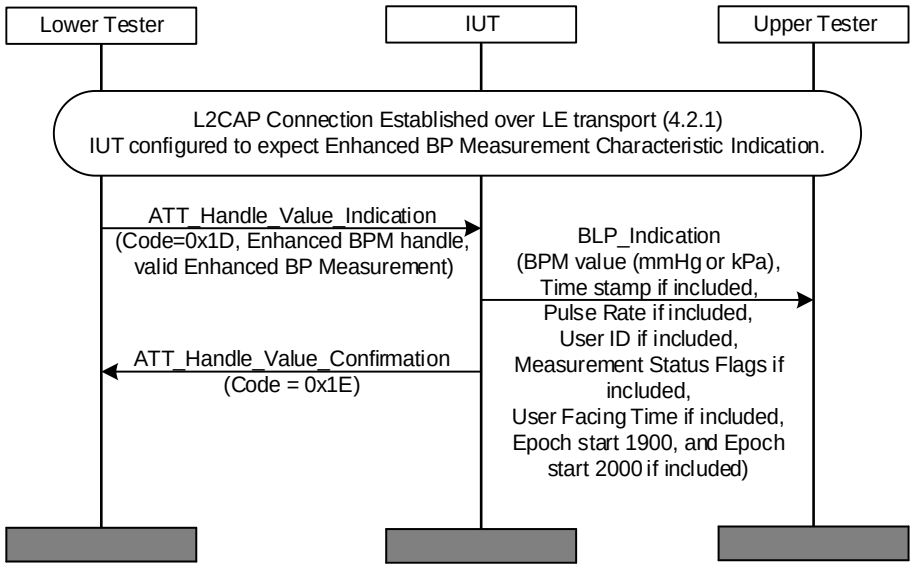

Figure 4.20: BLP/COL/BPF/BV-19-C [Receive Enhanced Blood Pressure Measurement Indications]

- Expected Outcome

  Pass verdict

  For each test pattern derived from Table 4.9, the IUT receives the indication of the Enhanced Blood Pressure Measurement with the expected test pattern.

  The IUT reports the indication of the Enhanced Blood Pressure Measurement values with the expected test pattern to the Upper Tester.

  The reported field values and units match the ones sent by the Lower Tester.

  The IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

  Note that an IUT may send the ATT_Handle_Value_Confirmation before or after it reports the received Blood Pressure Measurement to the Upper Tester.

Flag Field	Value	Pass Criteria (Reported in Enhanced Blood Pressure Measurement characteristic)
bit 0	0	Blood pressure for Systolic, Diastolic, and MAP is in units of mmHg
	1	Blood pressure for Systolic, Diastolic, and MAP is in units of kPa
bit 1	0	Time Stamp field is not present
	1	Time Stamp field is present
bit 2	0	Pulse Rate field is not present
	1	Pulse Rate field is present
bit 3	0	User ID field is not present
	1	User ID field is present
bit 4	0	Measurement Status field is not present
	1	Measurement Status field is present
bit 5	0	User Facing Time field is not present
	1	User Facing Time field is present
bit 6	0	Epoch start = 1900
	1	Epoch start = 2000

Table 4.9: Pass Criteria for Characteristics – Enhanced Blood Pressure Measurement Indications

BLP/COL/BPF/BV-20-C [Receive Enhanced Blood Pressure Measurement Indications - with UDS]

- Test Purpose

  Verify that the Collector IUT, after performing the Consent procedure, can receive an indication of the Enhanced Blood Pressure Measurement Characteristic value as described in Table 4.10.

- Reference

  [12] 4.8

- Initial Condition

  - The preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT has registered a user, knows the Consent Code and User Index of this user.

- The IUT knows the handle of the Enhanced Blood Pressure Measurement characteristic.
- The IUT is configured to expect Enhanced Blood Pressure Measurement Indications.
- The Flags Field and field values for the Enhanced Blood Pressure Measurement characteristic are configured as described in Table 4.10 with the exception of bit 3, which only has value 1.
- The Collector IUT has performed the Consent procedure and has consent to access the characteristics.

- Test Procedure

  This test is run for each value of each bit shown in Table 4.10:

  1. For the registered user, the Upper Tester instructs the Collector IUT to perform the Consent procedure.
  2. The Lower Tester sends an ATT_Handle_Value_Indication containing an Enhanced Blood Pressure Measurement characteristic handle and value, with the User ID field for the selected user, as described in Table 4.10.
  3. The IUT receives an ATT_Handle_Value_Indication from the Lower Tester containing an Enhanced Blood Pressure Measurement characteristic handle and value and reports it to the Upper Tester.
  4. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.
  5. Verify that the characteristic values meet the requirements of the service.

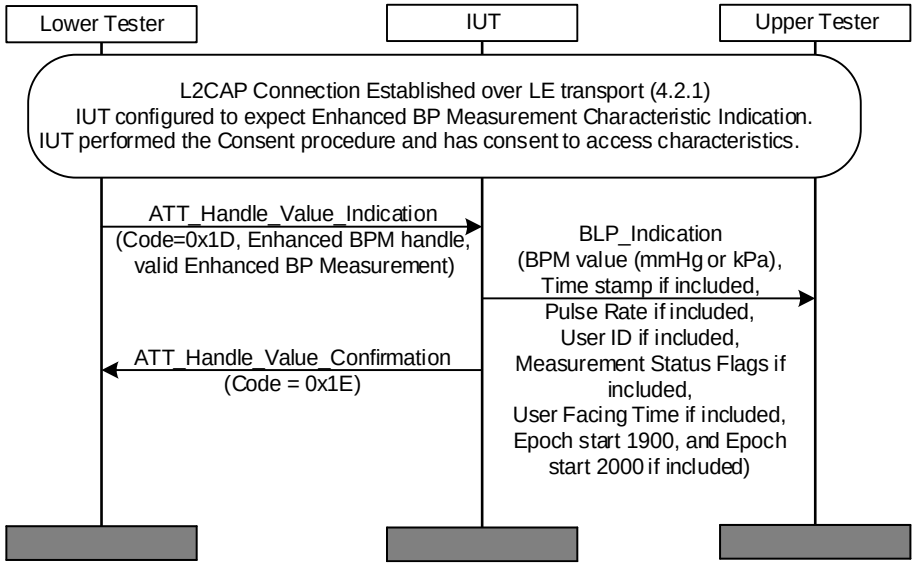

Figure 4.21: BLP/COL/BPF/BV-20-C [Receive Enhanced Blood Pressure Measurement Indications – with UDS]

- Expected Outcome

  Pass verdict

  For each test pattern, the IUT receives the indication of the Enhanced Blood Pressure Measurement with the expected test pattern with:

  - Bit 3 of Flags field set to 1, and
  - User ID field for the selected user.

  The IUT reports to the Upper Tester the indication of the Enhanced Blood Pressure Measurement values.

The reported field values and units match the ones sent by the Lower Tester.

The IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

Note that an IUT may send the ATT_Handle_Value_Confirmation before or after it reports the received Blood Pressure Measurement to the Upper Tester.

Flag Field	Value	Pass Criteria (Reported in Enhanced Blood Pressure Measurement characteristic)
bit 0	0	Blood pressure for Systolic, Diastolic, and MAP is in units of mmHg
	1	Blood pressure for Systolic, Diastolic, and MAP is in units of kPa
bit 1	0	Time Stamp field is not present
	1	Time Stamp field is present
bit 2	0	Pulse Rate field is not present
	1	Pulse Rate field is present
bit 3	1	User ID field is present
bit 4	0	Measurement Status field is not present
	1	Measurement Status field is present
bit 5	0	User Facing Time field is not present
	1	User Facing Time field is present
bit 6	0	Epoch start = 1900
	1	Epoch start = 2000

Table 4.10: Pass Criteria for Characteristics – Enhanced Blood Pressure Measurement Indications with UDS

4.4.3 Receive Enhanced Blood Pressure Measurements Indications with reserved flags, with reserved measurement status bits, or with additional octets

- Test Purpose

  For each test case in Table 4.11, verify that the Collector IUT can receive indication of the Enhanced Blood Pressure Measurement Characteristic value, from a Blood Pressure Sensor, as described in Table 4.11.

- Reference

  [12] 4.8

- Initial Condition

  - The preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT is configured to expect Enhanced Blood Pressure Measurement Indication.
  - The IUT knows the handle of the Enhanced Blood Pressure Measurement characteristic.

- Test Case Configuration

Test Case ID	Enhanced Blood Pressure Measurement flags and field values
BLP/COL/BPF/BI-08-C [Receive Enhanced Blood Pressure Measurement Indications with reserved flags]	For this test, use Flags = 0xFF (all 1s). Also, include valid uses of the other flags: Blood Pressure in kPa, time stamp, pulse rate, user id, measurement status, and user facing time. Any valid values for time stamp, pulse rate, user id, measurement status, and user facing time may be sent by the Lower Tester.
BLP/COL/BPF/BI-09-C [Receive Enhanced Blood Pressure Measurement Indications with reserved measurement status bits]	For this test, use Flags = 0x12, valid mmHg Blood Pressure, valid time stamp, reserved measurement status bits all set to 1s (e.g., 0xFFFF).
BLP/COL/BPF/BI-10-C [Receive Enhanced Blood Pressure Measurement Indications with additional octets not comprehended]	For this test, use Flags = 0x7E, valid mmHg Blood Pressure, valid time stamp, valid pulse rate, valid user id, valid measurement status, valid user facing time, the reserved Flags bit set, and at least two additional octets not comprehended by the Collector. The total number of octets does not exceed the maximum MTU size.

Table 4.11: Enhanced Blood Pressure Measurement characteristic indication - BI test cases

- Test Procedure

  For each test case in Table 4.11:

  1. The Lower Tester sends an ATT_Handle_Value_Indication, to the IUT, containing an Enhanced Blood Pressure Measurement characteristic value and fields as described in Table 4.11.
  2. The IUT receives an ATT_Handle_Value_Indication from the Lower Tester containing an Enhanced Blood Pressure Measurement characteristic handle and value and reports it to the Upper Tester.
  3. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

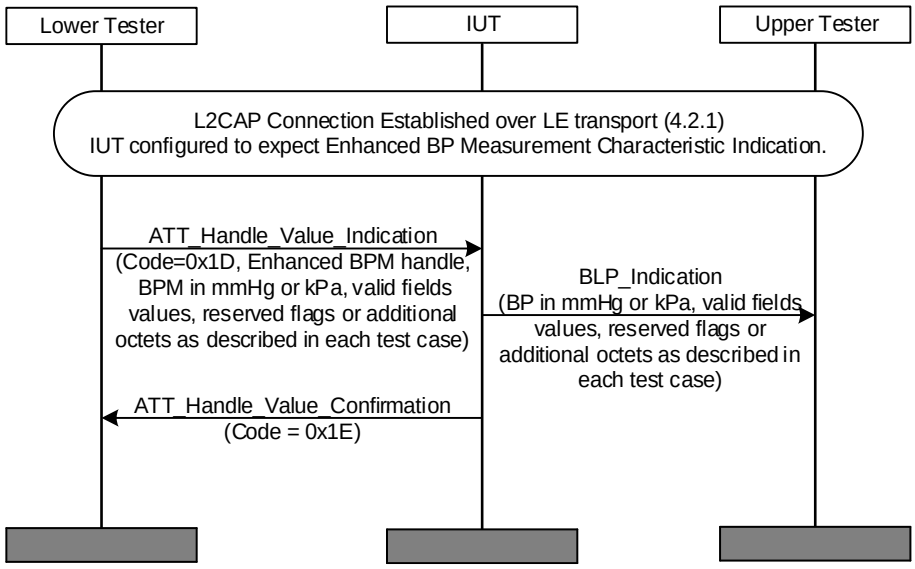

Figure 4.22: Receive Enhanced Blood Pressure Measurements Indications with reserved flags, with reserved measurement status bits, or with additional octets

- Expected Outcome

  Pass verdict

  For each test case in Table 4.11, the IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

  The IUT reports the received enhanced Blood Pressure measurement to the Upper Tester. The reported field values match the ones sent by the Lower Tester.

BLP/COL/BPF/BV-21-C [Receive multiple Enhanced Blood Pressure Measurements Indications]

- Test Purpose

  Verify that the Collector IUT can receive a series of Enhanced Blood Pressure Measurement characteristic indications.

- Reference

  [12] 4.8

- Initial Condition

  - The preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT is configured to expect Enhanced Blood Pressure Measurement Indication.
  - The IUT knows the handle of the Enhanced Blood Pressure Measurement characteristic.

- Test Procedure

  1. The Lower Tester sends multiple (i.e., two or more) ATT_Handle_Value_Indications to the IUT; each contains an Enhanced Blood Pressure Measurement characteristic value in mmHg with a time stamp, pulse rate, user id, measurement status, and user facing time if supported.
  2. The IUT receives multiple (i.e., two or more) ATT_Handle_Value_Indications from the Lower Tester each containing an Enhanced Blood Pressure Measurement characteristic handle and value and reports it to the Upper Tester.
  3. For each received indication, the IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.
  4. Verify that the characteristic values meet the requirements of the service.

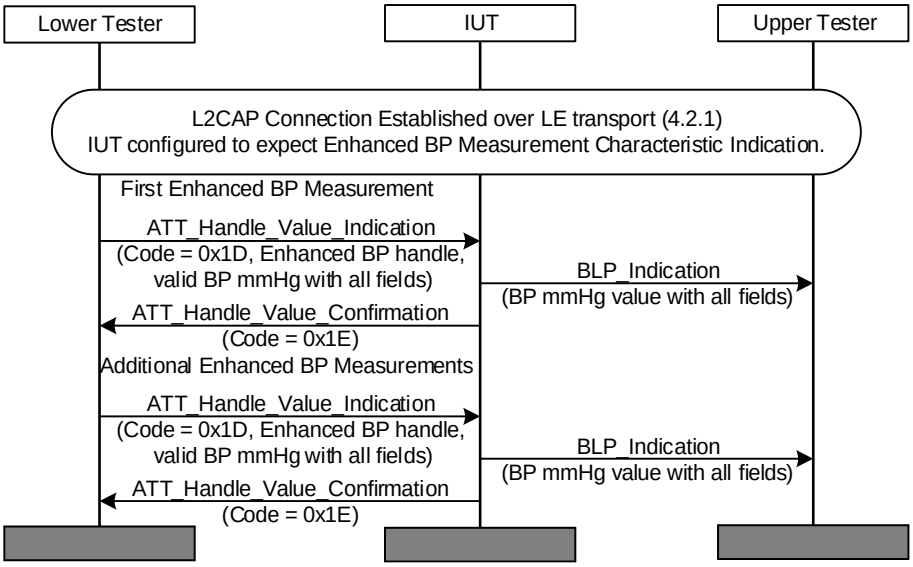

Figure 4.23: BLP/COL/BPF/BV-21-C [Receive multiple Enhanced Blood Pressure Measurements Indications]

- Expected Outcome

  Pass verdict

  For each ATT_Handle_Value_Indication sent to the IUT:

  - The IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.
  - The IUT reports all of the received mmHg Blood Pressure measurement values to the Upper Tester, e.g., BLP_Indication (Blood Pressure value, time stamp, pulse rate, user id, measurement status, and user facing time if supported) as specified in the flags field. The reported field values match the ones sent by the Lower Tester.

BLP/COL/BPF/BV-22-C [Receive Enhanced Intermediate Cuff Pressure Notifications]

- Test Purpose

  Verify that the Collector IUT can receive notifications of the Enhanced Intermediate Cuff Pressure Characteristic value, as described in Table 4.12.

- Reference

  [12] 4.9

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT knows the handle of the Enhanced Intermediate Cuff Pressure characteristic.
  - The IUT is configured to expect Enhanced Intermediate Cuff Pressure Notifications.
  - The Flags Field and field values for the Enhanced Blood Pressure Measurement characteristic are configured as described in Table 4.12.

- Test Procedure

  This test is run for each value of each bit shown in Table 4.12:

  1. The Lower Tester sends an ATT_Handle_Value_Notification containing an Enhanced Intermediate Cuff Pressure characteristic handle and value to the IUT as described in Table 4.12.
  2. The IUT receives an ATT_Handle_Value_Notification from the Lower Tester containing an Enhanced Intermediate Cuff Pressure characteristic handle and value and reports it to the Upper Tester.
  3. Verify that the characteristic values meet the requirement of the service.

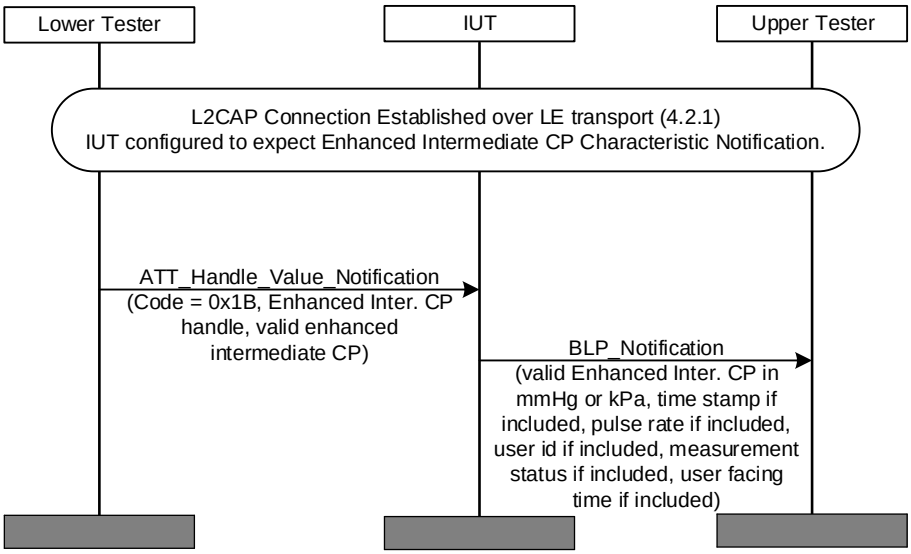

Figure 4.24: BLP/COL/BPF/BV-22-C [Receive Enhanced Intermediate Cuff Pressure Notifications]

- Expected Outcome

  Pass verdict

  For each test pattern, the IUT receives the notification of the Enhanced Intermediate Cuff Pressure with the expected combination as described in Table 4.12.

  The IUT reports to the Upper Tester the notification of the Enhanced Intermediate Cuff Pressure values.

  The reported field values and units match the ones sent by the Lower Tester.

Flag Field	Value	Pass Criteria (Reported in Enhanced Intermediate Cuff Pressure characteristic)
bit 0	0	Enhanced Intermediate Cuff Pressure in units of mmHg
	1	Enhanced Intermediate Cuff Pressure in units of kPa
bit 1	0	Time Stamp field is not present
	1	Time Stamp field is present
bit 2	0	Pulse Rate field is not present
	1	Pulse Rate field is present
bit 3	0	User ID field is not present
	1	User ID field is present
bit 4	0	Measurement Status field is not present
	1	Measurement Status field is present

Flag Field	Value	Pass Criteria (Reported in Enhanced Intermediate Cuff Pressure characteristic)
bit 5	0	User Facing Time field is not present
	1	User Facing Time field is present
bit 6	0	Epoch start = 1900
	1	Epoch start = 2000

Table 4.12: Pass Criteria for Characteristics - Enhanced Intermediate Cuff Pressure notifications

BLP/COL/BPF/BV-23-C [Receive Enhanced Intermediate Cuff Pressure Notifications - with UDS]

- Test Purpose

  Verify that the Collector IUT, after performing the Consent procedure, can receive notifications of the Enhanced Intermediate Cuff Pressure Characteristic value, as described in Table 4.13.

- Reference

  [12] 4.9

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT has registered a user, knows the Consent Code and User Index of this user.
  - The IUT knows the handle of the Enhanced Intermediate Cuff Pressure characteristic.
  - The IUT is configured to expect Enhanced Intermediate Cuff Pressure Notifications.
  - The Flags Field and field values for the Enhanced Intermediate Cuff Pressure characteristic are configured as described in Table 4.13 with the exception of bit 3, which only has value 1.
  - The Collector IUT has performed the Consent procedure and has consent to access the characteristics.

- Test Procedure

  This test is run for each value of each bit shown in Table 4.13:

  1. The Lower Tester sends an ATT_Handle_Value_Notification containing an Enhanced Intermediate Cuff Pressure characteristic handle and value to the IUT as described in Table 4.13.
  2. The IUT receives an ATT_Handle_Value_Notification from the Lower Tester containing an Enhanced Intermediate Cuff Pressure characteristic handle and value and reports it to the Upper Tester.
  3. Verify that the characteristic values meet the requirement of the service.

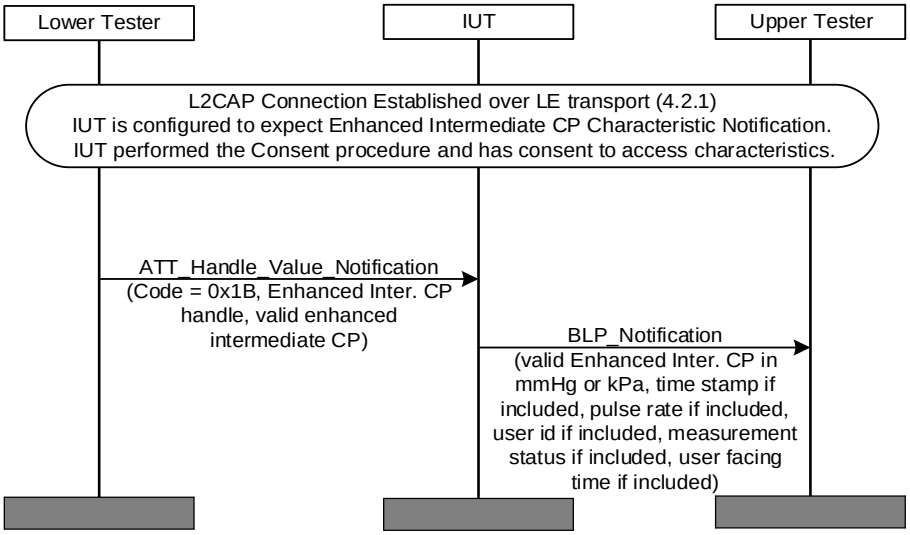

Figure 4.25: BLP/COL/BPF/BV-23-C [Receive Enhanced Intermediate Cuff Pressure Notifications - with UDS]

- Expected Outcome

  Pass verdict

  For each test pattern, the IUT receives the notification of the Enhanced Intermediate Cuff Pressure with the expected combination as described in Table 4.13 with:

  - Bit 3 of Flags field set to 1, and
  - User ID field for the selected user.

  The IUT reports to the Upper Tester the notifications of the Enhanced Intermediate Cuff Pressure values.

  The reported field values and units match the ones sent by the Lower Tester.

Flag Field	Value	Pass Criteria (Reported in Enhanced Intermediate Cuff Pressure characteristic)
bit 0	0	Enhanced Intermediate Cuff Pressure in units of mmHg
	1	Enhanced Intermediate Cuff Pressure in units of kPa
bit 1	0	Time Stamp field is not present
	1	Time Stamp field is present
bit 2	0	Pulse Rate field is not present
	1	Pulse Rate field is present
bit 3	1	User ID field is present
bit 4	0	Measurement Status field is not present
	1	Measurement Status field is present
bit 5	0	User Facing Time field is not present
	1	User Facing Time field is present
bit 6	0	Epoch start = 1900
	1	Epoch start = 2000

Table 4.13: Pass Criteria for Characteristics - Enhanced Intermediate Cuff Pressure notifications with UDS

4.4.4 Receive Enhanced Intermediate Cuff Pressure Notifications with reserved flags, with reserved measurement status bits, or with additional octets

- Test Purpose

  For each test case in Table 4.14, verify that the Collector IUT can receive notifications of the Enhanced Intermediate Cuff Pressure Characteristic from a Blood Pressure Sensor.

- Reference

  [12] 4.9

- Initial Condition

  - The preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT is configured to expect Enhanced Intermediate Cuff Pressure Notifications.
  - The IUT knows the handle of the Enhanced Intermediate Cuff Pressure characteristic.

- Test Case Configuration

Test Case ID	Enhanced Blood Pressure Measurement flags and field values
BLP/COL/BPF/BI-11-C [Receive Enhanced Intermediate Cuff Pressure Notifications with reserved flags]	For this test, use Flags = 0x90 (Blood Pressure in mmHg, no Time Stamp, no Pulse Rate, no User ID, Measurement Status, no User Facing Time). Any valid values for the Measurement Status field may be sent by the Lower Tester.
BLP/COL/BPF/BI-12-C [Receive Enhanced Intermediate Cuff Pressure Notifications with reserved measurement status bits]	For this test, use Flags = 0x10, valid mmHg Blood Pressure, measurement status bits (e.g., 0xFFFF).
BLP/COL/BPF/BI-13-C [Receive Enhanced Intermediate Cuff Pressure Notifications with additional octets not comprehended]	For this test, use Flags = 0x10, valid mmHg Blood Pressure, valid measurement status, one reserved Flags bit set, and at least two additional octets not comprehended by the Collector. The total number of octets does not exceed the maximum MTU size.

Table 4.14: Enhanced Intermediate Cuff Pressure characteristic notification - BI test cases

- Test Procedure

  For each test case in Table 4.14:

  1. The Lower Tester sends an ATT_Handle_Value_Notification, to the IUT, containing an Enhanced Intermediate Cuff Pressure characteristic value as described in Table 4.14.
  2. The IUT receives an ATT_Handle_Value_Notification from the Lower Tester containing an Enhanced Intermediate Cuff Pressure characteristic handle and value and reports it to the Upper Tester.
  3. Verify that the characteristic values meet the requirements of the service.

  For this test, use Flags = 0x90 (Blood Pressure in mmHg, no Time Stamp, no Pulse Rate, no User ID, Measurement Status, no User Facing Time). Any valid values for the Measurement Status field may be sent by the Lower Tester.

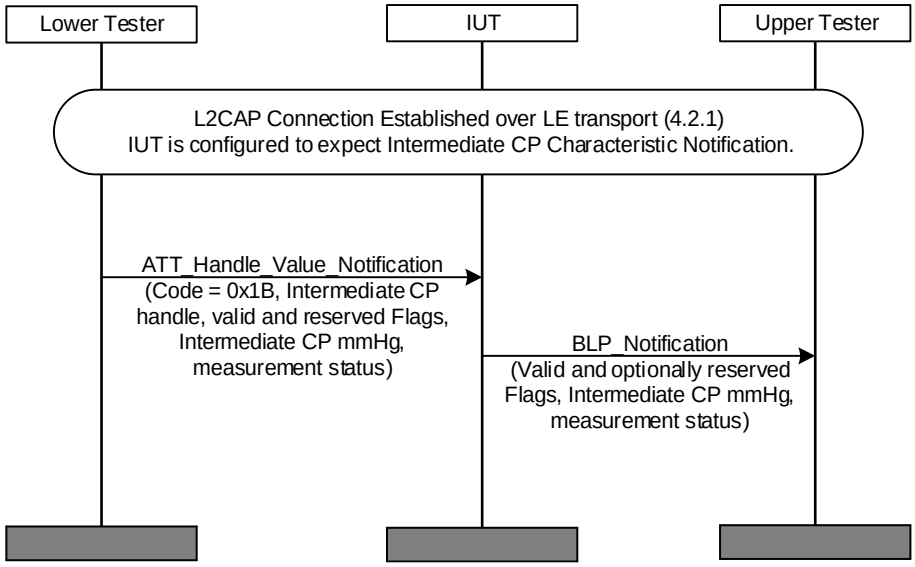

Figure 4.26: Receive Enhanced Intermediate Cuff Pressure Notifications with reserved flags, with reserved measurement status bits, or with additional octets

- Expected Outcome

  Pass verdict

  For each test case in Table 4.14, the IUT reports the received Enhanced Intermediate Cuff Pressure value to the Upper Tester. The reported field values match the ones sent by the Lower.

BLP/COL/BPF/BV-24-C [Receive multiple Enhanced Intermediate Cuff Pressure Notifications]

- Test Purpose

  Verify that the Collector IUT can receive two or more Enhanced Intermediate Cuff Pressure notifications followed by an Enhanced Blood Pressure Measurement indication.

- Reference

  [12] 4.8, 4.9

- Initial Condition

  - A preamble procedure defined in Section 4.2.2 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.
  - The IUT knows the handle of the Enhanced Blood Pressure Measurement characteristic.
  - The IUT knows the handle of the Enhanced Intermediate Cuff Pressure characteristic.
  - The Lower Tester is configured to enable Enhanced Blood Pressure Measurement Indication and Enhanced Intermediate Cuff Pressure Notification.

- Test Procedure

  1. The Lower Tester sends two or more ATT_Handle_Value_Notifications to the IUT; each contains the Enhanced Intermediate Cuff Pressure characteristic value in mmHg.
  2. The IUT receives two or more ATT_Handle_Value_Notifications from the Lower Tester containing the Enhanced Intermediate Cuff Pressure characteristic handle and value and reports it to the Upper Tester.

3. The Lower Tester sends an ATT_Handle_Value_Indication to the IUT, containing an Enhanced Blood Pressure Measurement characteristic handle and value in mmHg with a time stamp or a measurement status field.
4. The IUT receives an ATT_Handle_Value_Indication from the Lower Tester containing an Enhanced Blood Pressure Measurement characteristic handle and value and reports it to the Upper Tester.
5. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.
6. Verify that the characteristic values meet the requirements of the service.

- Expected Outcome

  Pass verdict

  For each ATT_Handle_Value_Notification sent to the IUT:

  - The IUT reports the received mmHg Blood Pressure value to the Upper Tester. The reported field values match the ones sent by the Lower Tester.

  For the ATT_Handle_Value_Indication sent to the IUT:

  - The IUT sends a correctly formatted ATT_Handle_Value_Confirmation (0x1E) to the Lower Tester.

  - The IUT reports the received mmHg Blood Pressure values to the Upper Tester, e.g., BLP_Indication (Blood Pressure value, measurement status) as specified in the flags field. The reported field values match the ones sent by the Lower Tester.

4.4.5 Read or Enable Blood Pressure Feature characteristic for Indication

BLP/COL/BPF/BV-25-C [Read Blood Pressure Feature characteristic – Bonding enabled]

- Test Purpose

  Verify that, after the initial connection and bonding, the IUT can read the Blood Pressure Feature characteristic.

- Reference

  [12] 4.6

- Initial Condition

  - The Upper Tester knows the handle of the Blood Pressure Feature characteristic contained in the Lower Tester.

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

  - The IUT is bonded with the Lower Tester.

- Test Procedure

  1. The Upper Tester commands the IUT to read the Blood Pressure Feature characteristic from the Lower Tester.
  2. The IUT sends an ATT_Read_Request (0x0A) to the Lower Tester containing the handle specified by the Upper Tester.
  3. The Lower Tester receives the ATT_Read_Request and then sends an ATT_Read_Response (0x0B) to the IUT containing the value of the Blood Pressure Feature characteristic.
  4. The IUT receives the ATT_Read_Response and reports the value to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reads the Blood Pressure Feature characteristic and reports its value to the Upper Tester.

  Reserved for future use bit values are ignored.

BLP/COL/BPF/BV-26-C [Enable Blood Pressure Feature characteristic for indication or read characteristic upon reconnection]

- Test Purpose

  Verify that the IUT can either enable for indication the Blood Pressure Feature characteristic or read the characteristic upon reconnection.

- Reference

  [12] 4.6

- Initial Condition

  - The handles of the Blood Pressure Feature characteristic and Client Characteristic Configuration descriptor have been previously discovered by the Upper Tester during the test procedure in Section 4.3.1 or are known to the Upper Tester by other means.
  - Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1.
  - The IUT is not paired and bonded with the Lower Tester.

- Test Procedure

  1. The Upper Tester orders the IUT to initiate pairing and bonding.
  2. The Upper Tester commands the IUT to perform, either alternative 2A or 2B:
     Alternative 2A (Configure Blood Pressure Feature characteristic for indication):
     2A.1. The IUT configures the Blood Pressure Feature characteristic for indication.

     Or

     Alternative 2B (Read Blood Pressure Feature characteristic upon reconnection):
     2B.1. The Upper Tester commands the IUT to disconnect, and the IUT terminates the connection with the Lower Tester
     2B.2. The Upper Tester commands the IUT to reconnect to the Lower Tester.
     2B.3 The IUT reads the Blood Pressure Feature characteristic from the Lower Tester.

- Expected Outcome

  Pass verdict

  In step 1, The IUT successfully completes pairing and bonding.

  In step 2A.1, the IUT enables the Blood Pressure Feature characteristic for indication.

  In step 2B.3, the IUT reads the Blood Pressure Feature characteristic and reports its value to the Upper Tester.

  Reserved for future use bit values are ignored.

4.5 Service Procedures – User Data Service

The procedures defined in this test group verify implementation of the User Data Service and usage of the same features by a Collector IUT.

BLP/COL/UDS/BV-01-C [Register New User]

- Test Purpose

  Verify that the Collector IUT can perform the Register New User procedure to obtain a User Index value for a new user.

- Reference

  [12] 4.12.5.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to User Control Point characteristic.
  - The Lower Tester is in a mode 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 Op Code (0x01) to the User Control Point with a Parameter Value of 0x04D2, which represents the Consent Code “1234”.
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an ATT_Handle_Value_Indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for Success (0x01) with the Response Parameter set to a User Index value chosen by the Lower Tester.
  4. The IUT receives an ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT writes a correctly formatted Register New User Op Code (0x01) and parameter to the User Control Point containing the values specified in the test case.

  The IUT receives an indication from the User Control Point containing the Response Value for Success (0x01) and User Index parameter value chosen by the Lower Tester and reports it to the Upper Tester.

BLP/COL/UDS/BV-02-C [Consent]

- Test Purpose

  Verify that the Collector IUT can perform the Consent procedure.

- Reference

  [12] 4.12.5.2.2

- Initial Condition
  - Perform the preamble described in Section 4.2.3 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 described in BLP/COL/UDS/BV-01-C [Register New User], and the Upper Tester knows the assigned User Index.
- Test Procedure
  1. The Consent Code associated with the User Index may have been previously cached by the IUT or may be entered during this step. The Upper Tester sends a command to the IUT to write the Consent Op Code (0x02) to the User Control Point with a Parameter Value that contains the User Index value of User A followed by 0x04D2, which represents the Consent Code “1234”.
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an ATT_Handle_Value_Indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02) followed by the Response Value for Success (0x01) without a Response Parameter.
  4. The IUT receives an ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.
- Expected Outcome

  Pass verdict

  The IUT writes a correctly formatted op code and parameter to the User Control Point containing the values specified in the test case.

  The IUT receives an indication from the User Control Point containing the Response Value for Success (0x01) and reports it to the Upper Tester.

BLP/COL/UDS/BV-03-C [List All Users – Registered User Name Present in a Single Message Registered User Data]

- Test Purpose

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

- Reference

  [12] 4.12.5.2.4

- Initial Condition
  - Perform the preamble described in Section 4.2.3 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 Op Code (0x04) to the User Control Point with no Operand.
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_Write_Response to acknowledge the write to the User Control Point.
  4. The Lower Tester, within 30 seconds from the receipt of the ATT_Write_Request in step 2, sends a first ATT_Handle_Value_Indication 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 1 set to 1, bit 2 set to 0, User Index and Registered User Name matching user 1.
  5. The IUT receives the first ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.
  7. Within 30 seconds from the receipt of the ATT_Handle_Value_Confirmation from the IUT, the Lower Tester sends a second ATT_Handle_Value_Indication repeating steps 4–6 for registered user 2.
  8. Within 30 seconds from the receipt of the ATT_Handle_Value_Confirmation from the IUT, the Lower Tester sends an ATT_Handle_Value_Indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for Success (0x01) with the Response Parameter having a value of 2 (Number of users).
  9. The IUT receives an ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT writes a correctly formatted op code 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 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.

BLP/COL/UDS/BV-04-C [List All Users – Registered User Name Present in a Multi-Message Registered User Data]

- Test Purpose

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

- Reference

  [12] 4.12.5.2.4

- Initial Condition

  - Perform the preamble described in Section 4.2.3 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 one registered user, user 3, with a Registered User Data length, [(ATT_MTU-3) to (2*(ATT_MTU-4)], requiring two indications of the Registered User characteristic.

- Test Procedure

1. The Upper Tester sends a command to the IUT to write the List All Users Op Code (0x04) to the User Control Point with no Operand.
2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
3. The Lower Tester sends an ATT_Write_Response to acknowledge the write to the User Control Point.
4. The Lower Tester, within 30 seconds from the receipt of the ATT_Write_Request in step 2, sends a first ATT_Handle_Value_Indication of the Registered User characteristic containing Segmentation Header field with the First Segment bit set to 1, Last Segment bit set to 0 and the Rolling Segment Counter set to a valid value, and the Registered User Data with Flags field bit 1 set to 1, bit 2 set to 0, User Index and part 1 of the Registered User Name of user 3.
5. The IUT receives the first ATT_Handle_Value_Indication from the Lower Tester containing the Registered User characteristic handle and value.
6. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.
7. The Lower Tester, within 30 seconds from the receipt of the ATT_Handle_Value_Confirmation in step 6, sends a second ATT_Handle_Value_Indication of the Registered User characteristic containing Segmentation Header field with the First Segment bit set to 0, Last Segment bit set to 1 and the Rolling Segment Counter incremented by 1, and the Registered User Data with only part 2 of the Registered User Name of user 3.
8. The IUT receives the second ATT_Handle_Value_Indication from the Lower Tester containing the Registered User characteristic handle and value. The IUT concatenates part 1 and 2 of the Registered User Name and reports it to the Upper Tester.
9. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.
10. The Lower Tester, within 30 seconds from the receipt of the ATT_Handle_Value_Confirmation in step 9, sends an ATT_Handle_Value_Indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for Success (0x01) with the Response Parameter having a value of 1 (Number of users).
11. The IUT receives the ATT_Handle_Value_Indication from the Lower Tester containing the User Control Point characteristic handle and value and reports it to the Upper Tester.
12. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

Pass verdict

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

The IUT reports the complete Registered User Name and User Index, received in steps 5 and 8, to the Upper Tester.

The IUT receives an indication from the User Control Point and reports it to the Upper Tester.

The Number of users matches the number of users contained in the Lower Tester.

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

BLP/COL/UDS/BV-05-C [List All Users – Truncated User Name]

- Test Purpose

  Verify that the Collector IUT can perform the List All Users procedure and process correctly the Segmentation Header and Registered User Data with a truncated user name.

- Reference

  [12] 4.12.5.2.4

- Initial Condition

  - Perform the preamble described in Section 4.2.3 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 one registered user, user 4, with a truncated user name length. 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 Op Code (0x04) to the User Control Point with no Operand.
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_Write_Response to acknowledge the write to the User Control Point.
  4. The Lower Tester, within 30 seconds from the receipt of the ATT_Write_Request in step 2, sends an ATT_Handle_Value_Indication of the Registered User characteristic containing Segmentation Header field with the First Segment and Last Segment bit set to 1 and the Rolling Segment Counter set to a valid value, and the Registered User Data with the Flags field set to 0x03 (bit 1 and 2 set to 1), User Index and the Registered User Name composed of the truncated user name for user 4.
  5. The IUT receives an ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.
  7. Within 30 seconds from the receipt of the ATT_Handle_Value_Confirmation from the IUT, the Lower Tester sends an ATT_Handle_Value_Indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for Success (0x01) with the Response Parameter having a value of 1 (Number of users).
  8. The IUT receives an ATT_Handle_Value_Indication from the Lower Tester containing the User Control Point characteristic handle and value and reports it to the Upper Tester.
  9. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

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

  The IUT reports the truncated Registered User Name and User Index, received in step 5, to the Upper Tester.

  The IUT receives an indication from the User Control Point and reports it to the Upper Tester.

The Number of users matches the number of users contained in the Lower Tester.

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

BLP/COL/UDS/BV-06-C [List All Users – No Users]

- Test Purpose

  Verify that the Collector IUT can perform the List All Users procedure and process correctly the indication when there are no registered users in the BLP Sensor.

- Reference

  [12] 4.12.5.2.4

- Initial Condition

  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to User Control Point characteristic.
  - The Lower Tester does not contain registered users (e.g., all registered users have been deleted by performing the BLP/COL/UDS/BV-09-C [Delete User(s) – All Users] procedure).

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the List All Users Op Code (0x04) to the User Control Point with no Operand.
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_Write_Response to acknowledge the write to the User Control Point.
  4. The Lower Tester, within 30 seconds from the receipt of the ATT_Write_Request in step 2, sends an ATT_Handle_Value_Indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x04) followed by the Response Value for Success (0x01) with the Response Parameter having a value of 0 (Number of users).
  5. The IUT receives an ATT_Handle_Value_Indication from the Lower Tester containing the User Control Point characteristic handle and value and reports it to the Upper Tester.
  6. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

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

  The IUT receives an indication from the User Control Point and reports it to the Upper Tester.

  The Number of users matches the number of users contained in the Lower Tester.

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

4.5.1 Delete User Data and Delete User(s) procedures

- Test Purpose

  For each selected test case in Table 4.15, verify that the Collector IUT can perform the selected procedure with the described Op Code and, if applicable, the Parameter value.

- Reference

  [12] 4.12.5.2.3, 4.12.5.2.5

- Initial Condition
  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to User Control Point characteristic.
  - Multiple users have previously been registered by following the procedure described in BLP/COL/UDS/BV-01-C [Register New User] 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 described in BLP/COL/UDS/BV-02-C [Consent] so that consent has been granted with respect to the user having the User Index of User B.
  - For the purposes of running BLP/COL/UDS/BV-07-C [Delete User Data], maintain the connection.
- Test Case Configuration

Test Case ID	Reference	Op Code	Parameter	Requirement
BLP/COL/UDS/BV-07-C [Delete User Data]	[12] 4.12.5.2.3	0x03	N/A	Delete user data for registered user with User Index of User B
BLP/COL/UDS/BV-08-C [Delete User(s) – Single User]	[12] 4.12.5.2.5	0x05	User Index of User A	Delete registered user with User Index of User A
BLP/COL/UDS/BV-09-C [Delete User(s) – All Users]	[12] 4.12.5.2.5	0x05	0xFF	Delete all registered users

Table 4.15: Delete User Data and Delete Users procedure test cases

- Test Procedure

  For each selected test case in Table 4.15, perform the below steps:

  1. The Upper Tester sends a command to the IUT to write the procedure Op Code <Op Code> to the User Control Point with, if applicable, a Parameter Value having a value set to the <Parameter> described in Table 4.15.
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an ATT_Handle_Value_Indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code <Op Code> followed by the Response Value for Success (0x01), and, if applicable, with the Response Parameter having a value set to the <Parameter> described in Table 4.15.
  4. The IUT receives an ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  For each selected test case in Table 4.15:

  - The IUT writes a correctly formatted Op Code and parameter, as described in Table 4.15, to the User Control Point.

- The IUT receives an ATT_Handle_Value_Indication of the User Control Point characteristic handle and value and reports it to the Upper Tester. The indication, if applicable, includes a Response Parameter having a value set to the <Parameter> value described in Table 4.15.
- Verify that the characteristic value meets the requirements of the service.

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

- Test Purpose

  For each selected test case in Table 4.16, verify that the Collector IUT can perform the selected sub-procedure on the <Characteristic> contained in the BLP Sensor.

- Reference

  [12] 4.12.2, 4.12.3

- Initial Condition
  - Perform the preamble described in Section 4.2.3 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 described in BLP/COL/UDS/BV-01-C [Register New User].
  - Perform the Consent procedure described in BLP/COL/UDS/BV-02-C [Consent] 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 4.16 and contained in the Lower Tester.

- Test Case Configuration

Test Case ID	Sub-procedure / Characteristic	ATT Command	ATT Response
BLP/COL/UDS/BV-10-C [Read User Index characteristic]	Read Characteristic Value / User Index characteristic	ATT_Read_Request (0x0A) with the handle	ATT_Read_Response (0x0B) with the characteristic value
BLP/COL/UDS/BV-11-C [Read Database Change Increment characteristic]	Read Characteristic Value / Database Change Increment Characteristic	ATT_Read_Request (0x0A) with the handle	ATT_Read_Response (0x0B) with the characteristic value
BLP/COL/UDS/BV-12-C [Write Database Change Increment characteristic]	Write Characteristic Value / Database Change Increment Characteristic	ATT_Write_Request (0x12) with the handle and value	ATT_Write_Response (0x13)

Table 4.16: Read User Index and Read or Write Database Change Increment characteristic test cases

- Test Procedure

  For each selected test case in Table 4.16:

  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

  For each selected test case in Table 4.16, 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.

BLP/COL/UDS/BV-13-C [Receive Database Change Increment Characteristic Notification]

- Test Purpose

  Verify the Collector IUT behavior on receipt of a notification of the Database Change Increment characteristic from a BLP Sensor.

- Reference

  [12] 4.12.3

- Initial Condition

  - The preamble procedure defined in Section 4.2.2 is used to initiate connection to a Blood Pressure Sensor.
  - The IUT has been connected to the Lower Tester, and the UDS Characteristics and the Database Change Increment are set to the same value in both devices.
  - The IUT has executed the applicable procedures included in Section 4.3.1, and the Database Change Increment is configured for notifications.

- Test Procedure

  1. A Client, which has performed the Consent procedure and is authorized to access the UDS characteristics, writes to the UDS characteristic and updates at least one UDS characteristic value on the Lower Tester (e.g., the First Name characteristic value). After updating the UDS characteristic, the Lower Tester increments the value of the Database Change Increment characteristic.
  2. The Client disconnects from the Lower Tester.
  3. Establish a connection between the IUT and the Lower Tester using the Preamble in Section 4.2.2.
  4. The Lower Tester sends a notification of the Database Change Increment characteristic to the IUT.
  5. The IUT reads the UDS Characteristics it supports.

- Expected Outcome

  Pass verdict

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

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

4.5.3 Read or Write UDS characteristic

- Test Purpose

  For each selected test case in Table 4.17, verify that the Collector IUT can perform the selected <Sub-procedure> for each characteristic of the User Data Service supported by the IUT.

- Reference

  [12] 4.12.1

- Initial Condition

  - TSPX_iut_supported_uds_read_characteristics_uuid_list and TSPX_iut_supported_uds_write_characteristics_uuid_list in the IXIT [11] specify all characteristics of the User Data Service supported by the IUT.
  - The preamble procedure defined in Section 4.2.2 is used to initiate connection to a Blood Pressure Sensor.
  - The Lower Tester includes one instantiation of the User Data Service [14], including all defined characteristics.
  - The Consent procedure has been performed and the IUT is authorized to access the User Data Service characteristics.
  - The IUT has previously executed the procedures included in Section 4.3.1, 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 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	UDS Characteristic
BLP/COL/UDS/BV-14-C [Read UDS characteristic]	Read Characteristic Value	UDS Characteristics for which the IUT supports reading as listed in the IXIT [11]
BLP/COL/UDS/BV-15-C [Write UDS characteristic]	Write Characteristic Value	UDS Characteristics for which the IUT supports writing as listed in the IXIT [11]

Table 4.17: Read or Write UDS Characteristic test cases

- Test Procedure

  If the test case in Table 4.17 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 as listed in the IXIT [11].
  2. For each characteristic of the User Data Service supported by the IUT, the IUT sends an ATT_Read_Request command to the Lower Tester.

  Or, if the test case in Table 4.17 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 ‘Date of Birth’, ‘Age’, ‘First Name’, ‘Last Name’, or ‘Gender’ UDS Characteristic.
  2. The IUT sends an ATT_Write_Request command to the Lower Tester with the value specified in step 1.

- Expected Outcome

  Pass verdict

  If the test case in Table 4.17 is for reading, for each characteristic contained in the Lower Tester's instantiation of the User Data Service supported by the IUT, as specified in the IXIT [11], the IUT reports the characteristic value correctly to the Upper Tester.

  If the test case in Table 4.17 is for writing, for the selected UDS Characteristic, for which the IUT supports writing as declared in the IXIT [11], 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 numeric-based characteristic, any values in the range of the characteristic.
  - For date-based characteristic, any values in the range of the characteristic.

4.5.4 Read Long or Write Long UDS characteristic

- Test Purpose

  For each selected test case in Table 4.18, verify that a Collector IUT can perform the selected <Sub-procedure> for the applicable UDS Characteristics.

- Reference

  [12] 4.12.1

- Initial Condition

  - TSPX_iut_supported_uds_characteristics_uuid_list in the IXIT [11] specifies all characteristics of the User Data Service supported by the IUT that use UTF-8 format.
  - The preamble procedure defined in Section 4.2.2 is used to initiate connection to a Blood Pressure Sensor.
  - The Lower Tester includes one instantiation of the User Data Service [14], including all defined characteristics.
  - The Consent procedure has been performed and the IUT is authorized to access the User Data Service characteristics.
  - The IUT has previously executed the procedure included in Section 4.3.1, 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 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
BLP/COL/UDS/BV-16-C [Read Long UDS characteristic]	Read Long Characteristic Value	UDS Characteristics for which the IUT supports Read Long Characteristic Values as listed in the IXIT [11]

Test Case ID	Sub-procedure	UDS Characteristic
BLP/COL/UDS/BV-17-C [Write Long UDS characteristic]	Write Long Characteristic Value	UDS Characteristics for which the IUT supports Write Long Characteristic Values as listed in the IXIT [11]

Table 4.18: Read or Write Long UDS Characteristic test cases

- Test Procedure

  If the test case in Table 4.18 is for reading:

  1. The Lower Tester exposes a UTF-8 based characteristic that is supported by the Collector 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 GATT Read Long Characteristic Values sub-procedure.

  Or, if the test case in Table 4.18 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 GATT Write Long Characteristic Values sub-procedure.

- Expected Outcome

  Pass verdict

  If the test case in Table 4.18 is for reading, for each UDS Characteristic using the UTF-8 format, for which support was declared in the IXIT [11], the IUT reports the characteristic value correctly, including all the printable and non-printable ASCII values.

  If the test case in Table 4.18 is for writing, for the selected UDS Characteristic using the UTF-8 format, for which support was declared in the IXIT [11], the IUT writes the characteristic value correctly to the Lower Tester including, for string-based characteristics, any printable or non-printable ASCII values.

4.6 Service Procedures – RACP

This test group contains test cases to verify the Collector IUT’s ability to configure, conduct compliant operation, and interpret values of the Record Access Control Point (RACP) and Blood Pressure Record characteristic.

4.6.1 Report Number of Stored Records with UDS

- Test Purpose

  For each test case in Table 4.19, verify that the IUT can perform the Report Number of Stored Records procedure with the listed <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)>.

- Reference

  [12] 4.11.3.2

- Initial Condition

  - The Lower Tester has previously been configured for at least two users, and the IUT has been assigned only one User ID and Consent Code at initial connection with the Lower Tester.

- The IUT has performed the Consent procedure with the User ID and assigned Consent Code.
- Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to RACP characteristic.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
BLP/COL/RAN/BV-01-C [Report Number of Stored Records with UDS – Operator All records]	All records	N/A	No filter parameter
BLP/COL/RAN/BV-02-C [Report Number of Stored Records with UDS – Operator Greater than or equal to with Sequence Number]	Greater than or equal to	Sequence Number	<Min filter value>
BLP/COL/RAN/BV-03-C [Report Number of Stored Records with UDS – Operator Greater than or equal to with Base Time]	Greater than or equal to	Base Time	<Min filter value>
BLP/COL/RAN/BV-04-C [Report Number of Stored Records with UDS – Operator Greater than or equal to with User Facing Time]	Greater than or equal to	User Facing Time	<Min filter value>

Table 4.19: Report Number of Stored Records with UDS

- Test Procedure

  For each selected test case in Table 4.19, perform the below steps:

  1. Perform an action on the Lower Tester that will induce it to generate at least 3 Blood Pressure records for the user assigned to the IUT and also at least 5 records for at least user not assigned to the IUT.
  2. The Upper Tester sends a command to the IUT to write the Report Number of Stored Records Op Code (0x04) to the RACP characteristic using the selected <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)> as described in Table 4.19.
  3. The IUT sends an ATT_Write_Request with the instruction from step 2 to the Lower Tester.
  4. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Number of Stored Records Response Op Code (0x05), an Operator of Null (0x00), and an Operand representing the number of records that were found for the appropriate User ID value.
  5. The IUT receives the ATT_Handle_Value_Indication from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  6. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  For each test case in Table 4.19, the IUT reports the received number of records, for the appropriate User ID value, to the Upper Tester.

  The received characteristic values meet the requirements of the service.

4.6.2 Report Number of Stored Records

- Test Purpose

  For each selected test case in Table 4.20, verify that the IUT can perform the Report Number of Stored Records procedure with the selected <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)>.

- Reference

  [12] 4.11.3.2

- Initial Condition

  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to RACP characteristic.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
BLP/COL/RAN/BV-05-C [Report Number of Stored Records – Operator All records]	All records	N/A	No filter parameter
BLP/COL/RAN/BV-06-C [Report Number of Stored Records – Operator Greater than or equal to with Sequence Number]	Greater than or equal to	Sequence Number	<Min filter value>
BLP/COL/RAN/BV-07-C [Report Number of Stored Records – Operator Less than or equal to with Base Time]	Less than or equal to	Base Time	<maximum filter value>
BLP/COL/RAN/BV-08-C [Report Number of Stored Records – Operator Less than or equal to with User Facing Time]	Less than or equal to	User Facing Time	<maximum filter value>
BLP/COL/RAN/BV-09-C [Report Number of Stored Records – Operator Within range of (inclusive) with Base Time]	Within range of (inclusive)	Base Time	<minimum filter value>, <maximum filter value>
BLP/COL/RAN/BV-10-C [Report Number of Stored Records – Operator Within range of (inclusive) with User Facing Time]	Within range of (inclusive)	User Facing Time	<minimum filter value>, <maximum filter value>

Table 4.20: Report Number of Stored Records with Optional Operators and Operands

- Test Procedure

  For each selected test case in Table 4.20, perform the below steps:

  1. Perform an action on the Lower Tester that will induce it to generate at least 3 Blood Pressure records for which UDS is not used or not supported and also at least 5 records for at least 1 user for which UDS is used.
  2. The Upper Tester sends a command to the IUT to write the Report Number of Stored Records Op Code (0x04) to the RACP characteristic using the selected <Operator>, applicable <Operand Filter Type>, and the <Operand Filter Value(s)> as described in Table 4.20.
  3. The IUT sends an ATT_Write_Request with the instruction from step 2 to the Lower Tester.
  4. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Number of Stored Records Response Op Code (0x05), an Operator of Null (0x00), and an Operand representing the number of records that were found for which UDS is not used or not supported.
  5. The IUT receives the ATT_Handle_Value_Indication from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  6. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  For each test case in Table 4.20, the IUT reports the received number of records, for which UDS is not used or for which UDS is not supported, to the Upper Tester.

  The received characteristic values meet the requirements of the service.

4.6.3 Report Stored Records procedure with UDS

- Test Purpose

  For each selected test case in Table 4.21, verify that, for a single user, the IUT can perform the Report Stored Records procedure with the mandatory <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)>.

- Reference

  [12] 4.11.3.3

- Initial Condition

  - Perform the preamble described in Section 4.2.3 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.
  - The Lower Tester has previously been configured for at least two users, and the IUT has been assigned only one User ID and Consent Code at initial connection with the Lower Tester.
  - The IUT has performed the Consent procedure with the User ID and assigned Consent Code.
  - The Sequence Number field of the Blood Pressure Record characteristic is set to start at 0.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
BLP/COL/RAR/BV-01-C [Report Stored Records with UDS – Operator All records]	All records	N/A	No filter parameter
BLP/COL/RAR/BV-02-C [Report Stored Records with UDS – Operator First record]	First record	No Filter Type	N/A
BLP/COL/RAR/BV-03-C [Report Stored Records with UDS – Operator Last record]	Last record	No Filter Type	N/A
BLP/COL/RAR/BV-04-C [Report Stored Records with UDS – Operator Greater than or equal to with Operand Sequence Number]	Greater than or equal to	Sequence Number	<Min filter value>
BLP/COL/RAR/BV-05-C [Report Stored Records with UDS – Operator Greater than or equal to with Operand Base Time]	Greater than or equal to	Base Time	<Min filter value>
BLP/COL/RAR/BV-06-C [Report Stored Records with UDS – Operator Greater than or equal to with Operand User Facing Time]	Greater than or equal to	User Facing Time	<Min filter value>

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
BLP/COL/RAR/BV-07-C [Report Stored Records with UDS – Operator Less than or equal to with Operand Sequence Number]	Less than or equal to	Sequence Number	<Max filter value>
BLP/COL/RAR/BV-08-C [Report Stored Records with UDS – Operator Within range of (inclusive) with Operand Sequence Number]	Within range of (inclusive)	Sequence Number	<Min filter value>, <Max filter value>

Table 4.21: Report Stored Records procedure with UDS

- Test Procedure

  For each selected test case in Table 4.21, perform the below steps:

  1. Perform an action on the Lower Tester that will induce it to generate at least 3 Blood Pressure records for the user assigned to the IUT and also several (e.g., 5 or more) records for one or more users not assigned to the IUT.
  2. The Upper Tester sends a command to the IUT to write the Report Stored Records Op Code (0x01) to the RACP characteristic using the selected <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)> as described in Table 4.21.
  3. The IUT sends an ATT_Write_Request with the instruction from step 2 to the Lower Tester.
  4. The Lower Tester sends one or more ATT_Handle_Value_Notifications of the Blood Pressure Record characteristic. The number of the notifications, per each Blood Pressure record, will depend on the size of each Blood Pressure record. Each notification contains a Segmentation Header field with a First Segment bit, Last Segment bit, Rolling Segment Counter bits, with appropriate values, and the recorded characteristic. The Rolling Segment Counters associated with the multiple notifications are consecutive.
  5. Per record, the IUT receives one or more ATT_Handle_Value_Notifications from the Lower Tester containing the transported data. When needed, the IUT first concatenates the multiple messages, preserving the same order as indicated by the Rolling Segment Counters, to extract the transported data. The IUT reports the transported data to the Upper Tester.
  6. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand consisting of the Request Op Code (0x01) followed by the Response Code Value for Success (0x01).
  7. The IUT receives the ATT_Handle_Value_Indication from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  8. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  For each test case in Table 4.21, the IUT reports the transported data, for which UDS is used, to the Upper Tester.

  The value of the User ID field is consistent with the value assigned to the IUT at initial configuration.

  If E2E-CRC is supported, the Blood Pressure Record characteristic contains a valid checksum; otherwise, the E2E-CRC field is omitted.

  The IUT reports the received control point response in step 7 to the Upper Tester.

  The received characteristic values meet the requirements of the service.

4.6.4 Report Stored Records procedure

- Test Purpose

  For each selected test case in Table 4.22, verify that the IUT can perform the Report Stored Records procedure with the selected <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s).

- Reference

  [12] 4.11.3.3

- Initial Condition

  - Perform the preamble described in Section 4.2.3 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.
  - The Sequence Number field of the Blood Pressure Record characteristic is set to start at 0.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
BLP/COL/RAR/BV-09-C [Report Stored Records – Operator All records]	All records	No Filter Type	N/A
BLP/COL/RAR/BV-10-C [Report Stored Records – Operator First record]	First record	No Filter Type	N/A
BLP/COL/RAR/BV-11-C [Report Stored Records – Operator Last record]	Last record	No Filter Type	N/A
BLP/COL/RAR/BV-12-C [Report Stored Records – Operator Greater than or equal to with Operand Sequence Number]	Greater than or equal to	Sequence Number	<Min filter value>
BLP/COL/RAR/BV-13-C [Report Stored Records – Operator Greater than or equal to with Operand Base Time]	Greater than or equal to	Base Time	<Min filter value>
BLP/COL/RAR/BV-14-C [Report Stored Records – Operator Greater than or equal to with Operand User Facing Time]	Greater than or equal to	User Facing Time	<Min filter value>
BLP/COL/RAR/BV-15-C [Report Stored Records – Operator Less than or equal to with Operand Sequence Number]	Less than or equal to	Sequence Number	<Max filter value>
BLP/COL/RAR/BV-16-C [Report Stored Records – Operator Within range of (inclusive) with Operand Sequence Number]	Within range of (inclusive)	Sequence Number	<Min filter value>, <Max filter value>

Table 4.22: Report Stored Records with Mandatory and Optional Operators

- Test Procedure

  For each selected test case in Table 4.22, perform the below steps:

  1. Perform an action on the Lower Tester that will induce it to generate at least 3 Blood Pressure records for which UDS is not used or not supported and also several (e.g., 5 or more) records for one or more users for which UDS is used.

2. The Upper Tester sends a command to the IUT to write the Report Stored Records Op Code (0x01) to the RACP characteristic using the selected <Operator>, applicable <Operand Filter Type>, and the <Operand Filter Value(s)> as described in Table 4.22.
3. The IUT sends an ATT_Write_Request with the instruction from step 2 to the Lower Tester.
4. The Lower Tester sends one or more ATT_Handle_Value_Notification of the Blood Pressure Record characteristic. The number of the notifications, per each Blood Pressure record, will depend on the size of each Blood Pressure record. Each notification contains a Segmentation Header field with a First Segment bit, Last Segment bit, Rolling Segment Counter bits, with appropriate values, and the recorded characteristic. The Rolling Segment Counters associated with the multiple notifications are consecutive.
5. Per record, the IUT receives one or more ATT_Handle_Value_Notification from the Lower Tester containing the transported data. When needed, the IUT first concatenates the multiple messages, preserving the same order as indicated by the Rolling Segment Counters, to extract the transported data. The IUT reports the transported data to the Upper Tester.
6. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand consisting of the Request Op Code (0x01) followed by the Response Code Value for Success (0x01).
7. The IUT receives the ATT_Handle_Value_Indication from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
8. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  For each test case in Table 4.22, the IUT reports the transported data, for which UDS is not used or for which UDS is not supported, to the Upper Tester.

  If E2E-CRC is supported, the Blood Pressure Record characteristic contains a valid checksum; otherwise, the E2E-CRC field is omitted.

  The IUT reports the received control point response in step 7 to the Upper Tester.

  The received characteristic values meet the requirements of the service.

BLP/COL/RAR/BV-17-C [Report Stored Records – Time Change Log Data]

- Test Purpose

  Verify that the IUT can perform the Report Stored Records procedure with an Operator of All records and retrieve Blood Pressure records containing Time Change Log data.

- Reference

  [12] 4.11.3.3

- Initial Condition

  - Perform the preamble described in Section 4.2.3 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.
  - The Sequence Number field of the Blood Pressure Record characteristic is set to start at 0.

- Test Procedure

  1. Perform an action on the Lower Tester that will induce it to generate a sequence of records, with at least one time change log entry, for which UDS is not used or not supported and also several records for one or more users for which UDS is used.
  2. The Upper Tester sends a command to the IUT to write the Report Stored Records Op Code (0x01) to the RACP characteristic with an Operator of All records (0x01).
  3. The IUT sends an ATT_Write_Request with the instruction from step 2 to the Lower Tester.
  4. The Lower Tester sends ATT_Handle_Value_Notifications of the Blood Pressure Record characteristic. The number of the notifications, per each Blood Pressure record, will depend on the size of each Blood Pressure record. Each notification contains a Segmentation Header field with a First Segment bit, Last Segment bit, Rolling Segment Counter bits, with appropriate values, and the transported data with the recorded characteristic. The Rolling Segment Counters associated with the multiple notifications are consecutive.
  5. Per record, the IUT receives ATT_Handle_Value_Notifications from the Lower Tester containing the transported data. When needed, the IUT first concatenates the multiple messages, preserving the same order as indicated by the Rolling Segment Counters, to extract the transported data. The IUT reports the transported data to the Upper Tester.
  6. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand consisting of the Request Op Code (0x01) followed by the Response Code Value for Success (0x01).
  7. The IUT receives an ATT_Handle_Value_Indication from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  8. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the transported data, which contains at least one Time Change Log Data, for which UDS is not used or not supported, to the Upper Tester.

  If E2E-CRC is supported, the Blood Pressure Record characteristic contains a valid checksum; otherwise, the E2E-CRC field is omitted.

  The IUT reports the received control point response in step 7 to the Upper Tester.

  The received characteristic values meet the requirements of the service.

4.6.5 Delete Stored Records procedure with UDS

- Test Purpose

  For each selected test case in Table 4.23, verify that, for a single user, the IUT can perform the Delete Stored Records procedure with the mandatory <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)>.

- Reference

  [12] 4.11.3.4

- Initial Condition

  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to RACP characteristic.
  - The Lower Tester has previously been configured for at least two users, and the IUT has been assigned only one User ID and Consent Code at initial connection with the Lower Tester.

- The IUT has performed the Consent procedure with the User ID and assigned Consent Code.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
BLP/COL/RAD/BV-01-C [Delete Stored Records with UDS – Operator All records]	All records	N/A	No filter parameter
BLP/COL/RAD/BV-02-C [Delete Stored Records with UDS – Operator Greater than or equal to with Sequence Number]	Greater than or equal to	Sequence Number	<Min filter value>
BLP/COL/RAD/BV-03-C [Delete Stored Records with UDS – Operator Greater than or equal to with Operand Base Time]	Greater than or equal to	Base Time	<Min filter value>
BLP/COL/RAD/BV-04-C [Delete Stored Records with UDS – Operator Greater than or equal to with Operand User Facing Time]	Greater than or equal to	User Facing Time	<Min filter value>

Table 4.23: Delete Stored Records with UDS

- Test Procedure

  For each selected test case in Table 4.23, perform the below steps:

  1. Perform an action on the Lower Tester that will induce it to generate at least 3 Blood Pressure records for the user assigned to the IUT and also several (e.g., 5 or more) records for one or more users not assigned to the IUT.
  2. For the user assigned to the IUT, the Upper Tester sends a command to the IUT to write the Delete Stored Records Op Code (0x02) to the RACP characteristic using the <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)> as described in Table 4.23.
  3. The IUT sends an ATT_Write_Request with the instruction from step 2 to the Lower Tester.
  4. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00) and an Operand consisting of the Request Op Code (0x02) followed by the Response Code Value for Success (0x01).
  5. The IUT receives the ATT_Handle_Value_Indication from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  6. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  For each selected test case in Table 4.23, the IUT deletes the required Blood Pressure records associated with the User.

  The value of the User ID field is consistent with the value assigned to the IUT at initial configuration.

  The IUT reports the received control point response in step 5 to the Upper Tester.

  The received characteristic values meet the requirements of the service.

4.6.6 Delete Stored Records procedure

- Test Purpose

  For each selected test case in Table 4.24, verify that the IUT can perform the Delete Stored Records procedure with the <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)>.

- Reference

  [12] 4.11.3.4

- Initial Condition

  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to RACP characteristic.

- Test Case Configuration

Test Case ID	Operator	Operand Filter Type	Operand Filter Values(s)
BLP/COL/RAD/BV-05-C [Delete Stored Records – Operator All records]	All records	No Filter Type	No filter parameter
BLP/COL/RAD/BV-06-C [Delete Stored Records – Operator First record]	First record	No Filter Type	No filter parameter
BLP/COL/RAD/BV-07-C [Delete Stored Records – Operator Last record]	Last record	No Filter Type	No filter parameter
BLP/COL/RAD/BV-08-C [Delete Stored Records – Operator Less than or equal to with Operand Sequence Number]	Less than or equal to	Sequence Number	<Max filter value>
BLP/COL/RAD/BV-09-C [Delete Stored Records – Operator Within range of (inclusive) with Operand Sequence Number]	Within range of (inclusive)	Sequence Number	<Min filter value>, <Max filter value>

Table 4.24: Delete Stored Records without UDS

- Test Procedure

  For each selected test case in Table 4.24, perform the below steps:

  1. Perform an action on the Lower Tester that will induce it to generate at least 3 Blood Pressure records for which UDS is not used or not supported and also several (e.g., 5 or more) records for one or more users for which UDS is used.
  2. The Upper Tester sends a command to the IUT to write the Delete Stored Records Op Code (0x02) to the RACP characteristic using the <Operator>, applicable <Operand Filter Type>, and <Operand Filter Value(s)> as described in Table 4.24.
  3. The IUT sends an ATT_Write_Request with the instruction from step 2 to the Lower Tester.
  4. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand consisting of the Request Op Code (0x02) followed by the Response Code Value for Success (0x01).
  5. The IUT receives the ATT_Handle_Value_Indication from the Lower Tester containing the RACP characteristic handle and value and reports it to the Upper Tester.
  6. The IUT sends an ATT_Handle_Value_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

  For each selected test case in Table 4.24, the IUT deletes the required Blood Pressure records for which UDS is not used or not supported.

  The IUT reports the received control point response in step 5 to the Upper Tester.

  The received characteristic values meet the requirements of the service.

BLP/COL/RAA/BV-01-C [Abort Operation]

- Test Purpose

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

- Reference

  [12] 4.11.3.5

- Initial Condition

  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to RACP characteristic.

- Test Procedure

  1. Perform an action on the Lower Tester that will induce it to generate enough records such that the transmission is not able to complete before the RACP Abort Operation procedure is attempted.
  2. The Upper Tester sends a command to the IUT to write the Report Stored Records Op Code (0x01) to the RACP characteristic using an Operator of All records (0x01).
  3. The IUT sends an ATT_Write_Request with the instruction from step 2 to the Lower Tester.
  4. The Lower Tester sends one or more ATT_Handle_Value_Notification of the Blood Pressure Record characteristic.
  5. The IUT receives one or more ATT_Handle_Value_Notification from the Lower Tester containing the Blood Pressure Record 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 Op Code (0x03) to the RACP characteristic with an Operator of Null (0x00) and no Operand.
  7. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand containing a Request Op Code (0x03) followed by the Response Code Value for Success (0x01).
  8. The IUT receives an ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.
  10. Verify that the Blood Pressure Record characteristic notifications stop.

- Expected Outcome

  Pass verdict

  The IUT receives some, but not all, notifications of the Blood Pressure Record characteristic.

  The IUT reports the received control point response in step 8 to the Upper Tester.

  The received characteristic values meet the requirements of the service.

4.7 Service Procedures – Error Handling

This test group contains test cases to verify the Collector IUT compliant operation when an error is reported by the Blood Pressure Sensor.

4.7.1 User Control Point – Response Value Error Codes

- Test Purpose

  This test group is for generic use and contains test cases to verify that the Collector 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

  [12] 4.14

- Initial Condition

  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to User Control Point characteristic.

- Test Case Configuration

Test Case ID	Op Code	Op Code Parameter Value	Response Code Value
BLP/COL/SPE/BI-01-C [User Control Point – Op Code Not Supported]	Optional Op Code	Associated Parameter	Op Code Not Supported (0x02)
BLP/COL/SPE/BI-02-C [User Control Point – User not Authorized]	Register New User Op Code (0x01)	Associated Parameter	User Not Authorized (0x05)
BLP/COL/SPE/BI-03-C [User Control Point – Operation Failed]	Register New User Op Code (0x01)	Associated Parameter	Operation Failed (0x04)

Table 4.25: User Control Point – Response Code Value error test cases

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write to the User Control Point characteristic, the Op Code, and associated parameter described in Table 4.25.
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an ATT_Handle_Value_Indication of the User Control Point characteristic with the Response Code Op Code (0x20), the Request Op Code, and Response Code Value specified in Table 4.25.
  4. The IUT receives an ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

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

BLP/COL/SPE/BI-04-C [Client Characteristic Configuration Descriptor Improperly Configured]

- Test Purpose

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

- Reference

  [12] 4.14

- Initial Condition

  - A preamble procedure defined in Section 4.2.3 is used to set up the LE transport and L2CAP channel and to initiate connection to a Blood Pressure Sensor.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write a valid Op Code to the User Control Point characteristic (e.g., by executing the test case described in BLP/COL/UDS/BV-01-C [Register New User]).
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_Error_Response with Error Code Client Characteristic Configuration Descriptor Improperly Configured (0xFD).
  4. The IUT receives an ATT_Error_Response from the Lower Tester and reports it to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received ATT Error Code, of Client Characteristic Configuration Descriptor Improperly Configured (0xFD), to the Upper Tester.

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

BLP/COL/SPE/BI-05-C [User Data Access Not Permitted]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives a User Data Access Not Permitted User Control Point Response Code.

- Reference

  [12] 4.14

- Initial Condition

  - Perform the preamble described in Section 4.2.3 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 BLP/COL/UDS/BV-14-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 IUT receives an Attribute Protocol Application Error response with the ATT Error Code 0x80, User Data Access Not Permitted, and reports it to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received Attribute Protocol Application Error, User Data Access Not Permitted, to the Upper Tester.

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

BLP/COL/SPE/BI-06-C [Procedure Already in Progress]

- Test Purpose

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

- Reference

  [12] 4.14

- Initial Condition

  - Perform the preamble described in Section 4.2.3 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 Op Code to the User Control Point characteristic (e.g., by executing the test case described in BLP/COL/UDS/BV-01-C [Register New User]).
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_Error_Response with Error 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_Response from the Lower Tester and reports it to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reports the received ATT Error Response in step 4 to the Upper Tester.

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

BLP/COL/SPE/BI-07-C [Procedure Timeout]

- Test Purpose

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

- Reference

  [12] 4.12.4.2.6

- Initial Condition
  - Perform the preamble described in Section 4.2.3 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 Op Code to the User Control Point characteristic (e.g., by executing the test case described in BLP/COL/UDS/BV-01-C [Register New User]).
  2. The IUT sends an ATT_Write_Request 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 Attribute Protocol 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 Attribute Protocol Timeout period, the IUT notifies the Upper Tester of the timeout.

4.7.2 RACP – Response Value Error Codes

- Test Purpose

  This test group is for generic use and contains test cases to verify that the Collector 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

  [12] 4.11.4
- Initial Condition
  - Perform the preamble described in Section 4.2.3 with the required <Control Point Characteristic> set to RACP characteristic.
  - The Upper Tester knows the IUT supported Op Code, supported optional Operator, and Operand as specified in the IXIT [11].
- Test Case Configuration

Test Case ID	Op Code, Operator, and Operand	Request Op Code, Response Code Value
BLP/COL/SPE/BI-08-C [RACP – Operator not supported]	Op Code = 0x01 (Report Stored Records) Operator = Optional Operator Operand = 0x01 (Sequence Number)	Request Op Code = 0x01 (Report Stored Records) Response Code Value = 0x04 (Operator not supported)
BLP/COL/SPE/BI-09-C [RACP – Operand not supported]	Op Code = 0x01 (Report Stored Records) Operator = Supported Operator Operand = Optional Operand Filter Type with appropriate Filter Parameters	Request Op Code = 0x01 (Report Stored Records) Response Code Value = 0x09 (Operand not supported)

Test Case ID	Op Code, Operator, and Operand	Request Op Code, Response Code Value
BLP/COL/SPE/BI-10-C [RACP – Procedure not completed]	Op Code = 0x01 (Report Stored Records) Operator = 0x01 (All records)	Request Op Code = 0x01 (Report Stored Records) Response Code Value = 0x08 (Procedure not completed)

Table 4.26: RACP – Response Code Value error test cases

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write to the RACP characteristic the Op Code, Operator, and Operand Filter Type with the appropriate Filter Parameters described in Table 4.26.
  2. The IUT sends an ATT_Write_Request with the instruction from step 1 to the Lower Tester.
  3. The Lower Tester sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand consisting of the Request Op Code followed by the Response Code Value specified in Table 4.26.
  4. The IUT receives an ATT_Handle_Value_Indication 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_Confirmation to the Lower Tester.

- Expected Outcome

  Pass verdict

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

4.8 Blood Pressure Sensor - Reporting Blood Pressure Measurements with UDS consent and bonding

This group tests the Blood Pressure Sensor IUT implementation to verify that it will send measurement data only to the correct user.

BLP/SEN/BPT/BV-01-C [Multi-User Blood Pressure Sensor - Single Trusted Collector with Multiple Users]

- Test Purpose

  Verify that the Blood Pressure Sensor IUT provides only the data that pertains to the correct user when different users use the same Collector.

- Reference

  [12] 3.1, 3.3, 4.13

- Initial Condition

  - There are at least two registered users already registered in the Blood Pressure Sensor IUT and these were registered by the same bonded Collector (i.e., the Lower Tester). These users are referred to below as “User A” and “User B”. Refer to BLP/COL/UDS/BV-01-C [Register New User] on how to register a user.
  - The Lower Tester and the Blood Pressure Sensor IUT are bonded.

- Test Procedure

  1. Perform the preamble described in Section 4.2.4 with the required <Control Point Characteristic> set to User Control Point.
  2. The Lower Tester initiates the Consent procedure and supplies the correct User ID 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 either the Blood Pressure Measurement characteristic or, if supported, the Enhanced Blood Pressure Measurement characteristic.
  6. Monitor indications sent by the IUT for 30 seconds.
  7. The Lower Tester terminates the connection with the IUT.
  8. Run the preamble procedure defined in Section 4.2.4 to configure the IUT for use with the User Control Point, emulating the same Collector as in step 1.
  9. The Lower Tester initiates the Consent procedure and supplies the correct User ID and Consent Code parameters for User B.
  10. The IUT confirms that the Consent procedure was completed successfully.
  11. The Lower Tester reads the value of the User Index characteristic. The value is recorded for assessment.
  12. Induce the IUT to indicate either the Blood Pressure Measurement characteristic or, if supported, the Enhanced Blood Pressure Measurement characteristic.
  13. Monitor indications sent by the IUT for a further 30 seconds.
  14. If the IUT has disconnected, the Lower Tester reconnects by running the procedure defined in Section 4.2.4 before proceeding.
  15. To prepare for future test cases, the Lower Tester deletes the users that it registered by using the Consent procedure followed by the Delete User Data procedure for each registered user and terminates the connection.

- Expected Outcome

  Pass verdict

  At step 3, the IUT, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02), followed by the Response Value for Success (0x01) without a Response Parameter.

  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 of the Blood Pressure Measurement characteristic, or Enhanced Blood Pressure Measurement characteristic, received from the IUT during steps 4–6 equals the value of the User Index for User A.

  At step 10, the IUT, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02), followed by the Response Value for Success (0x01) without a Response Parameter.

  The value of the User Index characteristic recorded at step 11 equals the value of the User Index for User B.

The value of the User Index field within any indications of the Blood Pressure Measurement characteristic, or Enhanced Blood Pressure Measurement characteristic, received from the IUT during steps 11–13 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 1–7.

No measurement data belonging to any user other than User B is received during steps 8–13.

BLP/SEN/BPT/BV-02-C [Multi-User Blood Pressure Sensor – Multiple Trusted Collectors – Sequential Access]

- Test Purpose

  Verify that the Blood Pressure Sensor IUT provides only the data that pertains to the correct user when different users use different Collectors, and these connect to the Blood Pressure Sensor IUT at different times.

- Reference

  [12] 3.3, 4.13

- Initial Condition

  - There are at least two registered users already registered in the Blood Pressure Sensor IUT, and these were registered by different bonded Collectors (e.g., Collector A and B). These are referred to below as “User A” and “User B”. Refer to BLP/COL/UDS/BV-01-C [Register New User] on how to register a user.

- Test Procedure

  1. The Lower Tester 1, emulating Collector A, runs the preamble procedure defined in Section 4.2.4 to configure the IUT for use with the User Control Point.
  2. The Lower Tester 1 initiates the Consent procedure and supplies the correct User ID and Consent Code parameters for User A.
  3. The IUT confirms that the Consent procedure was completed successfully.
  4. Induce the IUT to indicate either the Blood Pressure Measurement characteristic or, if supported, the Enhanced Blood Pressure Measurement characteristic for User A.
  5. Monitor indications sent by the IUT for 30 seconds or until a disconnection occurs (whichever comes first).
  6. The Lower Tester 1 terminates the connection with the IUT.
  7. The Lower Tester 2, emulating Collector B, runs the preamble procedure defined in Section 4.2.4 to configure the IUT for use with the User Control Point.
  8. The Lower Tester 2 initiates the Consent procedure and supplies the correct User ID and Consent Code parameters for User B.
  9. The IUT confirms that the Consent procedure was completed successfully.
  10. Induce the IUT to indicate either the Blood Pressure Measurement characteristic or, if supported, the Enhanced Blood Pressure Measurement characteristic for User B.
  11. Monitor indications sent by the IUT for 30 seconds.
  12. If the IUT has disconnected, the Lower Tester reconnects by running the procedure defined in Section 4.2.4 before proceeding.
  13. To prepare for future test cases, each Lower Tester deletes the users that it registered by using the Consent procedure followed by the Delete User Data procedure for each registered user and terminates the connection.

- Expected Outcome

  Pass verdict

  At step 3, the IUT, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02), followed by the Response Value for Success (0x01) without a Response Parameter.

  The value of the User Index field within any indications of the Blood Pressure Measurement characteristic, or the Enhanced Blood Pressure Measurement characteristic, received from the IUT during steps 4–5 equals the value of the User Index for User A.

  At step 9, the IUT, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02), followed by the Response Value for Success (0x01) without a Response Parameter.

  The value of the User Index field within any indications of the Blood Pressure Measurement characteristic, or the Enhanced Blood Pressure Measurement characteristic, received from the IUT during steps 10–11 equals the value of the User Index for User B.

  During steps 1–5, Lower Tester 1 receives only measurement data that is applicable to User A.

  During steps 7–11, Lower Tester 2 receives only measurement data that is applicable to User B.

- Notes

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

BLP/SEN/BPT/BV-03-C [Multi-User Blood Pressure Sensor – Multiple Trusted Collectors with one Collector not supporting UDS]

- Test Purpose

  Verify that the Blood Pressure Sensor IUT provides only the Blood Pressure record data that pertains to the correct user when different users use different Collectors with and without UDS support.

- Reference

  [12] 3.3, 4.13

- 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 Blood Pressure Sensor IUT has 2 users, of which one registered user was registered by bonded Collector A (Lower Tester 1). This is referred to below as “User A”. Refer to BLP/COL/UDS/BV-01-C [Register New User] on how to register a user.
  - Collector C (Lower Tester 2) has also established a bond with the Blood Pressure Sensor IUT. Collector C does not use or support UDS.
  - The Blood Pressure Sensor IUT contains Blood Pressure records for “User A”, for which UDS is used, and for Collector C, for which UDS is not used or not supported.

- Test Procedure

  1. The Lower Tester 1, emulating Collector A, runs the preamble procedure defined in Section 4.2.4 to configure the IUT for use with the User Control Point and RACP.
  2. The Lower Tester 1 initiates the Consent procedure and supplies the correct User ID and Consent Code parameters for User A.
  3. The IUT confirms that the Consent procedure was completed successfully.
  4. The Lower Tester 1 reads the value of the User Index characteristic. The value is recorded for assessment.
  5. The Lower Tester 1 writes the Report Stored Records Op Code (0x01) to the RACP characteristic using an Operator of All records (0x01).
  6. The IUT sends ATT_Handle_Value_Notifications of the Blood Pressure Record characteristic with the records associated with User A.
  7. The Lower Tester 1 receives ATT_Handle_Value_Notifications from the IUT containing the Blood Pressure Record characteristic handle and values.
  8. The IUT sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand consisting of the Request Op Code (0x01) followed by the Response Code Value for Success (0x01).
  9. The Lower Tester 1 receives the ATT_Handle_Value_Indication from the IUT containing the RACP characteristic handle and value associated with User A.
  10. The Lower Tester 1 terminates the connection with the IUT.
  11. The Lower Tester 2, emulating Collector C, runs the preamble procedure defined in Section 4.2.4 to configure the IUT for use with the RACP.
  12. The Lower Tester 2 writes the Report Stored Records Op Code (0x01) to the RACP characteristic using an Operator of All records (0x01).
  13. The IUT sends ATT_Handle_Value_Notifications of the Blood Pressure Record characteristic with all records not associated with users supporting UDS.
  14. The Lower Tester 2 receives ATT_Handle_Value_Notifications from the IUT containing the Blood Pressure Record characteristic handle and values not associated with users supporting UDS.
  15. The IUT sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand consisting of the Request Op Code (0x01) followed by the Response Code Value for Success (0x01).
  16. The Lower Tester 2 receives the ATT_Handle_Value_Indication from the IUT containing the RACP characteristic handle and value.
  17. If the IUT has disconnected, the Lower Tester reconnects by running the procedure defined in Section 4.2.4 before proceeding.
  18. To prepare for future test cases, each Lower Tester deletes the users that it registered by using the Consent procedure followed by the Delete User Data procedure for each registered user and terminates the connection.

- Expected Outcome

  Pass verdict

  At step 3, the IUT, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02), followed by the Response Value for Success (0x01) without a Response Parameter.

  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 notifications of the Blood Pressure Record characteristic and indication of the RACP characteristic received from the IUT during steps 6–9 equals the value of the User Index for User A.

During steps 5–9, Lower Tester 1 receives only Blood Pressure records that are applicable to User A.

During steps 12–16, Lower Tester 2 receives Blood Pressure records data belonging to users not supporting UDS.

Each notification of the Blood Pressure Record has the Segmentation Header field with the First Segment bit, Last Segment bit, and Rolling Segment Counter bits with appropriate values.

- Notes

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

BLP/SEN/BPT/BV-04-C [Multi-User Blood Pressure Sensor – Multiple Trusted Collectors – Concurrent Access]

- Test Purpose

  Verify that the Blood Pressure Sensor IUT provides only the data that pertains to the correct user to each Collector when different users use different Collectors and two Collectors connect to the Blood Pressure Sensor IUT concurrently.

- Reference

  [12] 3.3, 4.13

- Initial Condition

  - There are at least two registered users already registered in the Blood Pressure Sensor IUT, and these were registered by different bonded Collectors (e.g., Collector A and B). These are referred to below as “User A” and “User B”. Refer to BLP/COL/UDS/BV-01-C [Register New User] on how to register a user.

- Test Procedure

  1. The Lower Tester 1, emulating Collector A, runs the preamble procedure defined in Section 4.2.4 to configure the IUT for use with the User Control Point.
  2. A second Lower Tester 2, emulating Collector B, runs the preamble procedure defined in Section 4.2.4 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 2 concurrently.
  4. The Lower Tester 1 initiates the Consent procedure and supplies the correct User ID and Consent Code parameters for User A.
  5. The IUT confirms to Lower Tester 1 that the Consent procedure was completed successfully.
  6. The Lower Tester 2 initiates the Consent procedure and supplies the correct User ID and Consent Code parameters for User B.
  7. The IUT confirms to Lower Tester 2 that the Consent procedure was completed successfully.
  8. The Lower Tester 1 reads the value of the User Index characteristic. The value is recorded for assessment.
  9. The Lower Tester 2 reads the value of the User Index characteristic. The value is recorded for assessment.
  10. Induce the IUT to indicate either the Blood Pressure Measurement or, if supported, the Enhanced Blood Pressure Measurement characteristic for User A and User B.

11. Monitor indications sent by the IUT for 30 seconds.
12. If the IUT has disconnected, the Lower Tester reconnects by running the procedure defined in Section 4.2.4 before proceeding.
13. To prepare for future test cases, each Lower Tester deletes the users that it registered by using the Consent procedure followed by the Delete User Data procedure for each registered user and terminates the connection.

- Expected Outcome

  Pass verdict

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

  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 User Index field within any indications of the Blood Pressure Measurement characteristic, or Enhanced Blood Pressure Measurement characteristic, received from the IUT by Lower Tester 1 equals the value of the User Index for User A.

  The value of the User Index field within any indications of the Blood Pressure Measurement characteristic, or Enhanced Blood Pressure Measurement 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.

BLP/SEN/BPT/BI-01-C [Single User Blood Pressure Sensor - No Bond Relation]

- Test Purpose

  Verify that a Blood Pressure Sensor IUT does not send any indications of either the Blood Pressure Measurement characteristic or, if supported, the Enhanced Blood Pressure Measurement characteristic to a Collector with which it does not have a trusted relationship.

- Reference

  [12] 3.1

- Initial Condition

  - For the purposes of this test case, a bond is not established between the Blood Pressure Sensor IUT and the Lower Tester; i.e., they do not have a trusted relationship.
  - Run the preamble procedure defined in Section 4.2.1 to initiate connection to a Blood Pressure Sensor, without initiating bonding.
  - The Lower Tester knows the handle of the Blood Pressure Measurement characteristic and, if supported by the Blood Pressure Sensor IUT, the handle of the Enhanced Blood Pressure Measurement characteristic.

- Test Procedure

  1. The Lower Tester attempts to configure, for indication, either the Client Characteristic Configuration descriptor of the Blood Pressure Measurement characteristic or the Client Characteristic Configuration descriptor of the Enhanced Blood Pressure Measurement characteristic.
  2. Attempt to induce the IUT to send indications of the Blood Pressure Measurement characteristic, or, if supported, indications of the Enhanced Blood Pressure Measurement characteristic to the Collector.
  3. Monitor indications sent by the IUT for 30 seconds or until a disconnection occurs (whichever comes first).

- Expected Outcome

  Pass verdict

  In step 1, the IUT may reject the Write Request that the Lower Tester sends to the Client Characteristic Configuration descriptor(s).

  Regardless of whether the IUT accepts or rejects a write to the Client Characteristic Configuration descriptor(s) during step 1, the Lower Tester does not receive any indications of the Blood Pressure Measurement characteristic or the Enhanced Blood Pressure Measurement characteristic from the IUT during steps 1, 2, or 3.

BLP/SEN/BPT/BI-02-C [Multi-User Blood Pressure Sensor - No Records Found]

- Test Purpose

  Verify that a multi-user Blood Pressure Sensor IUT responds appropriately to a Report Stored Records procedure when there are no records for the requesting Collector, which does not use or support UDS, while there are records for one or more Collectors supporting UDS.

- Reference

  [12] 3.3, 4.11.3.3

- Initial Condition

  - Perform the preamble described in Section 4.2.4 with the required <Control Point Characteristic> set to User Control Point characteristic and RACP characteristic.
  - There are at least two registered users already registered in the Blood Pressure Sensor IUT, which were registered by the Lower Tester (i.e., the same bonded Collector registered all the users). Refer to BLP/COL/UDS/BV-01-C [Register New User] on how to register a user.
  - The Blood Pressure Sensor IUT contains one or more Blood Pressure records for each of the registered users, and there are no records for other users.
  - The Lower Tester disconnects and reconnects to the IUT, but it does not initiate a Consent procedure.

- Test Procedure

  1. The Lower Tester writes the Report Stored Records Op Code (0x01) to the RACP characteristic using an Operator of All records (0x01).
  2. The IUT, after sending an ATT_Write_Response to acknowledge the write to the RACP, sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand consisting of the Request Op Code (0x01) followed by the Response Code Value for No Records Found (0x06).

3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the RACP characteristic handle and value.
4. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT does not send any notification of the Blood Pressure Record characteristic.

  The IUT sends an indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (0x01) followed by the Response Code Value for No Records Found (0x06).

  Verify that the characteristic values meet the requirements of the service.

BLP/SEN/BPT/BI-03-C [Multi-User Blood Pressure Sensor - Wrong Consent]

- Test Purpose

  Verify that a Blood Pressure Sensor IUT does not send any indications of the Blood Pressure Measurement characteristic and, if supported, Enhanced Blood Pressure Measurement characteristic to a Collector that provided a Consent Code that was not accepted by the IUT.

- Reference

  [12] 3.3

- Initial Condition

  - Run the preamble procedure defined in Section 4.2.4 to configure the Blood Pressure Sensor IUT for use with the User Data Control Point.
  - There are at least two registered users already registered in the Blood Pressure Sensor IUT, which were registered by the Lower Tester (i.e., the same bonded Collector registered all the users). Refer to BLP/COL/UDS/BV-01-C [Register New User] on how to register a user.

- 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 IUT rejects the Consent Code.
  3. Monitor indications sent by the IUT for 30 seconds.
  4. If the IUT has disconnected, the Lower Tester reconnects by running the procedure defined in Section 4.2.4 before proceeding.
  5. To prepare for future test cases, the Lower Tester deletes the users that it registered by using the Consent procedure followed by the Delete User Data procedure for each registered user and terminates the connection.

- Expected Outcome

  Pass verdict

  The IUT, after sending an ATT_Write_Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02), followed by the Response Value for User Not Authorized (0x05) without a Response Parameter.

  The Lower Tester does not receive any indications of the Blood Pressure Measurement characteristic or the Enhanced Blood Pressure Measurement characteristic from the IUT.

4.9 Blood Pressure Sensor - Deleting of Blood Pressure records with UDS

This group tests the Blood Pressure Sensor IUT implementation to verify that it can report or delete Blood Pressure records, with enhanced Blood Pressure measurements, for a registered user.

BLP/SEN/RAD/BV-01-C [Blood Pressure Sensor - Delete Stored Records procedure with UDS]

- Test Purpose

  Verify that, after receiving the UDS Consent Code, the Blood Pressure Sensor IUT can perform the Delete Stored Records procedure for Blood Pressure records with the User ID assigned to the designated Lower Tester.

- Reference

  [12] 3.3, 4.11.3.4

  [13] 3.6.2.1, 3.6.3.3

- Initial Condition

  - There are at least two registered users already registered in the Blood Pressure Sensor IUT, and these were registered by the same bonded Collector (i.e., the Lower Tester). These users are referred to as “User A” and “User B”.
  - The Lower Tester executes the Consent procedure for User A.
  - Perform an action on the Blood Pressure Sensor IUT that will induce it to generate at least 3 blood pressure measurement records for User A, several (e.g., 5 or more) records for User B and other users not assigned to the Lower Tester.
  - The Lower Tester knows the Sequence Number for the generated records for User A and B.
  - The Blood Pressure Sensor IUT supported Operators and Operands are specified in the IXIT [11].
  - Perform the preamble described in Section 4.2.4 with the required <Control Point Characteristic> set to User Control Point characteristic and RACP characteristic.

- Test Procedure

  1. The Lower Tester writes the Delete Stored Records Op Code (0x02) to the RACP characteristic using an Operator of All records (0x01).
  2. The IUT sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (0x02) followed by the Response Code for Success (0x01).
  3. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.
  4. The Lower Tester writes the Report Number of Stored Records Op Code (0x04) to the RACP characteristic using an Operator of All records (0x01).
  5. The IUT sends an ATT_Handle_Value_Indication of the RACP characteristic with the Number of Stored Records Response Op Code (0x05), an Operator of Null (0x00), and an Operand representing that no records were found (0x0000).
  6. The Lower Tester executes the Consent procedure for User B.
  7. The Lower Tester writes the Report Number of Stored Records Op Code (0x04) to the RACP characteristic using an Operator of All records (0x01).

8. The IUT sends an ATT_Handle_Value_Indication of the RACP characteristic with the Number of Stored Records Response Op Code (0x05), an Operator of Null (0x00), and an Operand representing the number of records that were found.

- Expected Outcome

  Pass verdict

  For User A, the IUT sends:

  - One indication of the RACP characteristic containing a valid Operator and Operand with the Response Code Value for Success (0x01).
  - One indication of the RACP characteristic with the Number of Stored Records Response Op Code (0x05) and an Operand representing that no records were found (0x0000).

  For User B, the IUT sends one indication of the RACP characteristic with the Number of Stored Records Response Op Code (0x05) and an Operand representing the number of records that were found.

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

4.10 Blood Pressure Sensor - Reporting of Blood Pressure Records with Time Change Log Data

This group tests the Blood Pressure Sensor IUT implementation to verify that it can report Blood Pressure records with Time Change Log Data.

BLP/SEN/RAR/BV-01-C [Blood Pressure Sensor - Report Stored Records procedure with Time Change Log Data records]

- Test Purpose

  Verify that the Blood Pressure Sensor IUT can perform the Report Stored Records procedure and provide the requested Blood Pressure records with the time change log data.

- Reference

  [12] 3.3, 4.11.3.3

  [13] 3.6.2.1, 3.6.3.1

- Initial Condition

  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.
  - Perform actions on the Blood Pressure Sensor IUT to set the Rolling Segment Counter to a value close to the maximum value of 63.
  - Perform an action on the Blood Pressure Sensor IUT that will induce it to generate a sequence of records, with at least one time change log entry, for which UDS is not used or not supported and a sequence of records, with at least one time change log entry, for one or more users for which UDS is used.
  - Perform the preamble described in Section 4.2.4 to enable the Blood Pressure Sensor IUT for use with the RACP characteristic.

- Test Procedure

  1. The Lower Tester writes the Report Stored Records Op Code (0x01) to the RACP characteristic using an Operator of All records (0x01).
  2. The IUT sends ATT_Handle_Value_Notifications of the Blood Pressure Record characteristic. Each notification contains a Segmentation Header field describing the segmentation information and the transported data.
  3. The IUT sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (0x01) followed by the Response Code for Success (0x01).
  4. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT sends:

  - Multiple notifications of the Blood Pressure Record.
    - Each notification of the Blood Pressure Record has the Segmentation Header field with the First Segment bit, Last Segment bit, and Rolling Segment Counter bits with appropriate values.
    - The Blood Pressure Record contains the Time Change Log Data with the time change log entry for which UDS is not used or not supported.
    - The first notification includes the transported data consisting of the Sequence Number, UUID of the contained characteristic, and a segment of the recorded characteristic value, while subsequent notification(s) contain only the additional segment(s) of the recorded characteristic and, if supported, optional E2E-CRC.
    - The Rolling Segment Counter after reaching 63, the counter rolls over to 0.
  - An indication with the Response Code for Success (0x01).
  - Verify that the characteristic value meets the requirements of the service.

BLP/SEN/RAR/BV-02-C [Blood Pressure Sensor - Report Stored Records procedure with Time Change Log Data and UDS]

- Test Purpose

  Verify that, after receiving the UDS Consent Code, the Blood Pressure Sensor IUT can perform the Report Stored Records procedure and provide the Blood Pressure records for the User ID assigned to the designated Lower Tester.

- Reference

  [12] 3.3, 4.11.3.3

  [13] 3.6.2.1, 3.6.3.1

- 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 Blood Pressure Sensor IUT has previously been configured for at least two users, and the Lower Tester has been assigned only one User ID at initial connection with the IUT.

- The Lower Tester executes the Consent procedure with the User ID and assigned Consent Code.
- Perform an action on the Blood Pressure Sensor IUT that will induce it to generate a sequence of records, with at least one time change log entry, for the user assigned to the Lower Tester and a sequence of records, with at least one time change log entry, for one or more users not assigned to the Lower Tester.
- The Lower Tester knows the last Sequence Number, or the Sequence Number field of the Blood Pressure Record characteristic is set to start at 0 (e.g., by performing a reset).
- Perform the preamble described in Section 4.2.4 with the required <Control Point Characteristic> set to User Control Point characteristic and RACP characteristic.

- Test Procedure

  1. The Lower Tester writes the Report Stored Records Op Code (0x01) to the RACP characteristic using a supported operator and, as required, an operand with corresponding filter parameter(s) as specified in the IXIT [11].
  2. The IUT sends one or more ATT_Handle_Value_Notification of the Blood Pressure Record characteristic. Each notification contains a Segmentation Header field describing the segmentation information and the transported data.
  3. The IUT sends an ATT_Handle_Value_Indication of the RACP characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (0x01) followed by the Response Code for Success (0x01).
  4. The IUT receives an ATT_Handle_Value_Confirmation from the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT sends:

  - One or more notifications of the Blood Pressure Record.
    - Each notification of the Blood Pressure Record has the Segmentation Header field with the First Segment bit, Last Segment bit, and Rolling Segment Counter bits with appropriate values.
    - The Blood Pressure Record contains at least one Time Change Log Data with the time change log entry for the user assigned to the Lower Tester.
    - If present, the value of the User ID field is consistent with the value assigned to the Lower Tester at initial configuration.
    - The first notification includes the transported data consisting of the Sequence Number, UUID of the contained characteristic, and a segment of the recorded characteristic value, while subsequent notification(s) contain only the additional segment(s) of the recorded characteristic and, if supported, optional E2E-CRC.
  - An indication with the Response Code for Success (0x01).
  - Verify that the characteristic value meets the requirements of the service.

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 BLP [4].

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

Test Case(s): The applicable test case identifiers are required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported. Further details about the function of the TCMT are elaborated in [1].

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

Item	Feature	Test Case(s)
BLP 3/1	Blood Pressure Service as a Primary Service	BLP/SEN/BPF/BV-08-C
BLP 3/2	Include Blood Pressure Service UUID in AD in GAP Discoverable Mode	BLP/SEN/BPF/BV-01-C
BLP 3/3	Include Local Name in AD or Scan Response	BLP/SEN/BPF/BV-02-C
BLP 3/4 AND BLP 3/6	Target Address (Public, Static Random, or Private Random) in AD or Scan Response	BLP/SEN/BPF/BV-03-C BLP/SEN/BPF/BV-04-C BLP/SEN/BPF/BV-05-C
BLP 1/1 AND BLP 3/6 AND NOT BLP 3/4	No Target Address in AD or Scan Response – Multi-Bond	BLP/SEN/BPF/BV-06-C
BLP 1/1 AND BLP 3/7 AND NOT BLP 3/4	No Target Address in AD or Scan Response – Single Bond	BLP/SEN/BPF/BV-07-C
BLP 1/1 AND GAP 0/3 AND GATT 1a/4	Not discoverable over BR/EDR – Blood Pressure Service	BLP/SEN/SGGIT/SDPNF/BV-01-C
BLP 8/1	Discover Blood Pressure Service	BLP/COL/CGGIT/SER/BV-01-C
BLP 8/2 AND BLP 8/3	Blood Pressure Measurement	BLP/COL/CGGIT/CHA/BV-02-C
BLP 8/4 AND BLP 8/5	Intermediate Cuff Pressure	BLP/COL/CGGIT/CHA/BV-03-C
BLP 8/6 AND BLP 9/10	Blood Pressure Feature	BLP/COL/CGGIT/CHA/BV-04-C
BLP 9d/1	Blood Pressure Feature characteristic Indications	BLP/COL/CGGIT/ISFC/BV-01-C
BLP 9d/2	Read Blood Pressure Feature characteristic – Bonding enabled	BLP/COL/BPF/BV-25-C
BLP 9d/1 OR BLP 9d/2	Enable Blood Pressure Feature characteristic for indication or read characteristic upon reconnection	BLP/COL/BPF/BV-26-C

Item	Feature	Test Case(s)
BLP 9/1	Configure Blood Pressure Measurement characteristic for Indications	BLP/COL/BPF/BV-09-C
BLP 9/2	Receive Blood Pressure Measurement characteristic Indications	BLP/COL/BPF/BV-10-C BLP/COL/BPF/BI-01-C BLP/COL/BPF/BI-03-C
BLP 9/3	Receive multiple Blood Pressure Measurement characteristic Indications	BLP/COL/BPF/BV-11-C
BLP 9/2 AND BLP 9/7	Receive Blood Pressure Measurement characteristic with Measurement Status Field	BLP/COL/BPF/BI-02-C
BLP 9/8	Configure Intermediate Cuff Pressure characteristic for Notifications	BLP/COL/BPF/BV-12-C
BLP 9/9 AND (BLP 9/4 OR BLP 9/7)	Receive Intermediate Cuff Pressure characteristic Notifications	BLP/COL/BPF/BV-13-C BLP/COL/BPF/BI-04-C BLP/COL/BPF/BI-06-C BLP/COL/BPF/BV-14-C
BLP 9/7 AND BLP 9/9	Receive Intermediate Cuff Pressure characteristic with Measurement Status Field	BLP/COL/BPF/BI-05-C
BLP 9/10	Read Blood Pressure Feature characteristic	BLP/COL/BPF/BI-07-C
BLP 9/11	Verify Bond Status on Reconnection	BLP/COL/BPF/BV-16-C
BLP 8/7	Enhanced Blood Pressure Measurement	BLP/COL/CGGIT/CHA/BV-05-C
BLP 8/8	Enhanced Intermediate Cuff Pressure	BLP/COL/CGGIT/CHA/BV-06-C
BLP 8/9	Blood Pressure Record	BLP/COL/CGGIT/CHA/BV-08-C
BLP 8/10	RACP	BLP/COL/CGGIT/CHA/BV-07-C
BLP 10/1	Device Information Service	BLP/COL/CGGIT/SER/BV-02-C
BLP 10/2	Manufacturer Name String	BLP/COL/CGGIT/CHA/BV-09-C
BLP 10/3	Model Number String	BLP/COL/CGGIT/CHA/BV-10-C
BLP 10/4	System ID	BLP/COL/CGGIT/CHA/BV-11-C
BLP 17/1	User Data Service	BLP/COL/CGGIT/SER/BV-03-C
BLP 17/2	User Index	BLP/COL/CGGIT/CHA/BV-12-C
BLP 17/3	Database Change Increment	BLP/COL/CGGIT/CHA/BV-13-C
BLP 17/4	User Control Point	BLP/COL/CGGIT/CHA/BV-14-C BLP/COL/SPE/BI-01-C BLP/COL/SPE/BI-04-C
BLP 17/5	Registered User	BLP/COL/CGGIT/CHA/BV-15-C
BLP 17/6	First Name	BLP/COL/CGGIT/CHA/BV-16-C
BLP 17/7	Last Name	BLP/COL/CGGIT/CHA/BV-17-C
BLP 17/8	Other UDS Characteristics	BLP/COL/BPD/BV-11-C
BLP 3a/6	Blood Pressure Service UUID and User ID in AD	BLP/SEN/BPF/BV-09-C
BLP 9/14	Configure Enhanced Blood Pressure Measurement Characteristic for Indications	BLP/COL/BPF/BV-17-C

Item	Feature	Test Case(s)
BLP 9/15	Receive Enhanced Blood Pressure Measurement Indications	BLP/COL/BPF/BV-19-C BLP/COL/BPF/BI-08-C BLP/COL/BPF/BI-10-C BLP/COL/BPF/BV-21-C
BLP 7/4 AND BLP 9/15	Receive Enhanced Blood Pressure Measurement Indications with UDS	BLP/COL/BPF/BV-20-C
BLP 9/15 AND BLP 9/19	Receive Enhanced Blood Pressure Measurement Indications with reserved measurement status bits	BLP/COL/BPF/BI-09-C
BLP 9/21	Configure Enhanced Intermediate Cuff Pressure Characteristic for Notifications	BLP/COL/BPF/BV-18-C
BLP 9/22	Receive Enhanced Intermediate Cuff Pressure Notifications	BLP/COL/BPF/BV-22-C BLP/COL/BPF/BI-11-C BLP/COL/BPF/BI-13-C
BLP 7/4 AND BLP 9/22	Receive Enhanced Intermediate Cuff Pressure Notifications with UDS	BLP/COL/BPF/BV-23-C
BLP 9/19 AND BLP 9/22	Receive Enhanced Intermediate Cuff Pressure Notifications with reserved measurement status bits	BLP/COL/BPF/BI-12-C
BLP 9/15 AND BLP 9/22 AND (BLP 9/16 OR BLP 9/19)	Receive multiple Enhanced Intermediate Cuff Pressure Notifications	BLP/COL/BPF/BV-24-C
BLP 18/12	Register New User	BLP/COL/UDS/BV-01-C BLP/COL/SPE/BI-02-C BLP/COL/SPE/BI-03-C BLP/COL/SPE/BI-06-C BLP/COL/SPE/BI-07-C
BLP 18/13	Consent	BLP/COL/UDS/BV-02-C
BLP 18/15 AND (BLP 17/6 OR BLP 17/7)	List All Users	BLP/COL/UDS/BV-03-C BLP/COL/UDS/BV-04-C BLP/COL/UDS/BV-05-C
BLP 18/15	List All Users – No Users	BLP/COL/UDS/BV-06-C
BLP 18/14	Delete User Data	BLP/COL/UDS/BV-07-C
BLP 18/16	Delete Users	BLP/COL/UDS/BV-08-C BLP/COL/UDS/BV-09-C
BLP 18/6	Read User Index Characteristic	BLP/COL/UDS/BV-10-C
BLP 18/9	Read Database Change Increment characteristic	BLP/COL/UDS/BV-11-C
BLP 18/10	Write Database Change Increment characteristic	BLP/COL/UDS/BV-12-C
BLP 18/8	Receive Database Change Increment Characteristic Notification	BLP/COL/UDS/BV-13-C
BLP 18/1	Read UDS Characteristic	BLP/COL/UDS/BV-14-C BLP/COL/SPE/BI-05-C
BLP 18/2	Write UDS Characteristics	BLP/COL/UDS/BV-15-C

Item	Feature	Test Case(s)
BLP 18/3	Read Long UDS Characteristic	BLP/COL/UDS/BV-16-C
BLP 18/4	Write Long UDS Characteristic	BLP/COL/UDS/BV-17-C
BLP 7/4 AND BLP 9a/1 AND BLP 9b/1	Report Number of Stored Records with UDS – Operator All records	BLP/COL/RAN/BV-01-C
BLP 7/4 AND BLP 9a/1 AND BLP 9b/2	Report Number of Stored Records with UDS – Operator Greater than or equal to with Sequence Number	BLP/COL/RAN/BV-02-C
BLP 7/4 AND BLP 9a/1 AND BLP 9b/3	Report Number of Stored Records with UDS – Operator Greater than or equal to with Base Time	BLP/COL/RAN/BV-03-C
BLP 7/4 AND BLP 9a/1 AND BLP 9b/4	Report Number of Stored Records with UDS – Operator Greater than or equal to with User Facing Time	BLP/COL/RAN/BV-04-C
BLP 9a/1 AND BLP 9b/1	Report Number of Stored Records – Operator All records	BLP/COL/RAN/BV-05-C
BLP 9a/1 AND BLP 9b/2	Report Number of Stored Records – Operator Greater than or equal to with Sequence Number	BLP/COL/RAN/BV-06-C
BLP 9a/1 AND BLP 9b/6	Report Number of Stored Records – Operator Less than or equal to with Base Time	BLP/COL/RAN/BV-07-C
BLP 9a/1 AND BLP 9b/7	Report Number of Stored Records – Operator Less than or equal to with User Facing Time	BLP/COL/RAN/BV-08-C
BLP 9a/1 AND BLP 9b/9	Report Number of Stored Records – Operator Within range of (inclusive) with Base Time	BLP/COL/RAN/BV-09-C
BLP 9a/1 AND BLP 9b/10	Report Number of Stored Records – Operator Within range of (inclusive) with User Facing Time	BLP/COL/RAN/BV-10-C
BLP 9a/2	Record Access Control Point	BLP/COL/SPE/BI-08-C BLP/COL/SPE/BI-09-C BLP/COL/SPE/BI-10-C
BLP 7/4 AND BLP 9a/2 AND BLP 9b/1	Report Stored Records with UDS – Operator All records	BLP/COL/RAR/BV-01-C
BLP 7/4 AND BLP 9a/2 AND BLP 9b/11	Report Stored Records with UDS – First record	BLP/COL/RAR/BV-02-C
BLP 7/4 AND BLP 9a/2 AND BLP 9b/12	Report Stored Records with UDS – Last record	BLP/COL/RAR/BV-03-C
BLP 7/4 AND BLP 9a/2 AND BLP 9b/2	Report Stored Records with UDS – Greater than or equal to with Operand Sequence Number	BLP/COL/RAR/BV-04-C
BLP 7/4 AND BLP 9a/2 AND BLP 9b/3	Report Stored Records with UDS – Operator Greater than or equal to with Operand Base Time	BLP/COL/RAR/BV-05-C

Item	Feature	Test Case(s)
BLP 7/4 AND BLP 9a/2 AND BLP 9b/4	Report Stored Records with UDS – Operator Greater than or equal to with Operand User Facing Time	BLP/COL/RAR/BV-06-C
BLP 7/4 AND BLP 9a/2 AND BLP 9b/5	Report Stored Records with UDS – Operator Less than or equal to with Operand Sequence Number	BLP/COL/RAR/BV-07-C
BLP 7/4 AND BLP 9a/2 AND BLP 9b/8	Report Stored Records with UDS – Operator Within range of (inclusive) with Operand Sequence Number	BLP/COL/RAR/BV-08-C
BLP 9a/2 AND BLP 9b/1	Report Stored Records – All records	BLP/COL/RAR/BV-09-C
BLP 9a/2 AND BLP 9b/11	Report Stored Records – Operator First record	BLP/COL/RAR/BV-10-C
BLP 9a/2 AND BLP 9b/12	Report Stored Records – Operator Last record	BLP/COL/RAR/BV-11-C
BLP 9a/2 AND BLP 9b/2	Report Stored Records – Greater than or equal to with Operand Sequence Number	BLP/COL/RAR/BV-12-C
BLP 9a/2 AND BLP 9b/3	Report Stored Records – Greater than or equal to with Operand Base Time	BLP/COL/RAR/BV-13-C
BLP 9a/2 AND BLP 9b/4	Report Stored Records – Greater than or equal to with Operand User Facing Time	BLP/COL/RAR/BV-14-C
BLP 9a/2 AND BLP 9b/5	Report Stored Records – Operator Less than or equal to with Operand Sequence Number	BLP/COL/RAR/BV-15-C
BLP 9a/2 AND BLP 9b/8	Report Stored Records – Operator Within range of (inclusive) with Operand Sequence Number	BLP/COL/RAR/BV-16-C
BLP 7/3 AND BLP 9a/2 AND BLP 9b/1	Report Stored Records – Time Change Log Data	BLP/COL/RAR/BV-17-C
BLP 7/4 AND BLP 9c/1	Delete Stored Records with UDS – Operator All records	BLP/COL/RAD/BV-01-C
BLP 7/4 AND BLP 9c/2	Delete Stored Records with UDS – Operator Greater than or equal to with Sequence Number	BLP/COL/RAD/BV-02-C
BLP 7/4 AND BLP 9c/3	Delete Stored Records with UDS – Operator Greater than or equal to with Operand Base Time	BLP/COL/RAD/BV-03-C
BLP 7/4 AND BLP 9c/4	Delete Stored Records with UDS – Operator Greater than or equal to with Operand User Facing Time	BLP/COL/RAD/BV-04-C
BLP 9c/1	Delete Stored Records – Operator All records	BLP/COL/RAD/BV-05-C
BLP 9c/11	Delete Stored Records – Operator First record	BLP/COL/RAD/BV-06-C
BLP 9c/12	Delete Stored Records – Operator Last record	BLP/COL/RAD/BV-07-C

Item	Feature	Test Case(s)
BLP 9c/5	Delete Stored Records – Operator Less than or equal to with Operand Sequence Number	BLP/COL/RAD/BV-08-C
BLP 9c/8	Delete Stored Records – Operator Within range of (inclusive) with Operand Sequence Number	BLP/COL/RAD/BV-09-C
BLP 9a/2 AND BLP 9a/4	Abort Operation	BLP/COL/RAA/BV-01-C
BLP 3/9 AND BLP 3a/4	Multi-User BLP Sensor	BLP/SEN/BPT/BV-01-C BLP/SEN/BPT/BV-02-C BLP/SEN/BPT/BV-03-C BLP/SEN/BPT/BI-02-C BLP/SEN/BPT/BI-03-C
BLP 3/9 AND BLP 3a/5	Multi-User BLP Sensor – Multiple Trusted Collectors with Concurrent Access	BLP/SEN/BPT/BV-04-C
BLP 1/3 AND NOT BLP 3a/4	Single User BLP Sensor - No Bond Relation	BLP/SEN/BPT/BI-01-C
BLP 1/3 AND BLP 3/9	Blood Pressure Sensor - Delete Stored Records procedure with UDS	BLP/SEN/RAD/BV-01-C
BLP 1/3 AND BLP 3/8	Blood Pressure Sensor - Report Stored Records procedure with Time Change Log Data records	BLP/SEN/RAR/BV-01-C
BLP 1/3 AND BLP 3/8 AND BLP 3/9	Blood Pressure Sensor - Report Stored Records procedure with Time Change Log Data and UDS	BLP/SEN/RAR/BV-02-C

Table 5.1: Test case mapping

6 RACP Test Matrix

The following tables summarize the features of the RACP and the combinations with other features that are tested and not tested. For the tables, below, the following key applies:

YES = A test for this combination exists.

NO = A test for this combination does not exist.

N/A = Not a valid combination

RACP Operators	RACP Request Op Codes			
	Report stored records	Delete stored records	Report number of stored records	Abort Operation
All records	YES	YES	YES	N/A
Greater than or equal to	YES	YES	YES	N/A
Less than or equal to	YES	YES	YES	N/A
Within range of (inclusive)	YES	YES	YES	N/A
First record	YES	YES	YES	N/A
Last record	YES	YES	YES	N/A
Null	N/A	N/A	N/A	YES

Table 6.1: RACP Operator test coverage

RACP Response Codes	RACP Request Op Codes				
	Report stored records	Delete stored records	Report number of stored records	Abort Operation	Other
Success	YES	YES	YES	YES	
Op Code not supported	N/A	N/A	N/A	N/A	YES
Invalid Operator	NO	NO	NO	N/A	N/A
Operator not supported	YES	NO	NO	N/A	N/A
Invalid Operand	NO	NO	NO	N/A	N/A
No records found	YES	NO	NO	N/A	N/A
Abort unsuccessful	N/A	N/A	N/A	NO	N/A
Procedure not completed	YES	NO	NO	NO	
Operand not supported	YES	NO	NO	N/A	
Procedure not applicable	NO	NO	NO	N/A	
Procedure already in progress	NO	NO	NO	NO	

Table 6.2: RACP Response Code test coverage

RACP Operator	Filter Type		
	Sequence Number	**Base Time**	**User Facing time**
All records	N/A	N/A	N/A
Greater than or equal to	YES	YES	YES
Less than or equal to	YES	YES	YES
Within range of (inclusive)	YES	YES	YES
First record	N/A	N/A	N/A
Last record	N/A	N/A	N/A
Null	N/A	N/A	N/A

Table 6.3: RACP Filter Type test coverage

7 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2011-10-25	Adopted by the I SIG Board of Directors
	1.0.1r0	2012-05-18	TSE 4640: TCMT update for BLP/SEN/BPD/BV-03-I, BLP/SEN/BPF/BV-03-I, BLP/SEN/BPF/BV-04-I. BLP/SEN/BPF/BV-05-I. BLP/SEN/BPF/BV-06-I, BLP/SEN/BPF/BV-07-I (legacy IDs: TP/BPD/BP/BV-03-I, TP/BPF/BP/BV-03-I, TP/BPF/BP/BV-04-I. TP/BPF/BP/BV-05-I. TP/BPF/BP/BV-06-I, TP/BPF/BP/BV-07-I)
1	1.0.1		Prepare for Publication
	1.0.2r1	2013-05-04	TSE 5154: Change all the GATT Client Discovery test case references from -I to –C: BLP/COL/BPD/BV-01-I, BLP/COL/BPD/BV-02-I, BLP/COL/BPD/BV-04-I, BLP/COL/BPD/BV-05-I, BLP/COL/BPD/BV-06-I, BLP/COL/BPD/BV-07-I, BLP/COL/BPD/BV-08-I, and BLP/COL/BPD/BV-09-I (legacy IDs: TP/BPD/CO/BV-01-I, TP/BPD/CO/BV-02-I, TP/BPD/CO/BV-04-I, TP/BPD/CO/BV-05-I, TP/BPD/CO/BV-06-I, TP/BPD/CO/BV-07-I, TP/BPD/CO/BV-08-I, and TP/BPD/CO/BV-09-I)
	1.0.2r2	2013-05-10	Removed an incorrectly added “0” in BLP/COL/BPF/BV-12-I (legacy ID: TP/BPF/CO/BV-12-I) that was referenced in BLP/COL/BPF/BI-05-I (legacy ID: TP/BPF/CO/BI-05-I)
2	1.0.2	2013-07-02	Prepare for Publication
	1.0.3r01	2013-09-30	TSE 5296: Updated first sentence of test procedure of BLP/COL/BPD/BV-10-I (legacy ID: TP/BPD/CO/BV-10-I) to add, “and a disconnection may occur between the two tests” for clarification.
3	1.0.3	2013-12-03	Prepare for Publication
	1.0.4r00	2015-05-10	TSE 6225: Updated mapping for BLP/SEN/BPF/BV-06-I and 07-I (legacy ID: TP/BPF/BP/BV-06-I and 07-I); editorial fixes throughout TCMT.
	1.0.4r01	2015-05-27	Added Section 4.1.3 on Verdict Conventions. Deleted non-specific Fail verdicts throughout document.
4	1.0.4	2015-07-14	Prepared for TCRL 2015-1 publication
	1.0.5r00	2016-05-19	Converted to new Test Case ID conventions as defined in TSTO v4.1.
	1.0.5r01	2016-06-16	Test Spec Template Conversion
5	1.0.5	2016-07-13	Prepared for TCRL 2016-1 publication.

Publication Number	Revision Number	Date	Comments
	1.0.6r00-01	2018-03-20 – 2018-04-13	TSE 10480 (rating 1): Made editorial changes to tables for BLP/COL/BPF/BV-10-I and 13-I. TSE 10541 (rating 1): Corrected typos in test cases BLP/COL/BPF/BV-14-I and BV-10-I; BLP/COL/BPF/BI-01-I, BI-02-I, and BI-03-I. TSE 10542 (rating 1): Removed the requirement for reporting the maximum number of Blood Pressure measurements via IXIT in the BLP/COL/BPF/BV-11-I Initial Condition and Test Procedure.
6	1.0.6	2018-06-27	Approved by BTI. Prepared for TCRL 2018-1 publication.
	1.0.7r00	2018-10-02	TSE 11007 (rating 3): Updated mapping for BLP/COL/BPF/BV-13-I – 14-I, BLP/COL/BPF/BI-04-I & 06-I.
	1.0.1.0	2018-11-09	Updated version number from 1.0.7 to 1.0.1.0 to align with adoption of the specification 1.0.10
7	1.0.1.0	2018-11-21	Approved by BTI. Prepared for TCRL 2018-2 publication.
	1.0.1.1 r00–r01	2019-04-04 – 2019-05-31	TSE 11366 (rating 2): Updated TCMT for BLP/COL/BPF/BI-05-I from “BLP 9/2 AND BLP 9/9” to “BLP 9/7 AND BLP 9/9.”
8	1.0.1.1	2019-07-29	Approved by BTI. Prepared for TCRL 2019-1 publication.
	p9r00–r16	2018-06-13 – 2020-06-04	Updated TS based on BLP v1.1 r02 CR. Updated TS based on BLP v1.1 r03 CR. Updated TS based on BLP v1.1 CR r07 with the updated segmentation scheme and resolved Med WG comments. Updated TCMT per BLP.ICS v1.1.0r03 and resolved BTI comments. Added the Client GGIT test cases for the enhanced Blood Pressure characteristics. Added Blood Pressure Sensor TCs with UDS consent requirement for Indication, Notification of enhanced characteristics, Stored Measurements, and RACP. Removed BLP/SEN/BPT/BI-02-I [Multi-User Blood Pressure Sensor - No Consent]. Updated TCMT, and TS based on BTI CR feedback. Updated TS based on PTS and WG feedback by: Removing TC BLP/SEN/RAR/BV-01-I [Blood Pressure Sensor - Report Stored Records procedure with UDS] as test case is covered by BLP/SEN/BPT/BV-03-I. Updated the Test Case Mapping Table and editorial changes. The Operator *Equal to* has been removed from the BLP PS specification accordingly 5 RACP TCs involving the Operator *Equal to* have been removed and TCs re-numbered. Updated TCMT and editorial changes per feedback from the Formal IOP held in Chambery.

Publication Number	Revision Number	Date	Comments
			Proposed TS version for D1.1 review and approval. Incorporated feedback from BTI, added the step numbering to applicable v1.0 test procedures in Section 4.3, and updated BLP/COL/BPF/BV-19-I and BLP/COL/BPF/BV-22-I test procedures. Updated Section 3.2 by removing the paragraph referencing the Device Time Server, Device Time Client roles, TS and ICS references. Incorporated feedback from BTI and Med WG. Updated legacy test cases to GGIT tests, changed CGGIT test case references from "CL" to "COL" and updated TCMT. Updated the GGIT tests to conform to TSE 13087. Updated TCIDs to Header 8 and TOC 8 style into the table of contents. Updated the TCIDs by introducing the new individual TCID and table/group TCID headings. Added TSE 13327 and 13329 comments to applicable test cases. Updated TCMT entries for (Issue ID 14949): BLP/SEN/RAD/BV-01-I, BLP/SEN/RAR/BV-01-I, BLP/SEN/RAR/BV-02-I. Updated the Pass verdict for the TCs in Section 4.6.3, 4.6.4, BLP/COL/RAR/BV-17-I, and BLP/COL/UDS/BV-03-I to 05. Updated TCs BLP/COL/SPE/BI-01-I to 03 into a test group table format. Updated TCs BLP/COL/SPE/BI-08-I to 10 into a test group table format. Incorporated feedback from BTI: Added BLP/SEN/SGGIT/SDPNF/BV-01-C to replace BLP/SEN/BPD/BV-03-I (TSE 15068) and Updated TCMT; editorial changes. Added preamble 4.2.4; editorial changes.
9	p9	2020-12-22	Set publication number for previous v1.0.1.1 to p8. Template-related editorials. Approved by BTI on 2020-07-06. BLP v1.1 adopted by BoD on 2020-12-15. Prepared for publication.

Publication Number	Revision Number	Date	Comments
	p10r00–r08	2021-02-22 – 2021-12-23	TSE 16863 (rating 4): Changes from E16360. Added new test group ISFC. New test cases added: BLP/COL/BPF/BV-25-I and -26-I and BLP/COL/CGGIT/ISFC/BV-01-C. Updated TCMT for the new test cases. Minor editorial updates to the preambles. TSE 18041 (rating 2): Updated the TCMT for BLP/COL/CGGIT/CHA/BV-04-C. TSE 18042 (rating 1): Removed direct references to GATT test cases in the following test cases: BLP/COL/BPD/BV-11-I, BLP/COL/UDS/BV-14-I – -17-I and BLP/SEN/BPF/BV-08-I. TSE 18054 (rating 2): Updated the language in the test procedure of BLP/COL/BPF/BV-19-I, -20-I, -22-I, and -23-I to clarify the number of iterations. Updated TS to the latest template. Made editorial changes, including updating the copyright page to align with the latest DNMD and adding captions to the figures.
10	p10	2022-01-25	Approved by BTI on 2022-01-06. Prepared for TCRL 2021-2 publication.
	p11r00	2023-08-22	TSE 23252 (rating 1): Converted the following TCs to -C tests: BLP/COL/BPD/BV-11-I, BLP/COL/BPF/ BI-01-I – -13-I, BLP/COL/BPF/BV-09-I – -14-I and -16-I – -26-I, BLP/COL/RAA/BV-01-I, BLP/COL/RAD/BV-01-I – -09-I, BLP/COL/RAN/ BV-01-I – -10-I, BLP/COL/RAR/BV-01-I – -17-I, BLP/COL/SPE/BI-01-I – -10-I, BLP/COL/UDS/BV-01-I – -17-I, BLP/SEN/BPF/BV-01-I – -09-I, BLP/SEN/BPT/BI-01-I – -03-I, BLP/SEN/BPT/BV-01-I – -04-I, BLP/SEN/RAD/BV-01-I, and BLP/SEN/RAR/BV-01-I – -02-I. Updated the TCMT accordingly. Editorials to align the document with the latest TS template. Deleted draft revision history comments prior to p0. Updated copyright year.
11	p11	2024-07-01	Approved by BTI on 2024-04-21. Prepared for TCRL 2024-1 publication.

Acknowledgments

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Jörg Brakensiek	Bluetooth SIG, Inc.
Ismail Mohamud	Bluetooth SIG, Inc.
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Bob Hughes	Intel
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