Physical Activity Monitor Profile (PAMP)

***Bluetooth*® Test Suite**

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Contents

1 Scope

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

2 References, definitions, and abbreviations

2.1 References

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

[1] Bluetooth Core Specification, Version 4.2 or later

[2] Test Strategy and Terminology Overview

[3] Physical Activity Monitor Profile, Version 1.0

[4] Physical Activity Monitor Service, Version 1.0

[5] ICS Proforma for Physical Activity Monitor Profile

[6] GATT Test Suite, GATT.TS

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

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

[9] ICS Proforma for Physical Activity Monitor Service

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 from [1] and [2] apply.

3 Test Suite Structure (TSS)

3.1 Overview

The Physical Activity Monitor Profile requires the presence of GAP, SM (when used over LE transport), SDP (when used over BR/EDR transport), L2CAP, and GATT. This is illustrated in Figure 3.1.

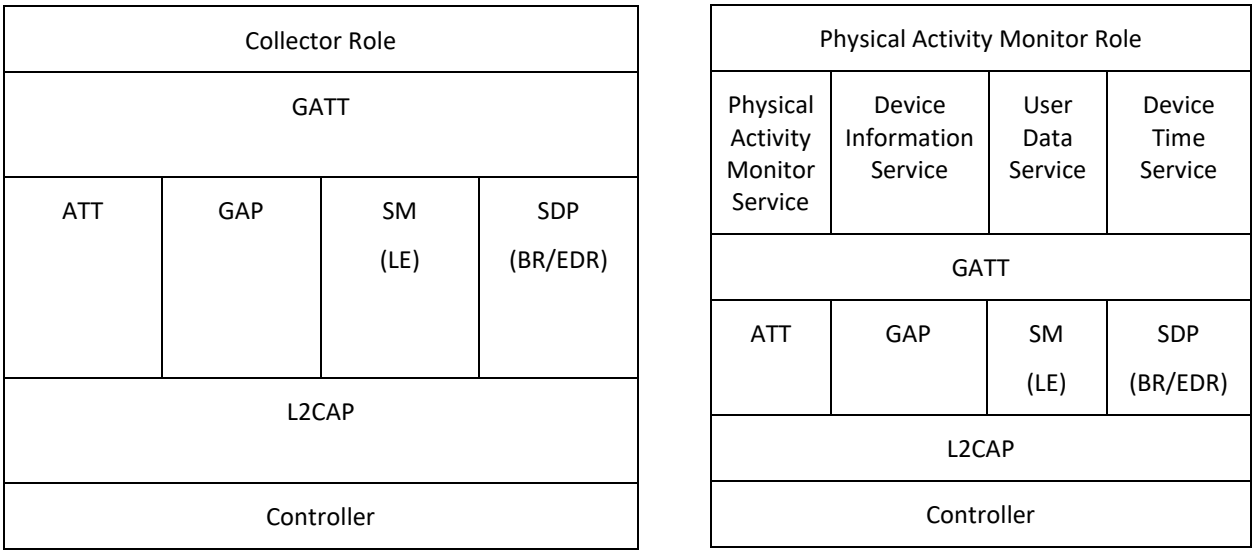

Figure 3.1: Physical Activity Monitor Profile Test Model

3.2 Test Strategy

The test objectives are to verify the functionality of the Physical Activity Monitor Profile within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach covers mandatory and optional requirements in the profile 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 cataloged 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
- Discover Services
- Physical Activity Monitor Requirements
- Configure Notification
- Receive Indications
- Receive Notifications
- Service Procedure – Physical Activity Monitor Control Point
- Service Procedure – User Control Point
- Service Procedure – User Data Service
- Service Procedure – Error Handling

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

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

Additionally, testing of this specification includes tests from the GATT Test Suite [6] referred to as Generic GATT Integrated Tests (GGIT); when used, the test cases in GGIT are referred 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>**
PAMP	Physical Activity Monitor Profile
Identifier Abbreviation	**Role Identifier <IUT role>**
COL	Collector Role
MON	Physical Activity Monitor Role
Identifier Abbreviation	**Reference Identifier <GGIT test group>**
CGGIT	Client Generic GATT Integrated Tests
SGGIT	Server Generic GATT Integrated Tests
Identifier Abbreviation	**Reference Identifier <GGIT class>**
CHA	Characteristic
SDPNF	SDP Record Not Found
SER	Service
Identifier Abbreviation	**Feature Identifier <feat>**
CDWR	Characteristic Descriptor Read and Write (Configure Indication and Notification)
CRW	Characteristic Read and Write
DIS	Discover Services
PAMF	Physical Activity Monitor Features
PCP	Physical Activity Monitor Control Point
SCI	Service Characteristic Indications
SCN	Service Characteristic Notifications
SPE	Service Procedure – Error Handling
UCP	User Control Point

Table 4.1: PAMP TC feature naming conventions

4.1.2 Conformance

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

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

Such tests may verify:

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

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

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

4.1.3 Pass/Fail verdict conventions

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

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

4.2 Setup preambles

The procedures defined in this section are provided as information, as they are used by test equipment in achieving the initial conditions in certain tests.

4.2.1 ATT Bearer on LE Transport

- Preamble Procedure

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

4.2.2 ATT Bearer on BR/EDR Transport

- Preamble Procedure

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

4.2.3 Register New User – by Lower Tester

- Preamble Purpose

  This preamble procedure specifies how the Lower Tester acting as a collector registers a new user in the Physical Activity Monitor.

- Preamble Procedure

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

4.2.4 Register New User – by IUT

- Preamble Purpose

  This preamble procedure specifies how the IUT acting as a collector registers a new user in the Physical Activity Monitor.

- Preamble Procedure

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

4.2.5 Consent – by Lower Tester

- Preamble Purpose

  This preamble procedure specifies how the Lower Tester acting as a collector provides consent, for a registered user, to the Physical Activity Monitor.

- Preamble Procedure

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

4.2.6 Consent – by IUT

- Preamble Purpose

  This preamble procedure specifies how the IUT acting as a collector provides consent, for a registered user, to the Physical Activity Monitor.

- Preamble Procedure

  1. The Upper Tester orders the IUT to write the User Control Point characteristic with the Consent Op Code value of 0x02, and User Index and Consent Code parameter values for the registered user.

2. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
3. The Lower Tester sends the IUT an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02) followed by the Response Value for “Success” (0x01) without a Response Parameter.

4.3 Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in Section 5.3, Client test procedures (CGGIT), in [6] using Table 4.2 below as input:

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]	Physical Activity Monitor Service	[3] 4.2	-	-	Primary Service
PAMP/COL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Physical Activity Monitor Features]	Physical Activity Monitor Features Characteristic	[3] 4.3.1	0x02 (Read)	8	-
PAMP/COL/CGGIT/CHA/BV-03-C [Characteristic GGIT – General Activity Instantaneous Data]	General Activity Instantaneous Data Characteristic	[3] 4.3.1	0x10 (Notify)	Up to 38	-
PAMP/COL/CGGIT/CHA/BV-04-C [Characteristic GGIT – General Activity Summary Data]	General Activity Summary Data Characteristic	[3] 4.3.1	0x20 (Indicate)	Up to 77	-
PAMP/COL/CGGIT/CHA/BV-05-C [Characteristic GGIT – CardioRespiratory Activity Instantaneous Data]	CardioRespiratory Activity Instantaneous Data Characteristic	[3] 4.3.1	0x10 (Notify)	Up to 24	-
PAMP/COL/CGGIT/CHA/BV-06-C [Characteristic GGIT – CardioRespiratory Activity Summary Data]	CardioRespiratory Activity Summary Data Characteristic	[3] 4.3.1	0x20 (Indicate)	Up to 62	-
PAMP/COL/CGGIT/CHA/BV-07-C [Characteristic GGIT – Step Counter Activity Summary Data]	Step Counter Activity Summary Data Characteristic	[3] 4.3.1	0x20 (Indicate)	Up to 29	-
PAMP/COL/CGGIT/CHA/BV-08-C [Characteristic GGIT – Sleep Activity Instantaneous Data]	Sleep Activity Instantaneous Data Characteristic	[3] 4.3.1	0x10 (Notify)	Up to 28	-
PAMP/COL/CGGIT/CHA/BV-09-C [Characteristic GGIT – Sleep Activity Summary Data]	Sleep Activity Summary Data Characteristic	[3] 4.3.1	0x20 (Indicate)	Up to 68	-
PAMP/COL/CGGIT/CHA/BV-10-C [Characteristic GGIT – Physical Activity Monitor Control Point]	Physical Activity Monitor Control Point Characteristic	[3] 4.3.1	0x28 (Write, Indicate)	Skip	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
PAMP/COL/CGGIT/CHA/BV-11-C [Characteristic GGIT – Physical Activity Current Session]	Physical Activity Current Session Characteristic	[3] 4.3.1	0x22 (Indicate, Read)	17	-
PAMP/COL/CGGIT/CHA/BV-12-C [Characteristic GGIT – Physical Activity Session Descriptor]	Physical Activity Session Descriptor Characteristic	[3] 4.3.1	0x20 (Indicate)	Skip	-
PAMP/COL/CGGIT/SER/BV-13-C [Service GGIT – Device Information]	Device Information Service	[3] 4.2	-	-	Primary Service
PAMP/COL/CGGIT/CHA/BV-14-C [Characteristic GGIT – Manufacturer Name String]	Manufacturer Name String Characteristic	[3] 4.3.2	0x02 (Read)	Up to ATT_MTU – 3	-
PAMP/COL/CGGIT/CHA/BV-15-C [Characteristic GGIT – Model Number String]	Model Number String Characteristic	[3] 4.3.2	0x02 (Read)	Up to ATT_MTU – 3	-
PAMP/COL/CGGIT/CHA/BV-16-C [Characteristic GGIT – System ID]	System ID Characteristic	[3] 4.3.2	0x02 (Read)	8	-
PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]	User Data Service	[3] 4.2	-	-	Primary Service
PAMP/COL/CGGIT/CHA/BV-18-C [Characteristic GGIT – User Control Point]	User Control Point Characteristic	[3] 4.3.3	0x28 (Write, Indicate)	Skip	-
PAMP/COL/CGGIT/CHA/BV-19-C [Characteristic GGIT – Database Change Increment]	Database Change Increment Characteristic	[3] 4.3.3	0x1A (Read, Write, Notify)	4	-
PAMP/COL/CGGIT/CHA/BV-20-C [Characteristic GGIT – User Index]	User Index Characteristic	[3] 4.3.3	0x02 (Read)	1	-
PAMP/COL/CGGIT/CHA/BV-21-C [Characteristic GGIT – First Name]	First Name Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-22-C [Characteristic GGIT – Middle Name]	Middle Name Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-23-C [Characteristic GGIT – Last Name]	Last Name Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
PAMP/COL/CGGIT/CHA/BV-24-C [Characteristic GGIT – Age]	Age Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-25-C [Characteristic GGIT – Date of Birth]	Date of Birth Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-26-C [Characteristic GGIT – Gender]	Gender Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-27-C [Characteristic GGIT – Weight]	Weight Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-28-C [Characteristic GGIT – Height]	Height Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-29-C [Characteristic GGIT – High Resolution Height]	High Resolution Height Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-30-C [Characteristic GGIT – Stride Length]	Stride Length Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-31-C [Characteristic GGIT – Handedness]	Handedness Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-32-C [Characteristic GGIT – Device Wearing Position]	Device Wearing Position Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-33-C [Characteristic GGIT – Heart Rate Max]	Heart Rate Max Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-34-C [Characteristic GGIT – Resting Heart Rate]	Resting Heart Rate Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-35-C [Characteristic GGIT – Maximum Recommended Heart Rate]	Maximum Recommended Heart Rate Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-36-C [Characteristic GGIT – Two Zone Heart Rate Limits]	Two Zone Heart Rate Limits Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-37-C [Characteristic GGIT – Three Zone Heart Rate Limits]	Three Zone Heart Rate Limits Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
PAMP/COL/CGGIT/CHA/BV-38-C [Characteristic GGIT – Four Zone Heart Rate Limits]	Four Zone Heart Rate Limits Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-39-C [Characteristic GGIT – Five Zone Heart Rate Limits]	Five Zone Heart Rate Limits Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-40-C [Characteristic GGIT – VO_2 Max]	VO_2 Max Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-41-C [Characteristic GGIT – High Intensity Exercise Threshold]	High Intensity Exercise Threshold Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-42-C [Characteristic GGIT – Activity Goal]	Activity Goal Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-43-C [Characteristic GGIT – Sedentary Interval Notification]	Sedentary Interval Notification Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-44-C [Characteristic GGIT – Caloric Intake]	Caloric Intake Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-45-C [Characteristic GGIT – Language]	Language Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/COL/CGGIT/CHA/BV-46-C [Characteristic GGIT – Preferred Units]	Preferred Units Characteristic	[3] 4.3.3	0x0A (Read, Write)	Skip	-
PAMP/MON/SGGIT/SDPNF/BV-01-C [Not discoverable over BR/EDR – Physical Activity Monitor Service]	Physical Activity Monitor Service	[3] 4.2	-	-	-
PAMP/MON/SGGIT/SDPNF/BV-02-C [Not discoverable over BR/EDR – Device Information Service]	Device Information Service	[3] 4.2	-	-	-
PAMP/MON/SGGIT/SDPNF/BV-03-C [Not discoverable over BR/EDR – User Data Service]	User Data Service	[3] 4.2	-	-	-
PAMP/MON/SGGIT/SDPNF/BV-04-C [Not discoverable over BR/EDR – Device Time Service]	Device Time Service	[3] 4.2	-	-	-

Table 4.2: Input for the GGIT Client test procedure

4.4 Physical Activity Monitor Features

4.4.1 Low Energy Transport

The procedures defined in this test group verify additional Physical Activity Monitor requirements beyond those defined in Physical Activity Monitor Service [4] when using the LE transport.

PAMP/MON/PAMF/BV-01-C [Physical Activity Monitor Service UUID in AD]

- Test Purpose

  Verify that the Physical Activity Monitor IUT includes the Physical Activity Monitor Service UUID in AD (Advertising Data) when using the LE transport.

- Reference

  [3] 3.1.1.1

- Initial Condition

  - The IUT is in GAP discoverable mode.
  - The IUT has been induced to generate Advertising packets.

- Test Procedure

  1. The Lower Tester listens for Advertising packets.

- Expected Outcome

  Pass verdict

  At least one received Advertisement packet contains the defined Service UUID for «Physical Activity Monitor Service».

PAMP/MON/PAMF/BV-02-C [Local Name AD Type Included in AD or Scan Response]

- Test Purpose

  Verify that the Physical Activity Monitor IUT includes the Local Name AD Type in Advertising Data when using the LE transport.

- Reference

  [3] 3.1.1.2

- Initial Condition

  - The IUT is in GAP Discoverable mode.
  - The IUT has been induced to generate Advertising packets.

- Test Procedure

  1. The Lower Tester listens for Advertising packets.
  2. When the Lower Tester receives an Advertisement packet from the IUT, it sends a Scan Request to the IUT.
  3. The Lower Tester listens for a Scan Response from the IUT.

- Expected Outcome

  Pass verdict

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

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

PAMP/MON/PAMF/BV-03-C [Appearance Included in AD or Scan Response]

- Test Purpose

  Verify that the Physical Activity Monitor IUT includes the Appearance characteristic value in AD (Advertising Data) or Scan Response data when using the LE transport.

- Reference

  [3] 3.1.1.4

- Initial Condition

  - The IUT is in GAP Discoverable mode.
  - The IUT has been induced to generate Advertising packets.

- Test Procedure

  1. The Lower Tester listens for Advertising packets.
  2. When the Lower Tester receives an Advertisement packet from the IUT, it sends a Scan Request to the IUT.
  3. The Lower Tester listens for a Scan Response from the IUT.

- Expected Outcome

  Pass verdict

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

  The IUT includes the Appearance Characteristic value in either the Advertising packet or Scan Response packet, but not both.

PAMP/MON/PAMF/BV-04-C [Writable Device Name Characteristic]

- Test Purpose

  Verify that the Physical Activity Monitor IUT supports the writing of the Device Name characteristic when using the LE transport.

- Reference

  [3] 3.1.1.3

- Initial Condition

  - Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1.
  - The IUT includes an instantiation of the Device Name characteristic with Properties having at least the Write (0x08) bit set.
  - The Lower Tester has discovered the Device Name characteristic and has saved the handle range.

- Test Procedure

  1. The Lower Tester writes the Device Name characteristic value (e.g., by executing the test procedure in GATT.TS [6] GATT/SR/GAW/BV-03-C).

- Expected Outcome

  Pass verdict

  The IUT sends an *ATT_Write_Response* indicating successful write of the Device Name characteristic value.

PAMP/MON/PAMF/BV-05-C [Physical Activity Monitor Multiple Users]

- Test Purpose

  Verify that the Physical Activity Monitor IUT supports multiple users, maintains the value of the Database Change Increment characteristic separately for each user, sends Physical Activity Monitor Service data characteristic indications and notification only if the user has given consent, and if data is deleted, only data corresponding to the User Index value is deleted.

- Reference

  [3] 3.2

- Initial Condition

  - Run the preamble procedure for the Lower Tester to initiate a connection to the IUT included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The IUT includes one instantiation of the User Data Service [8].
  - The IUT includes one instantiation of the Physical Activity Monitor Service [4].
  - The Lower Tester has discovered supported services on the IUT.
  - If the IUT requires a bonding procedure, then perform a bonding procedure.
  - If IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.
  - Using the test procedure in GATT.TS [6] GATT/SR/GAW/BV-08-C, the Lower Tester has:
    1. Enabled notifications of the Database Change Increment characteristic by writing value 0x0001 to the Client Characteristic Configuration descriptor.
    2. Enabled indications of the Physical Activity Monitor Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor.
    3. Enabled indications of the General Activity Summary Data characteristic by writing value 0x0002 to the Client Characteristic Configuration.
    4. Enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor.
  - The Lower Tester has two new users registered (e.g., by running procedures included in Section 4.2.3). These users are referred to below as “**User A**” and “**User B**”.

- Test Procedure

  1. The Lower Tester reads the value of the Physical Activity Monitor Features characteristic.
  2. The Lower Tester provides consent for **User A** (e.g., by running procedures included in Section 4.2.5).

3. The Lower Tester reads the value of the Database Change Increment characteristic. The value is recorded for assessment.
4. The Lower Tester updates one of the User Data Service characteristics present on the IUT and writes an incremented value of the Database Change Increment characteristic.
5. The Upper Tester orders the IUT to indicate the General Activity Summary Data characteristic for **User A**.
6. The Lower Tester monitors indications sent by the IUT for an additional 30 seconds or until a disconnection occurs (whichever comes first).
7. The Lower Tester terminates the connection with the IUT.
8. The Lower Tester reconnects to the IUT.
9. Repeat steps 2 and 3 for **User B**.
10. Repeat steps 5–7 for **User B**.
11. The Lower Tester reconnects to the IUT.
12. The Lower Tester provides consent for **User A** (e.g., by running procedures included in Section 4.2.5).
13. The Lower Tester writes the User Control Point characteristic with the Delete User Data Op Code value of 0x03 without Parameter value.
14. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
15. The IUT sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x03) followed by the Response Value for “Success” (0x01) without a Response Parameter.
16. The Lower Tester reads the value of the User Index characteristic for **User A**.
17. Repeat steps 9 and 10.

- Expected Outcome

  Pass verdict

  In step 1, the Physical Activity Monitor Features characteristic has the Multiple Users Supported bit of the Features field set to 1.

  The Database Change Increment characteristic value for **User B** is set to 0x00.

  After step 4, the Database Change Increment characteristic value for **User A** is set to 0x01.

  The IUT does not send General Activity Summary Data indications without consent.

  In step 16, the User Index characteristic value for **User A** is set to 0xFF.

  In step 17, the IUT sends General Activity Summary Data indications for **User B**.

PAMP/MON/PAMF/BV-06-C [Monitor Pairing and Bonding]

- Test Purpose

  Verify that the Physical Activity Monitor IUT successfully pairs and bonds with the Collector (Lower Tester).

- Reference

  [3] 6.1, 6.3

- Initial Condition

  - Run the preamble procedure for the Lower Tester to initiate a connection to the IUT included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The IUT includes one instantiation of the Physical Activity Monitor Service [4].

- The Lower Tester has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
- The IUT is not paired and bonded with the Lower Tester.

- Test Procedure

  1. The Lower Tester reads the Physical Activity Monitor Features characteristic from the IUT.
  2. The IUT sends an *ATT_Error_Response* with the Error Code set to “Insufficient Authentication”.
  3. The IUT sends an SM Peripheral Security Request.
  4. The Lower Tester initiates pairing and bonding with the following requirements depending on transport:
     a. Security Mode 1 and either Security Level 2 or 3, if LE transport is used.
     b. Security Mode 4 (service-level enforced security), if BR/EDR transport is used.
  5. The IUT responds to the pairing request using one of the allowed security configurations.
  6. The Lower Tester continues the pairing process.

- Expected Outcome

  Pass verdict

  The IUT successfully completes pairing and bonding.

PAMP/COL/PAMF/BV-01-C [Collector Pairing and Bonding]

- Test Purpose

  Verify that the Collector IUT successfully pairs and bonds with the Physical Activity Monitor (Lower Tester).

- Reference

  [4] 6.2, 6.3

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The IUT is not paired and bonded with the Lower Tester.

- Test Procedure

  1. The Upper Tester orders the IUT to initiate pairing.
  2. The IUT initiates pairing with the following requirements depending on transport:
     a. Security Mode 1 and either Security Level 2 or 3, if LE transport is used.
     b. Security Mode 4 (service-level enforced security), if BR/EDR transport is used.

3. The Lower Tester responds to the pairing request using one of the allowed security configurations and indicates required bonding.
4. The IUT continues the pairing process.

- Expected Outcome

  Pass verdict

  The IUT successfully completes pairing and bonding.

PAMP/COL/PAMF/BI-01-C [Read Physical Activity Monitor Features Characteristic with RFU bits]

- Test Purpose

  Verify that the Collector IUT can read the Physical Activity Monitor Features characteristic and ignore invalid RFU bits.

- Reference

  [4] 3.1.1.1

- Initial Condition

  - The handle of the Physical Activity Monitor Features characteristic has been previously discovered by the IUT (e.g., by running characteristic procedures in Section 1.1), or is known to the IUT by other means.
  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.

- Test Procedure

  1. The Upper Tester orders the IUT to read the value of the Physical Activity Monitor Features characteristic from the Lower Tester.
  2. The Lower Tester, after receiving the *ATT_Read_Request* from the IUT, sends an *ATT_Read_Response* to the IUT containing the Physical Activity Monitor Features characteristic value with the RFU bits in the Features field set to 1.

- Expected Outcome

  Pass verdict

  The IUT sends a correctly formatted *ATT_Read_Request* to the Lower Tester, containing the handle specified by the Upper Tester.

  The IUT receives the response from the Lower Tester, ignores the RFU bits that are set to 1, and reports the received value to the Upper Tester.

4.5 Configure Notification

PAMP/COL/CDWR/BV-01-C [User Data Service – Configure Notification Database Change Increment Characteristic]

- Test Purpose

  Verify that the Collector IUT can write to and read the Client Characteristic Configuration descriptor for Database Change Increment characteristic supporting notification.

- Reference

  [1] Vol. 3, Part G, 3.3.3.3, [3] 4.6

- Initial Condition

  - The handle of the Client Characteristic Configuration descriptor of Database Change Increment characteristic has been previously discovered by the IUT (e.g., by running characteristic procedures in Section 1.1), or is known to the IUT by other means.
  - Establish an ATT Bearer connection between the IUT and the Lower Tester as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The Database Change Increment Client Characteristic Configuration descriptor of the Lower Tester has an initial value of 0x0000.

- Test Procedure

  1. The Upper Tester orders the IUT to send a correctly formatted *ATT_Write_Request* (Code = 0x12) with the handle 0x0001 to the Lower Tester.
  2. The Upper Tester orders the IUT to read the value of the Database Change Increment Client Characteristic Configuration descriptor.
  3. The IUT reads the characteristic descriptor (e.g., by executing the procedure in GATT.TS [6] GATT/CL/GAR/BV-06-C).

- Expected Outcome

  Pass verdict

  The IUT successfully writes to the Database Change Increment characteristic descriptor.

  The IUT successfully reads the value of the Database Change Increment characteristic descriptor.

4.6 Receive Indications

The procedures defined in this test group verify the ability of the Collector IUT to receive indications for the characteristics exposed by services on the Physical Activity Monitor (Lower Tester), when enabled.

4.6.1 Receive Characteristic Indications – Physical Activity Monitor Service

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the Collector IUT can receive indications of the Physical Activity Monitor Service characteristics. The verification is done one value at a time, as enumerated in the test cases in Table 4.3 below, using this generic test procedure.

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester generates measurement data for at least one active session and one ended session.

- The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
- The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
- The IUT has configured the Client Characteristic Configuration descriptor for the characteristic listed in Table 4.3 (e.g., by running characteristic procedures in Section 1.1).

- Test Case Configuration

Test Case	Reference	Characteristic Name
PAMP/COL/SCI/BV-01-C [General Activity Summary Data Indication]	[3] 4.4.3	General Activity Summary Data
PAMP/COL/SCI/BV-02-C [CardioRespiratory Activity Summary Data Indication]	[3] 4.4.5	CardioRespiratory Activity Summary Data
PAMP/COL/SCI/BV-03-C [Step Counter Activity Summary Data Indication]	[3] 4.4.6	Step Counter Activity Summary Data
PAMP/COL/SCI/BV-04-C [Sleep Activity Summary Data Indication]	[3] 4.4.8	Sleep Activity Summary Data
PAMP/COL/SCI/BV-05-C [Physical Activity Current Session Indication]	[3] 4.4.10	Physical Activity Current Session
PAMP/COL/SCI/BV-06-C [Physical Activity Session Descriptor Indication]	[3] 4.4.11	Physical Activity Session Descriptor

Table 4.3: Indications – Supported Fields

- Test Procedure

1. If a characteristic listed in Table 4.3 supports long values requiring segmentation, the Lower Tester sends a long characteristic value to the IUT in a series of *ATT_Handle_Value_Indications*, performing the segmentation procedure as described in Physical Activity Monitor Service [4] Section 2.4.
2. Else, the Lower Tester sends an *ATT_Handle_Value_Indication* containing a complete characteristic value to the IUT.
3. The Lower Tester sends one or more indications for each characteristic listed in Table 4.3.
4. In case the IUT does not store the indications, the results are sent to the Upper Tester and logged before sending the next indication.

- Expected Outcome

Pass verdict

The IUT correctly parses each indication according to Table 4.3 and reports the received value to the Upper Tester.

The IUT correctly reassembles each long characteristic value by reversing the segmentation procedure described in Physical Activity Monitor Profile [3] Section 4.4.

PAMP/COL/SCI/BV-07-C [Service Changed Indication]

- Test Purpose

  Verify that the Collector IUT properly performs service and characteristic discovery within the handle range specified and invalidates and refreshes cached values when a “Service Changed” indication happens.

- Reference

  [3] 4.7

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester supports the Service Changed characteristic.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the Service Changed Client Characteristic Configuration descriptor of the Lower Tester (e.g., by executing the test procedure in GATT.TS [6] GATT/CL/GAD/BV-06-C).

- Test Procedure

  1. The Upper Tester orders the IUT to enable indications of the Service Changed characteristic.
  2. The IUT sends an *ATT_Write_Request* to the Lower Tester with the handle of the Service Changed Client Characteristic Configuration descriptor and the value set to 0x0002.
  3. The Lower Tester sends a *Characteristic Value Indication* of the Service Changed characteristic with the handle range corresponding to the Physical Activity Monitor Service.
  4. If the IUT starts service discovery, skip steps 5 and 6.
  5. The Upper Tester orders the IUT to perform a Physical Activity Monitor Control Point procedure.
  6. The IUT starts service discovery.

- Expected Outcome

  Pass verdict

  The IUT performs service discovery in either step 4 or step 6.

4.6.2 Receive Characteristic Indications – Ignore Invalid RFU Bits

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the Collector IUT ignores invalid RFU bits in the indications of the Physical Activity Monitor Service characteristics. The verification is done one value at a time, as enumerated in the test cases in Table 4.4 below, using this generic test procedure.

- Initial Condition
  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester generates measurement data for at least one active session and one ended session.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has configured the Client Characteristic Configuration descriptor for the characteristic listed in Table 4.4 (e.g., by running characteristic procedures in Section 1.1).
- Test Case Configuration

Test Case	Reference
PAMP/COL/SCI/BI-01-C [General Activity Summary Data Indication with RFU bits]	[4] 3.3.1.1.2
PAMP/COL/SCI/BI-02-C [CardioRespiratory Activity Summary Data Indication with RFU bits]	[4] 3.5.1.1.2
PAMP/COL/SCI/BI-03-C [Step Counter Activity Summary Data Indication with RFU bits]	[4] 3.6.1.1.2
PAMP/COL/SCI/BI-04-C [Sleep Activity Summary Data Indication with RFU bits]	[4] 3.8.1.1.2
PAMP/COL/SCI/BI-05-C [Physical Activity Current Session Indication with RFU bits]	[4] 3.10.1.1.1
PAMP/COL/SCI/BI-06-C [Physical Activity Session Descriptor Indication with RFU bits]	[4] 3.11.1.1.1

Table 4.4: Indications - RFU Bits

- Test Procedure
  1. The Lower Tester sends one or more indications for the characteristic listed in Table 4.4 but sets all the RFU bits in the Flags field to 1.
  2. The IUT reports the received indications to the Upper Tester.
- Expected Outcome

  Pass verdict

  The IUT correctly parses the received indications according to Table 4.4, ignores the RFU bits that are set to 1, and reports the received value to the Upper Tester.

4.7 Receive Notifications

The procedures defined in this test group verify the ability of the Collector IUT to receive notifications for the characteristics exposed by services on the Physical Activity Monitor (Lower Tester), when enabled.

PAMP/COL/SCN/BV-01-C [Database Change Increment Notification]

- Test Purpose

  Verify that the Collector IUT reads the UDS characteristics that it supports when a Database Change Increment notification happens.

- Reference

  [3] 4.6.1

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [8] including at least the characteristics supported by the IUT.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The Lower Tester supports notifications of the Database Change Increment characteristic.
  - The IUT has enabled notifications of the Database Change Increment characteristic by writing value 0x0001 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
  - The IUT has enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
  - The IUT has registered a new user and provided consent (e.g., by running procedures included in Section 4.2.4 and Section 4.2.6).

- Test Procedure

  1. The Lower Tester updates at least one of the User Data Service characteristics and increments the Database Change Increment characteristic value.
  2. The Lower Tester sends an *ATT_Handle_Value_Notification* containing the updated Database Change Increment value.
  3. The IUT reads the supported User Data Service characteristic values.
  4. The Lower Tester sends an *ATT_Read_Response* for each characteristic read by the IUT.

- Expected Outcome

  Pass verdict

  In step 3, the IUT reads the supported User Data Service characteristics.

4.7.1 Receive Characteristic Notifications – Physical Activity Monitor Service

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the Collector IUT can receive notifications of the Physical Activity Monitor Service characteristics. The verification is

done one value at a time, as enumerated in the test cases in Table 4.5 below, using this generic test procedure.

- Initial Condition
  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The Lower Tester generates measurement data for at least one active session.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The IUT has configured the Client Characteristic Configuration descriptor for the characteristic listed in Table 4.5 (e.g., by running characteristic procedures in Section 1.1).
- Test Case Configuration

Test Case	Reference
PAMP/COL/SCN/BV-02-C [General Activity Instantaneous Data Notification]	[3] 4.4.2
PAMP/COL/SCN/BV-03-C [CardioRespiratory Activity Instantaneous Data Notification]	[3] 4.4.4
PAMP/COL/SCN/BV-04-C [Sleep Activity Instantaneous Data Notification]	[3] 4.4.7

Table 4.5: Notifications - Physical Activity Monitor Service

- Test Procedure
  1. If a characteristic listed in Table 4.5 supports long values requiring segmentation, the Lower Tester sends a long characteristic value to the IUT in a series of *ATT_Handle_Value_Notifications*, performing the segmentation procedure as described in Physical Activity Monitor Service [4] Section 2.4.
  2. Else, the Lower Tester sends an *ATT_Handle_Value_Notification* containing a complete characteristic value to the IUT.
  3. The Lower Tester sends one or more notifications for each characteristic listed in Table 4.5.
  4. In case the IUT does not store the notifications, the results are sent to the Upper Tester and logged before sending the next notification.
- Expected Outcome

  Pass verdict

  The IUT correctly parses each notification according to Table 4.5 and reports the received value to the Upper Tester.

  The IUT correctly reassembles each long characteristic value by reversing the segmentation procedure described in Physical Activity Monitor Profile [3] Section 4.4.

4.7.2 Receive Characteristic Notifications – Ignore Invalid RFU Bits

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the Collector IUT ignores invalid RFU bits in the notifications of the Physical Activity Monitor Service characteristics. The verification is done one value at a time, as enumerated in the test cases in Table 4.6 below, using this generic test procedure.

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The Lower Tester generates measurement data for at least one active session.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The IUT has configured the Client Characteristic Configuration descriptor for the characteristic listed in Table 4.6 (e.g., by running characteristic procedures in Section 1.1).

- Test Case Configuration

Test Case	Reference
PAMP/COL/SCN/BI-01-C [General Activity Instantaneous Data Notification with RFU bits]	[4] 3.2.1.1.2 [4] 3.2.1.1.17
PAMP/COL/SCN/BI-02-C [CardioRespiratory Activity Instantaneous Data Notification with RFU bits]	[4] 3.4.1.1.2
PAMP/COL/SCN/BI-03-C [Sleep Activity Instantaneous Data Notification with RFU bits]	[4] 3.7.1.1.2

Table 4.6: Notifications – RFU Bits

- Test Procedure

  1. The Lower Tester sends one or more notifications for the characteristic listed in Table 4.6 but sets all the RFU bits in all the fields to 1.
  2. The IUT reports the received notifications to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT correctly parses the received notifications according to Table 4.6, ignores the RFU bits that are set to 1, and reports the received value to the Upper Tester.

4.8 Service Procedure – Physical Activity Monitor Control Point

This test group contains test cases to verify that the Collector IUT can properly handle the requirements of the Physical Activity Monitor Control Point characteristic.

PAMP/COL/PCP/BV-01-C [Physical Activity Monitor Control Point – Service Procedures]

- Test Purpose

  Verify that the Collector IUT can write Op Codes to the Physical Activity Monitor Control Point characteristic and verify the response.

- Reference

  [3] 4.4.9

- Initial Condition

  - Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - Using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C, the IUT has:
    1. Enabled indications of the Physical Activity Monitor Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor.
    2. Enabled indications of the Physical Activity Session Descriptor characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor.
    3. Enabled indications of the Physical Activity Current Session characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor.
    4. Enabled indications of the General Activity Summary Data characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor.
  - The Lower Tester has no Session running.

- Test Procedure

  1. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Start Session/Sub-session Op Code value of 0x04 and a Type parameter value of 0x00.
  2. The Lower Tester sends an ATT_Write_Response indicating that the IUT has accepted the Op Code.
  3. The Lower Tester sends one indication of the Physical Activity Current Session characteristic.
  4. Repeat steps 1 and 2 for a Type parameter value of 0x01.
  5. The Lower Tester sends one indication of the Physical Activity Current Session characteristic.
  6. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Enquire Sessions Op Code value of 0x01 and zero parameters.
  7. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
  8. The Lower Tester sends an indication of the Physical Activity Monitor Control Point characteristic and one indication of the Physical Activity Session Descriptor characteristic.
  9. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Enquire Sub-sessions Op Code value of 0x02 and a Session ID parameter value of the Session received in the Physical Activity Session Descriptor characteristic in step 8.

10. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
11. The Lower Tester sends an indication of the Physical Activity Monitor Control Point characteristic and one or more indications of the Physical Activity Session Descriptor characteristic.
12. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Stop Op Code value of 0x05 with zero parameters.
13. The Lower Tester sends an *ATT_Write_Response* indicating that the IUT has accepted the Op Code.
14. The Lower Tester sends one indication of the Physical Activity Current Session characteristic.
15. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Get Ended Session Data Op Code value of 0x03, the Session ID parameter value of the ended Session received in the Physical Activity Current Session characteristic in step 14, a Sub-session ID value from the ended Session, and a Data Characteristic value of 0x01.
16. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
17. In less than 30 seconds from receiving the *ATT_Write_Request* from step 15, the Lower Tester starts sending one or more indications of the General Activity Summary Data characteristic. If more than one indication is being sent, the time between the *ATT_Handle_Value_Confirmation* sent by the IUT and the following indication sent by the Lower Tester is less than 30 seconds.
18. In less than 30 seconds from the last *ATT_Handle_Value_Confirmation* sent by the IUT, the Lower Tester sends one indication of the Physical Activity Monitor Control Point characteristic.
19. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Delete Ended Session Op Code value of 0x06 and the Session ID parameter value of the ended Session.
20. The Lower Tester sends an *ATT_Write_Response* indicating that it has accepted the Op Code.

- Expected Outcome

  Pass verdict

  The IUT successfully writes the specified Op Codes to the Physical Activity Monitor Control Point with the correct parameter values.

PAMP/COL/PCP/BV-02-C [Physical Activity Monitor Control Point – Set Average Activity Type]

- Test Purpose

  Verify that the Collector IUT can write Set Average Activity Type Op Code to the Physical Activity Monitor Control Point characteristic and verify the response.

- Reference

  [4] 4.4.9

- Initial Condition

  - Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.

- The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
- The IUT has enabled indications of the Physical Activity Monitor Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
- The IUT has enabled indications of the Physical Activity Session Descriptor characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
- The Lower Tester has a Session running.

- Test Procedure

  1. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Enquire Sessions Op Code value of 0x01 and zero parameters.
  2. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The Lower Tester sends an indication of the Physical Activity Monitor Control Point characteristic and one or more indications of the Physical Activity Session Descriptor characteristic.
  4. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Set Average Activity Type Op Code value of 0x07 with a Scope parameter value of 0x00 and a valid User-Defined Activity Type parameter value.
  5. The Lower Tester sends an *ATT_Write_Response* indicating that the IUT has accepted the Op Code.

- Expected Outcome

  Pass verdict

  The IUT successfully writes the specified Op Codes to the Physical Activity Monitor Control Point with the correct parameter values.

4.9 Service Procedure – User Control Point

This test group contains test cases to verify that the Collector IUT can properly handle the requirements of the User Control Point characteristic.

PAMP/COL/UCP/BV-01-C [User Control Point – Service Procedures]

- Test Purpose

  Verify that the Collector IUT can write Op Codes to the User Control Point characteristic and verify the response.

- Reference

  [4] 4.6.2.1

- Initial Condition

  - Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes an instantiation of the User Data Service [8] including the User Control Point characteristic.

- The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
- The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]).
- The IUT has enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
- The Lower Tester has no registered user.

- Test Procedure

  1. The Upper Tester orders the IUT to write the User Control Point characteristic with the Register New User Op Code value of 0x01 and a Consent Code parameter value of 0x04D2, which represents “1234”.
  2. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The Lower Tester sends the IUT an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value for “Success” (0x01), and Response parameter set to a value assigned by the Lower Tester representing the User Index.
  4. The Upper Tester orders the IUT to write the User Control Point characteristic with the Consent Op Code value of 0x02, the User Index parameter value received at step 3, and a Consent Code parameter value of 0x04D2, which represents “1234”.
  5. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
  6. The Lower Tester sends the IUT 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.
  7. The Upper Tester orders the IUT to write the User Control Point characteristic with the Delete User Data Op Code value of 0x03 without a Parameter value.
  8. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
  9. The Lower Tester sends the IUT an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x03) followed by the Response Value for “Success” (0x01) without a Response Parameter.

- Expected Outcome

  Pass verdict

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

PAMP/COL/UCP/BV-02-C [User Control Point – User Data Synchronization Procedure]

- Test Purpose

  Verify that the Collector IUT reads or updates the User Data Service characteristics on the Physical Activity Monitor based on the comparison of the local and remote Database Change Increment characteristic.

- Reference

  [3] 4.6.4

- Initial Condition
  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [8] including at least the characteristics supported by the IUT.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The Lower Tester does not support configuration of the Database Change Increment characteristic notification.
  - The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]).
  - The IUT has enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
  - The IUT has registered a new user and provided consent (e.g., by running procedures included in Section 4.2.4 and Section 4.2.6).
  - The IUT has read and cached the supported User Data Service characteristics and the Database Change Increment characteristic.
- Test Procedure

  1. The Upper Tester orders the IUT to disconnect.
  2. The IUT terminates the connection with the Lower Tester.
  3. The Upper Tester orders the IUT to update at least one cached User Data Service characteristic locally.
  4. The Upper Tester orders the IUT to reconnect to the Lower Tester.
  5. The Upper Tester orders the IUT to provide consent for the registered user (e.g., by running procedures included in Section 4.2.6).
  6. The IUT reads the Database Change Increment characteristic value.
  7. The IUT updates the User Data Service characteristic values modified in step 3 and increments the Database Change Increment characteristic value.
  8. Repeat steps 1 and 2.
  9. The Lower Tester updates one of the User Data Service characteristics supported by the IUT and increments the Database Change Increment characteristic value.
  10. Repeat steps 4–6.
  11. The IUT reads the supported User Data Service characteristic values.

- Expected Outcome

  Pass verdict

  In steps 6 and 10, the IUT successfully reads the Database Change Increment value.

  In step 7, the IUT successfully writes the updated User Data Service characteristics.

  In step 11, the IUT successfully reads the supported User Data Service characteristics.

4.10 Service Procedure – User Data Service

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the Collector IUT can perform a GATT Read/Write sub-procedure to read/write values for User Data Service characteristics supporting this operation. The verification is done one value at a time, as enumerated in the test cases in Table 4.7 below, using this generic test procedure.

  Verification should ensure that the Database Change Increment characteristic is updated after writing the User Data Service characteristic.

- Reference

  [4] 3.2, 4.6

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [8] including at least the characteristics supported by the IUT.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]).
  - The IUT has enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
  - The IUT has enabled notifications of the Database Change Increment characteristic by writing value 0x0001 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
  - The IUT has registered a new user and provided consent (e.g., by running procedures included in Section 4.2.4 and Section 4.2.6).

- Test Case Configuration

Test Case	Characteristic Name
PAMP/COL/CRW/BV-01-C [Characteristic Read Write – First Name]	First Name
PAMP/COL/CRW/BV-02-C [Characteristic Read Write – Middle Name]	Middle Name
PAMP/COL/CRW/BV-03-C [Characteristic Read Write – Last Name]	Last Name
PAMP/COL/CRW/BV-04-C [Characteristic Read Write – Age]	Age
PAMP/COL/CRW/BV-05-C [Characteristic Read Write – Date of Birth]	Date of Birth
PAMP/COL/CRW/BV-06-C [Characteristic Read Write – Gender]	Gender
PAMP/COL/CRW/BV-07-C [Characteristic Read Write – Weight]	Weight
PAMP/COL/CRW/BV-08-C [Characteristic Read Write – Height]	Height
PAMP/COL/CRW/BV-09-C [Characteristic Read Write – High Resolution Height]	High Resolution Height
PAMP/COL/CRW/BV-10-C [Characteristic Read Write – Stride Length]	Stride Length
PAMP/COL/CRW/BV-11-C [Characteristic Read Write – Handedness]	Handedness

Test Case	Characteristic Name
PAMP/COL/CRW/BV-12-C [Characteristic Read Write – Device Wearing Position]	Device Wearing Position
PAMP/COL/CRW/BV-13-C [Characteristic Read Write – Heart Rate Max]	Heart Rate Max
PAMP/COL/CRW/BV-14-C [Characteristic Read Write – Resting Heart Rate]	Resting Heart Rate
PAMP/COL/CRW/BV-15-C [Characteristic Read Write – Maximum Recommended Heart Rate]	Maximum Recommended Heart Rate
PAMP/COL/CRW/BV-16-C [Characteristic Read Write – Two Zone Heart Rate Limits]	Two Zone Heart Rate Limits
PAMP/COL/CRW/BV-17-C [Characteristic Read Write – Three Zone Heart Rate Limits]	Three Zone Heart Rate Limits
PAMP/COL/CRW/BV-18-C [Characteristic Read Write – Four Zone Heart Rate Limits]	Four Zone Heart Rate Limits
PAMP/COL/CRW/BV-19-C [Characteristic Read Write – Five Zone Heart Rate Limits]	Five Zone Heart Rate Limits
PAMP/COL/CRW/BV-20-C [Characteristic Read Write – VO2 Max]	VO_2 Max
PAMP/COL/CRW/BV-21-C [Characteristic Read Write – High Intensity Exercise Threshold]	High Intensity Exercise Threshold
PAMP/COL/CRW/BV-22-C [Characteristic Read Write – Activity Goal]	Activity Goal
PAMP/COL/CRW/BV-23-C [Characteristic Read Write – Sedentary Interval Notification]	Sedentary Interval Notification
PAMP/COL/CRW/BV-24-C [Characteristic Read Write – Caloric Intake]	Caloric Intake
PAMP/COL/CRW/BV-25-C [Characteristic Read Write – Language]	Language
PAMP/COL/CRW/BV-26-C [Characteristic Read Write – Preferred Units]	Preferred Units

Table 4.7: Characteristic Read/Write test cases

- Test Procedure

  1. The Upper Tester orders the IUT to write the characteristic value for the characteristic listed in Table 4.7.
  2. The IUT writes the characteristic value (e.g., by executing the test procedure in GATT.TS [6] GATT/CL/GAW/BV-03-C or GATT.TS [6] GATT/CL/GAW/BV-05-C depending on characteristic value length).
  3. The IUT updates the Database Change Increment characteristic value (e.g., by executing the test procedure in GATT.TS [6] GATT/CL/GAW/BV-03-C).
  4. The Upper Tester orders the IUT to read the characteristic value for the characteristic listed in Table 4.7.
  5. The IUT reads the characteristic value (e.g., by executing the test procedure in GATT.TS [6] GATT/CL/GAR/BV-01-C or GATT.TS [6] GATT/CL/GAR/BV-04-C depending on characteristic value length).
  6. The IUT reports the value to the Upper Tester.
  7. The Upper Tester confirms that the value written in step 2 matches the value read in step 5.

- Expected Outcome

  Pass verdict

  In step 2, the IUT writes the value successfully.

In step 3, the IUT increments the Database Change Increment for each test.

In step 5, the IUT successfully reads the value.

In step 7, the value reported by the IUT is validated.

4.11 Service Procedure – Error Handling

The procedures defined in this test group verify the ability of the Collector IUT to return to a stable state allowing further interaction from the Lower Tester when it receives an error response.

4.11.1 Physical Activity Monitor Control Point – ATT Application Error Codes

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the Collector IUT behaves appropriately when it receives an ATT Application Error Code. The verification is done one value at a time, as enumerated in the test cases in Table 4.8 below, using this generic test procedure.

- Reference

  [4] 4.7, 1.7

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The IUT has enabled indications of the Physical Activity Monitor Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.

- Test Case Configuration

Test Case	Op Code	Op Code Parameter Value	Error Code
PAMP/COL/SPE/BI-01-C [Physical Activity Monitor Control Point – Op Code Not Supported]	Enquire Sessions (0x01)	None	Op Code Not Supported (0x80)
PAMP/COL/SPE/BI-02-C [Physical Activity Monitor Control Point – Invalid Session ID]	Enquire Sub-sessions (0x02)	Session ID	Invalid Session ID (0x81)
PAMP/COL/SPE/BI-03-C [Physical Activity Monitor Control Point – Invalid Sub-session]	Get Ended Session Data (0x03)	Data Request Specification	Invalid Sub-session ID (0x82)
PAMP/COL/SPE/BI-04-C [Physical Activity Monitor Control Point – Session Still Running]	Delete Ended Session (0x06)	Session ID	Session Still Running (0x83)

Test Case	Op Code	Op Code Parameter Value	Error Code
PAMP/COL/SPE/BI-05-C [Physical Activity Monitor Control Point – No Data Available]	Get Ended Session Data (0x03)	Data Request Specification	No Data Available (0x84)
PAMP/COL/SPE/BI-06-C [Physical Activity Monitor Control Point – No Sessions Available]	Enquire Sessions (0x01)	None	No Sessions Available (0x85)
PAMP/COL/SPE/BI-07-C [Physical Activity Monitor Control Point – Invalid Type]	Start Session/Sub-session (0x04)	Type=0x00	Invalid Type (0x86)
PAMP/COL/SPE/BI-08-C [Physical Activity Monitor Control Point – No Session Running]	Start Session/Sub-session (0x04)	Type=0x01	No Session Running (0x87)
PAMP/COL/SPE/BI-09-C [Physical Activity Monitor Control Point – Nothing To Stop]	Stop Session (0x05)	None	Nothing To Stop (0x88)
PAMP/COL/SPE/BI-10-C [Physical Activity Monitor Control Point – Operation Failed]	Enquire Sessions (0x01)	None	Operation Failed (0x8A)
PAMP/COL/SPE/BI-11-C [Physical Activity Monitor Control Point – Activity Type Out Of Range]	Set Average Activity Type (0x07)	Set Average Activity Type Specification	Activity Type Out Of Range (0x89)

Table 4.8: Physical Activity Monitor Control Point ATT Application Error Test Cases

- Test Procedure

  1. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic using the Op Code and associated parameters specified in Table 4.8.
  2. The Lower Tester sends the *ATT_Application_Error* with the error code specified in Table 4.8.

- Expected Outcome

  Pass verdict

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

PAMP/COL/SPE/BI-12-C [Physical Activity Monitor Control Point – Enquire Sessions Error Response]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives an indication of the Physical Activity Monitor Control Point characteristic containing an Enquire Sessions Error Response.

- Reference

  [4] 4.7, 3.9.3.3

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.

- The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
- The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
- The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
- The IUT has enabled indications of the Physical Activity Monitor Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.

- Test Procedure

  1. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Enquire Sessions Op Code value of 0x01.
  2. The Lower Tester sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The Lower Tester sends an *ATT_Handle_Value_Indication* of the Physical Activity Monitor Control Point characteristic with the Enquire Sessions Error Response Op Code value of 0xFF and the Parameter value of 0xFF.

- Expected Outcome

  Pass verdict

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

PAMP/COL/SPE/BI-13-C [Physical Activity Monitor Control Point – Enquire Sub-sessions Error Response]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives an indication of the Physical Activity Monitor Control Point characteristic containing an Enquire Sub-sessions Error Response.

- Reference

  [4] 4.7, 3.9.3.4

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The IUT has enabled indications of the Physical Activity Monitor Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.

- Test Procedure

  1. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Enquire Sub-sessions Op Code value of 0x02 and a valid Session ID.
  2. The Lower Tester sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The Lower Tester sends an *ATT_Handle_Value_Indication* of the Physical Activity Monitor Control Point characteristic with the Enquire Sub-sessions Error Response Op Code value of 0xFE and the Parameter value of 0xFF.

- Expected Outcome

  Pass verdict

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

PAMP/COL/SPE/BI-14-C [Physical Activity Monitor Control Point – Get Ended Session Data Error Response]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives an indication of the Physical Activity Monitor Control Point characteristic containing a Get Ended Session Data Error Response.

- Reference

  [4] 4.7, 3.9.3.5

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The IUT has enabled indications of the Physical Activity Monitor Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.

- Test Procedure

  1. The Upper Tester orders the IUT to write the Physical Activity Monitor Control Point characteristic with the Get Ended Session Data Op Code value of 0x03, a valid Session ID, a Sub-session ID value of 0xFFFF, and a Data Characteristic value of 0x01.
  2. The Lower Tester sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. In less than 30 seconds from receiving the *ATT_Write_Request* from step 1, the Lower Tester sends an *ATT_Handle_Value_Indication* of the Physical Activity Monitor Control Point characteristic with the Get Ended Session Data Error Response Op Code value of 0xFD and the Parameter value of 0xFF.

- Expected Outcome

  Pass verdict

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

PAMP/COL/SPE/BI-15-C [Physical Activity Monitor Control Point – Procedure Already In Progress]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives the ATT Error Code “Procedure Already In Progress” from the Physical Activity Monitor Control Point in response to a Write Request.

- Reference

  [4] 4.7

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).
  - The IUT has enabled indications of the Physical Activity Monitor Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.

- Test Procedure

  1. The Upper Tester orders the IUT to execute a Physical Activity Monitor Control Point procedure.
  2. The IUT sends an *ATT_Write_Request*.
  3. The Lower Tester sends an *ATT_Error_Response* with the Error Code set to “Procedure Already In Progress”.

- Expected Outcome

  Pass verdict

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

PAMP/COL/SPE/BI-16-C [Physical Activity Monitor Control Point – Client Characteristic Configuration Descriptor Improperly Configured]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives the ATT Error Code “Client Characteristic Configuration Descriptor Improperly Configured” from the Physical Activity Monitor Control Point in response to a Write Request.

- Reference

  [4] 4.7

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the Physical Activity Monitor Service [4] including all defined characteristics.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the Physical Activity Monitor Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]).

- Test Procedure

  1. The Upper Tester orders the IUT to execute a Physical Activity Monitor Control Point procedure.
  2. The IUT sends an *ATT_Write_Request*.
  3. The Lower Tester sends an *ATT_Error_Response* with the Error Code set to “Client Characteristic Configuration Descriptor Improperly Configured”.

- Expected Outcome

  Pass verdict

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

4.11.2 User Control Point – Response Value Error Codes

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the Collector IUT behaves appropriately when it receives indications of the User Control Point characteristic with a Response Value error code in response to a Write Request. The verification is done one value at a time, as enumerated in the test cases in Table 4.9 below, using this generic test procedure.

- Reference

  [4] 4.7, 3.4.2.4

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [8] including at least the User Control Point characteristic.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]).

- The IUT has enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
- The IUT has registered a new user and provided consent (e.g., by running procedures included in Section 4.2.4 and Section 4.2.6).

- Test Case Configuration

Test Case	Op Code	Op Code Parameter Value	Response Value
PAMP/COL/SPE/BI-17-C [User Control Point – Op Code Not Supported]	Register New User (0x01)	None	Op Code Not Supported (0x02)
PAMP/COL/SPE/BI-18-C [User Control Point – Invalid Parameter]	Register New User (0x01)	Consent Code	Invalid Parameter (0x03)
PAMP/COL/SPE/BI-19-C [User Control Point – Operation Failed]	Consent (0x02)	User Index, Consent Code	Operation Failed (0x04)
PAMP/COL/SPE/BI-20-C [User Control Point – User Not Authorized]	Delete User Data (0x03)	None	User Not Authorized (0x05)

Table 4.9: User Control Point Response Value Error Codes Tests

- Test Procedure

1. The Upper Tester orders the IUT to write the User Control Point characteristic using the Op Code and associated parameters specified in Table 4.9.
2. The Lower Tester sends an *ATT_Write_Response.*
3. The Lower Tester sends an indication of the User Control Point containing the Response Op Code (0x20), the Request Op Code, and Response Value specified in Table 4.9.

- Expected Outcome

Pass verdict

In step 1, the IUT successfully writes the User Control Point characteristic value.

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

PAMP/COL/SPE/BI-21-C [User Control Point – User Data Access Not Permitted]

- Test Purpose

Verify that the Collector IUT behaves appropriately when it receives the ATT Application Error Code “User Data Access Not Permitted” from a supported User Data Service characteristic in response to a Read Request.

- Reference

[4] 4.7

- Initial Condition

- Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.

- The Lower Tester includes one instantiation of the User Data Service [8] including at least the User Control Point characteristic and the User Data Service characteristics supported by the IUT.
- The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
- The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]).
- The IUT has enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
- The IUT has registered a new user (e.g., by running procedures included in Section 4.2.4).

- Test Procedure

  1. The Upper Tester orders the IUT to read a supported User Data Service characteristic value.
  2. The IUT sends either an *ATT_Read_Request* or an *ATT_Read_Blob_Request* depending on characteristic value length.
  3. The Lower Tester sends an *ATT_Error_Response* with the error code set to “User Data Access Not Permitted” (0x80).

- Expected Outcome

  Pass verdict

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

PAMP/COL/SPE/BI-22-C [User Control Point – Procedure Already In Progress]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives the ATT Error Code “Procedure Already In Progress” from the User Control Point in response to a Write Request.

- Reference

  [4] 4.7

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [8] including at least the User Control Point characteristic and the User Data Service characteristics supported by the IUT.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]).
  - The IUT has enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
  - The IUT has registered a new user (e.g., by running procedures included in Section 4.2.4).

- Test Procedure

  1. The Upper Tester orders the IUT to write the User Control Point characteristic with the Consent Op Code value of 0x02, and User Index and Consent Code parameter values for the registered user.
  2. The IUT sends an *ATT_Write_Request* containing the Consent Op Code value of 0x02 and associated parameters.
  3. The Lower Tester sends an *ATT_Error_Response* with the Error Code set to “Procedure Already In Progress”.

- Expected Outcome

  Pass verdict

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

PAMP/COL/SPE/BI-23-C [User Control Point – Client Characteristic Configuration Descriptor Improperly Configured]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives the ATT Error Code “Client Characteristic Configuration Descriptor Improperly Configured” from the User Control Point in response to a Write Request.

- Reference

  [4] 4.7

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [8] including at least the User Control Point characteristic.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]).

- Test Procedure

  1. The Upper Tester orders the IUT to request a User Control Point procedure.
  2. The IUT sends an *ATT_Write_Request*.
  3. The Lower Tester sends an *ATT_Error_Response* with the Error Code set to “Client Characteristic Configuration Descriptor Improperly Configured”.

- Expected Outcome

  Pass verdict

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

PAMP/COL/SPE/BI-24-C [User Control Point – Procedure Timeout]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it writes a particular Op Code to the User Control Point and that it does not receive the User Control Point indication within 30 seconds or the link is lost.

- Reference

  [4] 4.7

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [8] including at least the User Control Point characteristic and the User Data Service characteristics supported by the IUT.
  - The Lower Tester may perform a bonding procedure. If previously bonded, enable encryption if not already enabled.
  - The IUT has discovered the User Data Service and has saved its handle range (e.g., by executing test case PAMP/COL/CGGIT/SER/BV-17-C [Service GGIT – User Data]).
  - The IUT has enabled indications of the User Control Point characteristic by writing value 0x0002 to the Client Characteristic Configuration descriptor using the test procedure in GATT.TS [6] GATT/CL/GAW/BV-08-C.
  - The IUT has registered a new user (e.g., by running procedures included in Section 4.2.4).

- Test Procedure

  1. The Upper Tester orders the IUT to write the User Control Point characteristic with the Consent Op Code value of 0x02, and valid Index and Consent Code parameter values for the registered user.
  2. The IUT sends an *ATT_Write_Request*.
  3. The Lower Tester sends the IUT an *ATT_Write_Response* indicating that it has accepted the Op Code.
  4. The Lower Tester does not send a User Control Point characteristic indication containing the Response Code Op Code (0x20) for 30 seconds.
  5. If the IUT disconnects after the 30-second interval, skip the following steps.
  6. The Upper Tester orders the IUT to write the User Control Point characteristic with the Consent Op Code value of 0x02, and User Index and Consent Code parameter values for the registered user.
  7. The Lower Tester waits a 30-second interval. If during the wait interval the Lower Tester receives an *ATT_Write_Request*, terminate the test with a Fail verdict.
  8. The Lower Tester disconnects from the IUT.
  9. The Upper Tester orders the IUT to reconnect.
  10. Repeat steps 1–3.
  11. The Lower Tester disconnects from the IUT.
  12. The Upper Tester orders the IUT to reconnect.
  13. Repeat steps 1 and 2.

- Expected Outcome

  Pass verdict

  In step 5, the IUT disconnects.

  Or

  In step 10, the IUT starts the Consent procedure.

  In step 13, the IUT starts the Consent procedure.

  Fail verdict

  In step 7, the IUT starts the Consent procedure.

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 Physical Activity Monitor Profile [5].

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

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

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

Item	Feature	Test Case(s)
PAMP 1/2	Profile supported over BR/EDR or LE	PAMP/COL/CGGIT/SER/BV-01-C
PAMP 1/2 AND PAMP 11/2	Profile supported over BR/EDR or LE and Device Information Service	PAMP/COL/CGGIT/SER/BV-13-C PAMP/COL/CGGIT/CHA/BV-14-C PAMP/COL/CGGIT/CHA/BV-15-C PAMP/COL/CGGIT/CHA/BV-16-C
PAMP 1/1 AND PAMP 2/2 AND NOT PAMP 2/1 AND GATT 1a/4	Profile supported over LE not discoverable over BR/EDR	PAMP/MON/SGGIT/SDPNF/BV-01-C PAMP/MON/SGGIT/SDPNF/BV-02-C
PAMP 1/1 AND PAMP 2/2 AND NOT PAMP 2/1 AND PAMP 5/3 AND GATT 1a/4	Profile supported over LE not discoverable over BR/EDR and User Data Service	PAMP/MON/SGGIT/SDPNF/BV-03-C
PAMP 1/1 AND PAMP 2/2 AND NOT PAMP 2/1 AND PAMP 5/4 AND GATT 1a/4	Profile supported over LE not discoverable over BR/EDR and Device Time Service	PAMP/MON/SGGIT/SDPNF/BV-04-C
PAMP 5/5	Physical Activity Monitor Service UUID in AD	PAMP/MON/PAMF/BV-01-C
PAMP 5/6 OR PAMP 5/7	Local Name AD Type Included in AD or Scan Response	PAMP/MON/PAMF/BV-02-C
PAMP 5/8	Writable Device Name Characteristic	PAMP/MON/PAMF/BV-04-C
PAMP 5/9 OR PAMP 5/10	Appearance Include in AD or Scan Response	PAMP/MON/PAMF/BV-03-C
PAMP 5/11	Multiple Users	PAMP/MON/PAMF/BV-05-C
PAMP 8/3 OR PAMP 8/4	Monitor Pairing and Bonding	PAMP/MON/PAMF/BV-06-C

Item	Feature	Test Case(s)
PAMP 12/1	Physical Activity Monitor Features Characteristic	PAMP/COL/CGGIT/CHA/BV-02-C PAMP/COL/PAMF/BI-01-C
PAMP 12/2	General Activity Instantaneous Data Characteristic	PAMP/COL/CGGIT/CHA/BV-03-C PAMP/COL/SCN/BV-02-C PAMP/COL/SCN/BI-01-C
PAMP 12/3	General Activity Summary Data Characteristic	PAMP/COL/CGGIT/CHA/BV-04-C PAMP/COL/SCI/BV-01-C PAMP/COL/SCI/BI-01-C
PAMP 12/4	CardioRespiratory Activity Instantaneous Data Characteristic	PAMP/COL/CGGIT/CHA/BV-05-C PAMP/COL/SCN/BV-03-C PAMP/COL/SCN/BI-02-C
PAMP 12/5	CardioRespiratory Activity Summary Data Characteristic	PAMP/COL/CGGIT/CHA/BV-06-C PAMP/COL/SCI/BV-02-C PAMP/COL/SCI/BI-02-C
PAMP 12/6	Step Counter Activity Summary Data Characteristic	PAMP/COL/CGGIT/CHA/BV-07-C PAMP/COL/SCI/BV-03-C PAMP/COL/SCI/BI-03-C
PAMP 12/7	Sleep Activity Instantaneous Data Characteristic	PAMP/COL/CGGIT/CHA/BV-08-C PAMP/COL/SCN/BV-04-C PAMP/COL/SCN/BI-03-C
PAMP 12/8	Sleep Activity Summary Data Characteristic	PAMP/COL/CGGIT/CHA/BV-09-C PAMP/COL/SCI/BV-04-C PAMP/COL/SCI/BI-04-C
PAMP 12/9	Physical Activity Monitor Control Point Characteristic	PAMP/COL/CGGIT/CHA/BV-10-C PAMP/COL/PCP/BV-01-C PAMP/COL/PCP/BV-02-C PAMP/COL/SPE/BI-01-C PAMP/COL/SPE/BI-02-C PAMP/COL/SPE/BI-03-C PAMP/COL/SPE/BI-04-C PAMP/COL/SPE/BI-05-C PAMP/COL/SPE/BI-06-C PAMP/COL/SPE/BI-07-C PAMP/COL/SPE/BI-08-C PAMP/COL/SPE/BI-09-C PAMP/COL/SPE/BI-10-C PAMP/COL/SPE/BI-11-C PAMP/COL/SPE/BI-12-C PAMP/COL/SPE/BI-13-C PAMP/COL/SPE/BI-14-C PAMP/COL/SPE/BI-15-C PAMP/COL/SPE/BI-16-C
PAMP 12/10	Physical Activity Current Session Characteristic	PAMP/COL/CGGIT/CHA/BV-11-C PAMP/COL/SCI/BV-05-C PAMP/COL/SCI/BI-05-C

Item	Feature	Test Case(s)
PAMP 12/11	Physical Activity Session Descriptor Characteristic	PAMP/COL/CGGIT/CHA/BV-12-C PAMP/COL/SCI/BV-06-C PAMP/COL/SCI/BI-06-C
PAMP 11/3	User Data Service	PAMP/COL/CGGIT/SER/BV-17-C
PAMP 13/1 AND PAMP 11/3	Database Change Increment Characteristic	PAMP/COL/CGGIT/CHA/BV-19-C
PAMP 13/1 AND PAMP 11/3 AND PAMP 13/6	Database Change Increment Notification	PAMP/COL/CDWR/BV-01-C
PAMP 13/2 AND PAMP 11/3	User Control Point Characteristic	PAMP/COL/CGGIT/CHA/BV-18-C PAMP/COL/SPE/BI-17-C PAMP/COL/SPE/BI-18-C PAMP/COL/SPE/BI-19-C PAMP/COL/SPE/BI-20-C PAMP/COL/SPE/BI-21-C PAMP/COL/SPE/BI-22-C PAMP/COL/SPE/BI-23-C PAMP/COL/SPE/BI-24-C PAMP/COL/UCP/BV-01-C
PAMP 13/3 AND PAMP 11/3	User Index Characteristic	PAMP/COL/CGGIT/CHA/BV-20-C
PAMP 13/4 AND PAMP 11/3	Other UDS Characteristics	PAMP/COL/CGGIT/CHA/BV-21-C PAMP/COL/CGGIT/CHA/BV-22-C PAMP/COL/CGGIT/CHA/BV-23-C PAMP/COL/CGGIT/CHA/BV-24-C PAMP/COL/CGGIT/CHA/BV-25-C PAMP/COL/CGGIT/CHA/BV-26-C PAMP/COL/CGGIT/CHA/BV-27-C PAMP/COL/CGGIT/CHA/BV-28-C PAMP/COL/CGGIT/CHA/BV-29-C PAMP/COL/CGGIT/CHA/BV-30-C PAMP/COL/CGGIT/CHA/BV-31-C PAMP/COL/CGGIT/CHA/BV-32-C PAMP/COL/CGGIT/CHA/BV-33-C PAMP/COL/CGGIT/CHA/BV-34-C PAMP/COL/CGGIT/CHA/BV-35-C PAMP/COL/CGGIT/CHA/BV-36-C PAMP/COL/CGGIT/CHA/BV-37-C PAMP/COL/CGGIT/CHA/BV-38-C PAMP/COL/CGGIT/CHA/BV-39-C PAMP/COL/CGGIT/CHA/BV-40-C PAMP/COL/CGGIT/CHA/BV-41-C PAMP/COL/CGGIT/CHA/BV-42-C PAMP/COL/CGGIT/CHA/BV-43-C PAMP/COL/CGGIT/CHA/BV-44-C PAMP/COL/CGGIT/CHA/BV-45-C PAMP/COL/CGGIT/CHA/BV-46-C

Item	Feature	Test Case(s)
PAMP 13/4 AND PAMP 11/3 AND PAMP 11/5	Other UDS Characteristics Read/Write	PAMP/COL/CRW/BV-01-C PAMP/COL/CRW/BV-02-C PAMP/COL/CRW/BV-03-C PAMP/COL/CRW/BV-04-C PAMP/COL/CRW/BV-05-C PAMP/COL/CRW/BV-06-C PAMP/COL/CRW/BV-07-C PAMP/COL/CRW/BV-08-C PAMP/COL/CRW/BV-09-C PAMP/COL/CRW/BV-10-C PAMP/COL/CRW/BV-11-C PAMP/COL/CRW/BV-12-C PAMP/COL/CRW/BV-13-C PAMP/COL/CRW/BV-14-C PAMP/COL/CRW/BV-15-C PAMP/COL/CRW/BV-16-C PAMP/COL/CRW/BV-17-C PAMP/COL/CRW/BV-18-C PAMP/COL/CRW/BV-19-C PAMP/COL/CRW/BV-20-C PAMP/COL/CRW/BV-21-C PAMP/COL/CRW/BV-22-C PAMP/COL/CRW/BV-23-C PAMP/COL/CRW/BV-24-C PAMP/COL/CRW/BV-25-C PAMP/COL/CRW/BV-26-C
PAMP 13/5 AND PAMP 11/3 AND PAMP 11/5	User Data Synchronization Procedure	PAMP/COL/SCN/BV-01-C PAMP/COL/UCP/BV-02-C
PAMP 11/1 AND PAMP 12/9	Service Changed Characteristic	PAMP/COL/SCI/BV-07-C
PAMP 16/6 OR PAMP 16/7	Collector Pairing and Bonding	PAMP/COL/PAMF/BV-01-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	p0	2020-12-22	Approved by BTI on 2020-12-07. PAMP v1.0 adopted by BoD on 2020-12-15. Prepared for publication.
	p1r00	2023-11-01	TSE 23279 (rating 1): Converted -I tests to -C tests as appropriate; updated the TCMT and TCRL accordingly. Performed other editorials to align the document with the latest TS template, including updates to the scope, references, Test Strategy, Test groups, TCID conventions, conformance, Pass/Fail verdict conventions, and TCMT introductory text. Updated the copyright page to align with the latest version of the DNMD. Deleted draft revision history comments prior to p0.
1	p1	2024-07-01	Approved by BTI on 2024-04-21. Prepared for TCRL 2024-1 publication.

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