Physical Activity Monitor Service (PAMS)

***Bluetooth*® Test Suite**

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Contents

1 Scope

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

2 References, definitions, and abbreviations

2.1 References

This document incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereinafter.

[1] Bluetooth Core Specification v4.2 or later

[2] Bluetooth Test Strategy and Terminology Overview

[3] Physical Activity Monitor Service v1.0

[4] ICS Proforma for Physical Activity Monitor Service, PAMS.ICS

[5] GATT Test Suite, GATT.TS

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

2.2 Definitions

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

2.3 Acronyms and abbreviations

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

3 Test suite structure (TSS)

3.1 Overview

The Physical Activity Monitor Service 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.

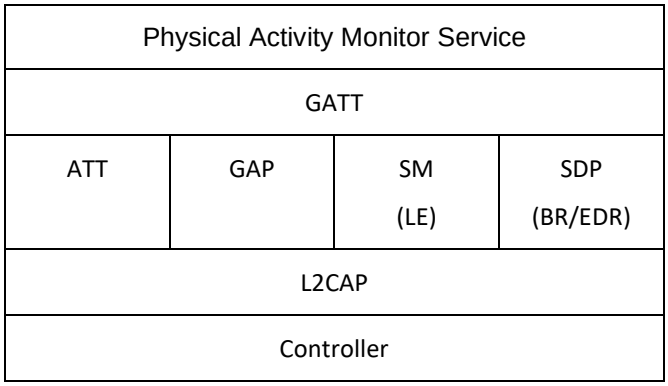

Figure 3.1: Physical Activity Monitor Service Test Model

3.2 Test strategy

The test objectives are to verify the functionality of the Physical Activity Monitor Service within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach is to cover mandatory and optional requirements in the service specification and to match these to the support of the IUT as described in the ICS. Any defined test is applicable to the IUT, if the ICS logical expression defined in the Test Case Mapping Table (TCMT) is valid.

The test equipment shall provide an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in the Physical Activity Monitor Service Test Suite. 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, an MMI, or another interface supported by the IUT.

The Physical Activity Monitor 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

  Verify that the IUT properly implements the GATT Server role for the supported service and characteristics.

- Segmentation of Data Records

  Verify that the IUT properly implements the segmentation of Data Records.

- Physical Activity Monitor Control Point Procedures

  Verify the behavior of procedures triggered by writing Op Codes to the Physical Activity Monitor Control Point characteristic.

- Service Procedure – Error Handling

  Verify that the IUT correctly handles error conditions that result from characteristic writes or failure to perform a requested operation due to rejection of the request by a Remote Device.

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

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

Additionally, testing of this specification includes tests from the GATT Test Suite [5] referred to as Generic GATT Integrated Tests (GGIT); when used, the GGIT tests are referred through a TC-ID string using the following convention <Spec abbreviation>/<IUT role>/<GGIT test group>/< GGIT class >/<xx>-<nn>-<y>.

Bolded ID parts shall appear in the order prescribed. Non-bolded ID parts (if applicable) shall appear between the bolded parts. The order of the non-bolded parts may vary from test suite to test suite, but shall be consistent within each test suite.

Identifier Abbreviation	**Spec Identifier <spec abbreviation>**
PAMS	Physical Activity Monitor Service
Identifier Abbreviation	**Role Identifier <IUT role>**
SR	PAMS Server
Identifier Abbreviation	**Reference Identifier <GGIT test group>**
SGGIT	Server Generic GATT Integrated Tests
Identifier Abbreviation	**Reference Identifier <GGIT class>**
CHA	Characteristic
SDP	Validate SDP Record
SER	Service
Identifier Abbreviation	**Feature Identifier <feat>**
PAMCP	Physical Activity Monitor Control Point Procedures
SEG	Segmentation of Data Records
SPE	Service Procedure – Error Handling

Table 4.1: PAMS TC Naming Conventions

4.1.2 Conformance

When conformance is claimed, all capabilities indicated as mandatory for this Specification shall be supported in the specified manner (process-mandatory). This also applies for all optional and conditional capabilities for which support is indicated. All mandatory capabilities, and optional and conditional capabilities for which support is indicated, are subject to verification as part of the Bluetooth Qualification Program.

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 that is 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 in order to constitute a pass verdict. However, it is noted that in order to provide a foundation for interoperability, it is necessary that a qualified implementation consistently and repeatedly pass any of the applicable tests.

In any case, where a member finds an issue with the Test Plan generated by Launch Studio, 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 errata request such that the issue may be addressed.

4.1.3 Pass/Fail verdict conventions

Each test case has an Expected Outcome section, which outlines all the detailed pass criteria conditions that shall be met by the IUT to merit a Pass Verdict.

The convention in this test suite is that, unless there is a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon as one of the pass criteria conditions cannot be met. If this occurs, the outcome of the test shall be the 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 Physical Activity Monitor Control Point

- Preamble Purpose

  This preamble procedure enables the IUT for use with the Physical Activity Monitor Control Point.

- Preamble Procedure

  1. Establish an ATT Bearer connection between the Lower Tester and the IUT as described in Section 4.2.1, if using an LE transport, or 4.2.2 if using a BR/EDR transport.
  2. The Lower Tester is acting as a Client.
  3. The handle of the Physical Activity Monitor Control Point characteristic has been previously discovered by the Lower Tester during a test procedure in Section 4.3 or is known to the Lower Tester by other means.
  4. The handle of the Client Configuration descriptor of the Physical Activity Monitor Control Point characteristic has been previously discovered by the Lower Tester during a test procedure in Section 4.3 or is known to the Lower Tester by other means.
  5. If the IUT requires bonding, then the Lower Tester performs a bonding procedure.
  6. Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Monitor Control Point characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.

4.3 Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in GATT.TS [5] Section 6.2 Server Test Procedures using Table 4.2 below as input.

- Additional Initial Condition
  - The IUT has populated the service database with at least one session and at least one sub-session and has data available.
  - The IUT is configured to send measurements to the Lower Tester.
- Additional Pass Verdict
  - All RFU bits are set to 0, and all included fields are not set to RFU values.

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
PAMS/SR/SGGIT/SER/BV-01-C [Service GGIT – Physical Activity Monitor]	Physical Activity Monitor Service	[3] 2.1	-	-	Not defined
PAMS/SR/SGGIT/CHA/BV-02-C [Characteristic GGIT – Physical Activity Monitor Features]	Physical Activity Monitor Features Characteristic	[3] 3.1	0x02 (Read)	8	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
PAMS/SR/SGGIT/CHA/BV-03-C [Characteristic GGIT – General Activity Instantaneous Data]	General Activity Instantaneous Data Characteristic	[3] 3.2	0x10 (Notify)	Up to 38	-
PAMS/SR/SGGIT/CHA/BV-04-C [Characteristic GGIT – General Activity Summary Data]	General Activity Summary Data Characteristic	[3] 3.3	0x20 (Indicate)	Up to 77	-
PAMS/SR/SGGIT/CHA/BV-05-C [Characteristic GGIT – CardioRespiratory Activity Instantaneous Data]	CardioRespiratory Activity Instantaneous Data Characteristic	[3] 3.4	0x10 (Notify)	Up to 24	-
PAMS/SR/SGGIT/CHA/BV-06-C [Characteristic GGIT – CardioRespiratory Activity Summary Data]	CardioRespiratory Activity Summary Data Characteristic	[3] 3.5	0x20 (Indicate)	Up to 62	-
PAMS/SR/SGGIT/CHA/BV-07-C [Characteristic GGIT – Step Counter Activity Summary Data]	Step Counter Activity Summary Data Characteristic	[3] 3.6	0x20 (Indicate)	Up to 29	-
PAMS/SR/SGGIT/CHA/BV-08-C [Characteristic GGIT – Sleep Activity Instantaneous Data]	Sleep Activity Instantaneous Data Characteristic	[3] 3.7	0x10 (Notify)	Up to 28	-
PAMS/SR/SGGIT/CHA/BV-09-C [Characteristic GGIT – Sleep Activity Summary Data]	Sleep Activity Summary Data Characteristic	[3] 3.8	0x20 (Indicate)	Up to 68	-
PAMS/SR/SGGIT/CHA/BV-10-C [Characteristic GGIT – Physical Activity Monitor Control Point]	Physical Activity Monitor Control Point Characteristic	[3] 3.9	0x28 (Write, Indicate)	Skip	-
PAMS/SR/SGGIT/CHA/BV-11-C [Characteristic GGIT – Physical Activity Current Session]	Physical Activity Current Session Characteristic	[3] 3.10	0x22 (Indicate, Read)	17	-
PAMS/SR/SGGIT/CHA/BV-12-C [Characteristic GGIT – Physical Activity Session Descriptor]	Physical Activity Session Descriptor Characteristic	[3] 3.11	0x20 (Indicate)	Skip	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
PAMS/SR/SGGIT/SDP/BV-13-C [SDP Record – Physical Activity Monitor Service]	Physical Activity Monitor Service	[3] 4	-	-	-

Table 4.2: Input for the GGIT Server Test Procedure

4.4 Segmentation of Data Records

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify compliant operation by characteristics that send indications or notification below and above the (ATT_MTU-3) size, which may necessitate the need to segment the Data Record into multiple indications or notifications. 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.

- Reference

  [3] 2.4

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - The handle range of each characteristic referenced in the test cases below has been previously discovered by the Lower Tester during the test procedures in Section 4.3 or is known to the Lower Tester by other means.
  - The handle of the Client Characteristic Configuration descriptor of each characteristic referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.3 or is known to the Lower Tester by other means.
  - If the IUT permissions for the characteristic require a specific security mode or security level, establish a connection meeting those requirements.
  - The Lower Tester knows the optional features supported by IUT (e.g., by executing test case PAMS/SR/SGGIT/CHA/BV-02-C [Characteristic GGIT – Physical Activity Monitor Features]).
  - The IUT is configured to send measurements to the Lower Tester.

- Test Case Configuration

Test Case	Reference
PAMS/SR/SEG/BV-01-C [Segmentation of Notifications – General Activity Instantaneous Data]	[3] 3.2.1
PAMS/SR/SEG/BV-02-C [Segmentation of Indications – General Activity Summary Data]	[3] 3.3.1
PAMS/SR/SEG/BV-03-C [Segmentation of Notifications – CardioRespiratory Activity Instantaneous Data]	[3] 3.4.1
PAMS/SR/SEG/BV-04-C [Segmentation of Indications – CardioRespiratory Activity Summary Data]	[3] 3.5.1

Test Case	Reference
PAMS/SR/SEG/BV-05-C [Segmentation of Indications – Step Counter Activity Summary Data]	[3] 3.6.1
PAMS/SR/SEG/BV-06-C [Segmentation of Notifications – Sleep Activity Instantaneous Data]	[3] 3.7.1
PAMS/SR/SEG/BV-07-C [Segmentation of Indications – Sleep Activity Summary Data]	[3] 3.8.1

Table 4.3: Segmented Indication and Notification Test Cases

- Test Procedure

  1. If the test case is for notification, enable notification by writing value 0x0001 to the Client Characteristic Configuration descriptor of the characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  2. Otherwise, if the test case is for indication, enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the characteristic.
  3. The Upper Tester orders the IUT to configure the service with data.
  4. The Upper Tester orders the IUT to generate one or more indications or notifications with the maximum set of fields.
  5. The IUT sends one or more indications or notifications of the characteristic being tested.

- Expected Outcome

  Pass verdict

  In step 5, the IUT sends one or more indications or notifications of the characteristic being tested.

  The Rolling Segment Counter increases by one for each indication or notification sent and is in the range of 0 to 63.

  In case of segmented Data Records, for each segmented Data Record:

  - The first indication or notification of the segmented Data Record shall have the First Segment bit of the Header field set to 1, the Last Segment bit set to 0, and the total number of octets set to (ATT_MTU-4).
  - The intermediate indications or notifications (that are neither first nor last), if any, shall have the First Segment bit and the Last Segment bit of the Header field both set to 0, and the total number of octets set to (ATT_MTU-4).
  - The last indication or notification of the segmented Data Record shall have the First Segment bit of the Header field set to 0 and the Last Segment bit set to 1.

  In case of non-segmented Data Records, the First Segment bit and the Last Segment bit of the Header field shall be set to 1, signifying that the entire Data Record fit within one indication or notification.

  The mandatory fields shall be included in the indication or notification.

  The optional fields included in the indication or notification shall have the corresponding bit in the Physical Activity Monitor Features characteristic set to 1.

  The optional fields included in any segment of the indication or notification shall have the associated bit of the Flags field set to 1; otherwise, the associated bit shall be set to 0.

4.5 Physical Activity Monitor Control Point Procedures

This test group tests the Physical Activity Monitor Control Point procedures.

PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]

- Test Purpose

  Verify that the IUT will respond to setting the Enquire Sessions Op Code and update all required characteristics and data values in the Physical Activity Session Descriptor characteristic.

- Reference

  [3] 3.9.1.1, 3.9.1.1.1

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The IUT has populated the service database with any number of sessions and sub-sessions.

- Test Procedure

  1. The Lower Tester writes the Enquire Sessions Op Code value of 0x01 with zero parameters to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The IUT sends one indication of the Physical Activity Monitor Control Point characteristic and one or more indications of the Physical Activity Session Descriptor characteristic.

- Expected Outcome

  Pass verdict

  In step 3, the IUT sends an indication of the Physical Activity Monitor Control Point characteristic containing a structure with the Op Code field set to the value Enquire Session Success Response (0xFC) and the Parameter field set to a non-RFU number of reported sessions.

  In step 3, the IUT sends a number of indications of the Physical Activity Session Descriptor characteristic equal to the Number of reported sessions.

  The indications have the Describes Session bit of the Flags field set to 1, all RFU bits set to 0, and the mandatory fields populated.

PAMS/SR/PAMCP/BV-02-C [Enquire Sub-Sessions Procedure]

- Test Purpose

  Verify that the IUT will respond to setting the Enquire Sub-Sessions Op Code and update all required characteristics and data values in the Physical Activity Session Descriptor characteristic.

- Reference

  [3] 3.9.1.1, 3.9.1.1.2

- Initial Condition
  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The value of a session that has sub-sessions has been previously discovered by the Lower Tester during the test procedure in the PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure] test case or is known to the Lower Tester by other means.
- Test Procedure
  1. The Lower Tester writes the Enquire Sub-sessions Op Code value of 0x02 and a Session ID parameter value of the known session on the IUT to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The IUT sends one indication of the Physical Activity Monitor Control Point characteristic and one or more indications of the Physical Activity Session Descriptor characteristic.
- Expected Outcome

  Pass verdict

  In step 3, the IUT sends an indication of the Physical Activity Monitor Control Point characteristic containing a structure with the Op Code field set to the value Enquire Sub-sessions Success Response (0xFB) and the Parameter field set to a non-RFU number of reported sub-sessions.

  In step 3, the IUT sends a number of indications of the Physical Activity Session Descriptor characteristic equal to the Number of reported sub-sessions.

  The indications have the Describes Session bit of the Flags field set to 0, and the mandatory fields are populated.

PAMS/SR/PAMCP/BV-03-C [Start Session/Sub-session Procedure]

- Test Purpose

  Verify that the IUT will respond to setting the Start Session/Sub-session Op Code and the Type parameter, starting a new session/sub-session, and updating all the required characteristics and data values in the Physical Activity Current Session characteristic.

- Reference

  [3] 3.9.1.1, 3.9.1.1.4

- Initial Condition
  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Current Session characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.

- The IUT has populated the service database with any number of sessions and sub-sessions.
- The IUT has no session running.

- Test Procedure

  1. The Lower Tester writes the Start Session/Sub-session Op Code value of 0x04 and a Type parameter value of 0x00 to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The IUT sends one indication of the Physical Activity Current Session characteristic.
  4. The Lower Tester writes the Start Session/Sub-session Op Code value of 0x04 and a Type parameter value of 0x01 to the Physical Activity Monitor Control Point characteristic.
  5. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  6. The IUT sends one indication of the Physical Activity Current Session characteristic.

- Expected Outcome

  Pass verdict

  In step 3, the IUT sends one indication of the Physical Activity Current Session characteristic with the Session Running bit of the Flags field set to 1 and the mandatory fields populated.

  In step 6, the IUT sends one indication of the Physical Activity Current Session characteristic with the Session Running bit of the Flags field set to 1, a Sub-session ID different than the one received in the previous Physical Activity Current Session characteristic, and the mandatory fields populated.

PAMS/SR/PAMCP/BV-04-C [Stop Session Procedure]

- Test Purpose

  Verify that the IUT will respond to setting the Stop Session Op Code and stop the current session and update all required characteristics and data values in the Physical Activity Current Session characteristic.

- Reference

  [3] 3.9.1.1, 3.9.1.1.5

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Current Session characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The IUT has a session running (e.g., by executing test case PAMS/SR/PAMCP/BV-03-C [Start Session/Sub-session Procedure]).

- Test Procedure

  1. The Lower Tester writes the Stop Session Op Code value of 0x05 with zero parameters on the IUT to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The IUT sends one indication of the Physical Activity Current Session characteristic.

- Expected Outcome

  Pass verdict

  In step 3, the IUT sends an indication of the Physical Activity Current Session characteristic with the Session Running bit of the Flags field set to 0 and the mandatory fields populated.

4.5.1 Get Ended Session Data Procedure

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the IUT will respond to setting the Get Ended Session Data Op Code and update all required characteristics and data values. 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.

- Reference

  [3] 3.9.1.1, 3.9.1.1.3

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - The IUT has an ended session that has stored session data (e.g., by executing test case PAMS/SR/PAMCP/BV-04-C [Stop Session Procedure]).
  - The Session ID of the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.
  - The list of sub-sessions associated to the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-02-C [Enquire Sub-Sessions Procedure]) or is known to the Lower Tester by other means.
  - The IUT is configured to send measurements to the Lower Tester.

- Test Case Configuration

Test Case	Property	Data Characteristic
PAMS/SR/PAMCP/BV-05-C [Get Ended Session Data – General Activity Instantaneous Data]	Notify	0x00
PAMS/SR/PAMCP/BV-06-C [Get Ended Session Data – General Activity Summary Data]	Indicate	0x01
PAMS/SR/PAMCP/BV-07-C [Get Ended Session Data – CardioRespiratory Activity Instantaneous Data]	Notify	0x02
PAMS/SR/PAMCP/BV-08-C [Get Ended Session Data – CardioRespiratory Activity Summary Data]	Indicate	0x03
PAMS/SR/PAMCP/BV-09-C [Get Ended Session Data – Step Counter Activity Summary Data]	Indicate	0x04
PAMS/SR/PAMCP/BV-10-C [Get Ended Session Data – Sleep Activity Instantaneous Data]	Notify	0x05

Test Case	Property	Data Characteristic
PAMS/SR/PAMCP/BV-11-C [Get Ended Session Data – Sleep Activity Summary Data]	Indicate	0x06

Table 4.4: Get Ended Session Data Procedure Test Cases

- Test Procedure

  1. If the test case is for notification, enable notification by writing value 0x0001 to the Client Characteristic Configuration descriptor of the characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  2. Otherwise, if the test case is for indication, enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the characteristic.
  3. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of the ended session, a Sub-session ID value from the ended session, and Data Characteristic value from Table 4.4 to the Physical Activity Monitor Control Point characteristic.
  4. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  5. In less than 30 seconds from receiving the *ATT_Write_Request* from step 3, the IUT starts sending:

     a. One or more indications if the Property value from Table 4.4 is set to “Indicate”. If more than one indication is being sent, the time between the *ATT_Handle_Value_Confirmation* sent by the Lower Tester and the following indication sent by the IUT is less than 30 seconds.

     b. One or more notifications if the Property value from Table 4.4 is set to “Notify”. If more than one notification is being sent, the time between notifications is less than 30 seconds.

  6. In less than 30 seconds from the last *ATT_Handle_Value_Confirmation* sent by the Lower Tester or notification sent by the IUT, the IUT sends one indication of the Physical Activity Monitor Control Point characteristic.
  7. Repeat steps 3–6 with the Sub-session ID value of 0xFFFF.

- Expected Outcome

  Pass verdict

  In steps 6 and 7, the IUT sends an indication of the Physical Activity Monitor Control Point characteristic containing a structure with the Op Code field set to the value Get Ended Session Data Success Response (0xFA) and the Parameter field set to a non-RFU number of reported Data Records.

  In steps 5 and 7, the IUT sends one or more indications or notifications depending on the requested data characteristic with the specified Session ID and Sub-session ID values, and the mandatory fields populated in the Data Record.

PAMS/SR/PAMCP/BV-12-C [Delete Ended Session Procedure]

- Test Purpose

  Verify that the IUT will respond to setting the Delete Ended Session Op Code, delete the requested session, and update all the required values in the Physical Activity Session Descriptor characteristic.

- Reference

  [3] 3.9.1.1, 3.9.1.1.6

- Initial Condition
  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The IUT has an ended session (e.g., by executing test case PAMS/SR/PAMCP/BV-04-C [Stop Session Procedure]).
  - The Session ID of the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.
- Test Procedure
  1. The Lower Tester writes the Delete Ended Session Op Code value of 0x06 and the Session ID value of the ended session to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
  3. The IUT sends one indication of the Physical Activity Session Descriptor characteristic.
- Expected Outcome

  Pass verdict

  In step 3, the IUT sends an indication of the Physical Activity Session Descriptor characteristic.

  The indication has the same Session ID from step 1, the Deleted Session bit of the Flags field set to 1, and the mandatory fields populated.

PAMS/SR/PAMCP/BV-13-C [Set Average Activity Type Procedure]

- Test Purpose

  Verify that the IUT will respond to setting the Set Average Activity Type Op Code and update all required characteristic and data values in the General Activity Summary Data characteristic.

- Reference

  [3] 3.9.1.1, 3.9.1.1.7

- Initial Condition
  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Current Session characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the General Activity Summary Data characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.

- The IUT has a session running with at least two sub-sessions that have stored session data (e.g., by executing test case PAMS/SR/PAMCP/BV-03-C [Start Session/Sub-session Procedure]).
- The IUT is configured to send measurements to the Lower Tester.

- Test Procedure

1. The Lower Tester writes the Set Average Activity Type Op Code value of 0x07 with a Scope parameter value of 0x01 and User-Defined Activity Type parameter value of 0x0E on the IUT to the Physical Activity Monitor Control Point characteristic.
2. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
3. The Lower Tester writes the Stop Session Op Code value of 0x05 with zero parameters on the IUT to the Physical Activity Monitor Control Point characteristic.
4. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
5. The IUT sends one indication of the Physical Activity Current Session characteristic.
6. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of the ended session (received in step 5), a Sub-session ID value of 0xFFFF, and Data Characteristic value of 0x01 to the Physical Activity Monitor Control Point characteristic.
7. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
8. In less than 30 seconds from receiving the *ATT_Write_Request* from step 6, the IUT starts sending one or more indications of the General Activity Summary Data characteristic. If more than one indication is sent, the time between the *ATT_Handle_Value_Confirmation* sent by the Lower Tester and the following indication sent by the IUT is less than 30 seconds.
9. In less than 30 seconds from the last *ATT_Handle_Value_Confirmation* sent by the Lower Tester, the IUT sends one indication of the Physical Activity Monitor Control Point characteristic.
10. The Lower Tester writes the Start Session/Sub-session Op Code value of 0x04 and a Type parameter value of 0x00 to the Physical Activity Monitor Control Point characteristic.
11. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
12. The IUT sends one indication of the Physical Activity Current Session characteristic.
13. The Lower Tester waits 30 seconds or until data is available for the current sub-session.
14. The Lower Tester writes the Start Session/Sub-session Op Code value of 0x04 and a Type parameter value of 0x01 to the Physical Activity Monitor Control Point characteristic.
15. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
16. The IUT sends one indication of the Physical Activity Current Session characteristic.
17. The Lower Tester writes the Set Average Activity Type Op Code value of 0x07 with a Scope parameter value of 0x00 and User-Defined Activity Type parameter value of 0xFF on the IUT to the Physical Activity Monitor Control Point characteristic.
18. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
19. The Lower Tester waits 30 seconds or until data is available for the current sub-session.
20. The Lower Tester writes the Stop Session Op Code value of 0x05 with zero parameters on the IUT to the Physical Activity Monitor Control Point characteristic.
21. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
22. The IUT sends one indication of the Physical Activity Current Session characteristic.
23. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of the ended session (received in step 22), a Sub-session ID value of 0xFFFF, and Data Characteristic value of 0x01 to the Physical Activity Monitor Control Point characteristic.
24. The IUT sends an *ATT_Write_Response* indicating that it has accepted the Op Code.
25. In less than 30 seconds from receiving the *ATT_Write_Request* from step 23, the IUT starts sending one or more indications of the General Activity Summary Data characteristic. If more than one indication is sent, the time between the *ATT_Handle_Value_Confirmation* sent by the Lower Tester and the following indication sent by the IUT is less than 30 seconds.

26. In less than 30 seconds from the last *ATT_Handle_Value_Confirmation* sent by the Lower Tester, the IUT sends one indication of the Physical Activity Monitor Control Point characteristic.

- Expected Outcome

  Pass verdict

  In step 8, the IUT sends one or more indications of the General Activity Summary Data characteristic.

  Each indication shall have the Average Activity Type field set to the same value as the one used in step 1.

  In step 25, the IUT sends one or more indications of the General Activity Summary Data characteristic.

  The indication(s) with the same Sub-session ID as the one received in the Physical Activity Current Session characteristic in step 16 shall have the Average Activity Type field set to the same value as the one used in step 17; the other(s) shall have the Average Activity Type field set to 0x00.

4.6 Service Procedure Error Handling

Test group for testing error handling behavior for Physical Activity Monitor Control Point procedures.

PAMS/SR/SPE/BV-01-C [Op Code Not Supported]

- Test Purpose

  Verify that the IUT will respond to setting an Op Code that is not supported by the server or is within a range that is RFU.

- Reference

  [3] 3.9.3.2.1

- Initial Condition

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

- Test Procedure

  1. The Lower Tester writes an Op Code set to an RFU value to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Op Code Not Supported” value of 0x80.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “Op Code Not Supported” to the Lower Tester.

PAMS/SR/SPE/BV-02-C [Invalid Session ID]

- Test Purpose

  Verify that the IUT will respond to calling a Control Point procedure Op Code, with an invalid Session ID or a Session ID that is within an RFU range, with an Invalid Session ID Error Response.

- Reference

  [3] 3.9.3.2.2

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The list of sessions has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.

- Test Procedure

  1. The Lower Tester writes the Enquire Sub-sessions Op Code value of 0x02 with an invalid Session ID parameter on the IUT to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Invalid Session ID” value of 0x81.
  3. The Lower Tester writes the Delete Ended Session Op Code value of 0x06 with an invalid Session ID parameter on the IUT to the Physical Activity Monitor Control Point characteristic.
  4. The IUT sends an *ATT_Application_Error* with error code “Invalid Session ID” value of 0x81.
  5. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID set to an RFU value, and valid Sub-session ID and Data Characteristic values.
  6. The IUT sends an *ATT_Application_Error* with error code “Invalid Session ID” value of 0x81.

- Expected Outcome

  Pass verdict

  In steps 1, 3, and 6, the IUT sends an error response of “Invalid Session ID” to the Lower Tester.

PAMS/SR/SPE/BV-03-C [Invalid Sub-session ID]

- Test Purpose

  Verify that the IUT will respond to calling a Control Point procedure Op Code with an invalid Sub-session ID that is not recognized by the server with an Invalid Sub-session ID error response.

- Reference

  [3] 3.9.3.2.3

- Initial Condition

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

- Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the General Activity Summary Data characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
- The IUT has an ended session (e.g., by executing test case PAMS/SR/PAMCP/BV-04-C [Stop Session Procedure]).
- The Session ID of the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.
- The list of sub-sessions associated to the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-02-C [Enquire Sub-Sessions Procedure]) or is known to the Lower Tester by other means.

- Test Procedure

  1. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of the ended session, an invalid Sub-session ID value, and a Data Characteristic value of 0x01 to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Invalid Sub-session ID” value of 0x82.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “Invalid Sub-session ID” to the Lower Tester.

PAMS/SR/SPE/BV-04-C [Session Still Running]

- Test Purpose

  Verify that the IUT will respond to calling the Get Ended Session Data or Delete Ended Session procedure with a Session ID that refers to a session that has not ended with a Session Still Running error response.

- Reference

  [3] 3.9.3.2.4

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the General Activity Summary Data characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The IUT has a running session (e.g., by executing test case PAMS/SR/PAMCP/BV-03-C [Start Session/Sub-session Procedure]).
  - The Session ID of the running session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.

- The list of sub-sessions associated to the running session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-02-C [Enquire Sub-Sessions Procedure]) or is known to the Lower Tester by other means.

- Test Procedure

  1. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of a running session, a valid Sub-session ID value, and a Data Characteristic value of 0x01 to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Session Still Running” value of 0x83.
  3. The Lower Tester writes the Delete Ended Session Op Code value of 0x06 with a Session ID of a running session to the Physical Activity Monitor Control Point characteristic.
  4. The IUT sends an *ATT_Application_Error* with error code “Session Still Running” value of 0x83.

- Expected Outcome

  Pass verdict

  In steps 1 and 3, the IUT sends an error response of “Session Still Running” to the Lower Tester.

PAMS/SR/SPE/BV-05-C [No Data Available]

- Test Purpose

  Verify that the IUT will respond to calling the Get Ended Session Data procedure if the server has no data stored in the server database that matches the parameter values with a No Data Available Error Response.

- Reference

  [3] 3.9.3.2.5

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the General Activity Summary Data characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The IUT has an ended session that is cleared of all session data.
  - The Session ID of the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.
  - The list of sub-sessions associated to the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-02-C [Enquire Sub-Sessions Procedure]) or is known to the Lower Tester by other means.

- Test Procedure

  1. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of the ended session, a valid Sub-session ID value, and a Data Characteristic value of 0x01 to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “No Data Available” value of 0x84.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “No Data Available” to the Lower Tester.

PAMS/SR/SPE/BV-06-C [No Sessions Available]

- Test Purpose

  Verify that the IUT will respond to calling the Enquire Sessions procedure if the server has no sessions stored in the server database with a No Sessions Available error response.

- Reference

  [3] 3.9.3.2.6

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.

- Test Procedure

  1. The Lower Tester writes the Enquire Sessions Op Code value of 0x01 with zero parameters to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “No Sessions Available” value of 0x85 if there are no sessions or one indication of the Physical Activity Monitor Control Point characteristic and one or more indications of the Physical Activity Session Descriptor characteristic, otherwise. If the indications were received, continue to step 3.
  3. If there is any session running, stop it (e.g., by executing test case PAMS/SR/PAMCP/BV-04-C [Stop Session Procedure]).
  4. Delete all sessions known from step 2 (e.g., by executing test case PAMS/SR/PAMCP/BV-12-C [Delete Ended Session Procedure]).
  5. The Lower Tester writes the Enquire Sessions Op Code value of 0x01 with zero parameters to the Physical Activity Monitor Control Point characteristic.
  6. The IUT sends an *ATT_Application_Error* with error code “No Sessions Available” value of 0x85.

- Expected Outcome

  Pass verdict

  In step 2, the IUT sends an error response of “No Sessions Available” to the Lower Tester, if there are no sessions.

  In step 6, the IUT sends an error response of “No Sessions Available” to the Lower Tester.

PAMS/SR/SPE/BV-07-C [Invalid Type]

- Test Purpose

  Verify that the IUT will respond to calling the Start Session/Sub-Session procedure if the Type parameter value is in the RFU value range with an Invalid Type error response.

- Reference

  [3] 3.9.3.2.7

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Current Session characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.

- Test Procedure

  1. The Lower Tester writes the Start Session/Sub-session Op Code value of 0x04 and a Type parameter with an RFU value to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Invalid Type” value of 0x86.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “Invalid Type” to the Lower Tester.

PAMS/SR/SPE/BV-08-C [No Session Running]

- Test Purpose

  Verify that the IUT will respond to calling the Start Session/Sub-Session procedure if the request cannot be executed due to no session being currently running with a No Session Running error response.

- Reference

  [3] 3.9.3.2.8

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.

- Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Current Session characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
- There is no session running on the IUT.

- Test Procedure

  1. The Lower Tester writes the Start Session/Sub-session Op Code value of 0x04 and a Type parameter value of 0x01 to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “No Session Running” value of 0x87.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “No Session Running” to the Lower Tester.

PAMS/SR/SPE/BV-09-C [Nothing To Stop]

- Test Purpose

  Verify that the IUT will respond to calling the Stop Session procedure, if the request cannot be executed since there is no session running that could be stopped, with a “Nothing To Stop” error response.

- Reference

  [3] 3.9.3.2.9

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The list of sessions has been previously discovered by the Lower Tester during the test procedure in the PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure] test case or is known to the Lower Tester by other means.
  - There is no session running on the IUT.

- Test Procedure

  1. The Lower Tester writes the Stop Session Op Code value of 0x05 with zero parameters on the IUT to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Nothing To Stop” value of 0x88.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “Nothing To Stop” to the Lower Tester.

PAMS/SR/SPE/BV-10-C [Operation Failed]

- Test Purpose

  Verify that the IUT will respond to calling the Get Ended Session Data procedure if the Data Characteristic parameter value received is in the RFU value range with an Operation Failed error response.

- Reference

  [3] 3.9.3.2.11

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  - The IUT has an ended session (e.g., by executing test case PAMS/SR/PAMCP/BV-04-C [Stop Session Procedure]).
  - The Session ID of the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.

- Test Procedure

  1. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of the ended session, a Sub-session ID value of 0xFFFF, and a Data Characteristic parameter set to an RFU value to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Operation Failed” value of 0x8A.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “Operation Failed” to the Lower Tester.

PAMS/SR/SPE/BV-11-C [Enquire Sessions CCCD Error]

- Test Purpose

  Verify that the IUT will respond with a “Client Characteristic Configuration Descriptor Improperly Configured” error response when it receives the Enquire Sessions Op Code, if the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic or Physical Activity Monitor Control Point characteristic are not configured for indications.

- Reference

  [3] 3.9.1.1.1

- Initial Condition
  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - The IUT has populated the service database with any number of sessions and sub-sessions.
- Test Procedure
  1. The Lower Tester writes the Enquire Sessions Op Code value of 0x01 with zero parameters to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” value of 0xFD.
  3. Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  4. Disable indication by writing value 0x0000 to the Client Characteristic Configuration descriptor of the Physical Activity Monitor Control Point characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  5. The Lower Tester writes the Enquire Sessions Op Code value of 0x01 with zero parameters to the Physical Activity Monitor Control Point characteristic.
  6. The IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” value of 0xFD.
- Expected Outcome

  Pass verdict

  In steps 2 and 6, the IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” to the Lower Tester.

PAMS/SR/SPE/BV-12-C [Enquire Sub-sessions CCCD Error]

- Test Purpose

  Verify that the IUT will respond with a “Client Characteristic Configuration Descriptor Improperly Configured” error response when it receives the Enquire Sub-sessions Op Code, if the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic or Physical Activity Monitor Control Point characteristic are not configured for indications.

- Reference

  [3] 3.9.1.1.2

- Initial Condition
  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - The value of a session that has sub-sessions has been previously discovered by the Lower Tester during the test procedure in the PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure] test case or is known to the Lower Tester by other means.

- Test Procedure

  1. The Lower Tester writes the Enquire Sub-sessions Op Code value of 0x02 and a Session ID parameter value of a session on the IUT to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” value of 0xFD.
  3. Enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  4. Disable indication by writing value 0x0000 to the Client Characteristic Configuration descriptor of the Physical Activity Monitor Control Point characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
  5. The Lower Tester writes the Enquire Sub-sessions Op Code value of 0x02 and a Session ID parameter value of a session on the IUT to the Physical Activity Monitor Control Point characteristic.
  6. The IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” value of 0xFD.

- Expected Outcome

  Pass verdict

  In steps 2 and 6, the IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” to the Lower Tester.

4.6.1 Get Ended Session Data CCCD Error

- Test Purpose

  This test group is for generic use and contains one or more test cases to verify that the IUT will respond with a “Client Characteristic Configuration Descriptor Improperly Configured” error response when it receives the Get Ended Session Data Op Code, if the Client Characteristic Configuration descriptor of the characteristic specified by the Data Characteristic parameter is not configured for indications or notifications, or the Physical Activity Monitor Control Point characteristic is not configured for indications. 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.

- Reference

  [3] 3.9.1.1.3

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - The IUT has an ended session (e.g., by executing test case PAMS/SR/PAMCP/BV-04-C [Stop Session Procedure]).
  - The Session ID of the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.

- The list of sub-sessions associated to the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-02-C [Enquire Sub-Sessions Procedure]) or is known to the Lower Tester by other means.

- Test Case Configuration

Test Case	Property	Data Characteristic
PAMS/SR/SPE/BV-13-C [Get Ended Session Data CCCD Error – General Activity Instantaneous Data]	Notify	0x00
PAMS/SR/SPE/BV-14-C [Get Ended Session Data CCCD Error – General Activity Summary Data]	Indicate	0x01
PAMS/SR/SPE/BV-15-C [Get Ended Session Data CCCD Error – CardioRespiratory Activity Instantaneous Data]	Notify	0x02
PAMS/SR/SPE/BV-16-C [Get Ended Session Data CCCD Error – CardioRespiratory Activity Summary Data]	Indicate	0x03
PAMS/SR/SPE/BV-17-C [Get Ended Session Data CCCD Error – Step Counter Activity Summary Data]	Indicate	0x04
PAMS/SR/SPE/BV-18-C [Get Ended Session Data CCCD Error – Sleep Activity Instantaneous Data]	Notify	0x05
PAMS/SR/SPE/BV-19-C [Get Ended Session Data CCCD Error – Sleep Activity Summary Data]	Indicate	0x06

Table 4.5: Get Ended Session Data CCCD Error Test Cases

- Test Procedure

1. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of the ended session, a Sub-session ID value from the ended session, and a Data Characteristic value from Table 4.5 to the Physical Activity Monitor Control Point characteristic.
2. The IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” value of 0xFD.
3. If the test case is for notification, enable notification by writing value 0x0001 to the Client Characteristic Configuration descriptor of the characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
4. Otherwise, if the test case is for indication, enable indication by writing value 0x0002 to the Client Characteristic Configuration descriptor of the characteristic.
5. Disable indication by writing value 0x0000 to the Client Characteristic Configuration descriptor of the Physical Activity Monitor Control Point characteristic using the test procedure in GATT.TS [5] GATT/SR/GAW/BV-08-C.
6. The Lower Tester writes the Get Ended Session Data Op Code value of 0x03, the Session ID of the ended session, a Sub-session ID value from the ended session, and a Data Characteristic value from Table 4.5 to the Physical Activity Monitor Control Point characteristic.
7. The IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” value of 0xFD.

- Expected Outcome

Pass verdict

In steps 2 and 7, the IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” to the Lower Tester.

PAMS/SR/SPE/BV-20-C [Delete Ended Session Procedure CCCD Error]

- Test Purpose

  Verify that the IUT will respond with a “Client Characteristic Configuration Descriptor Improperly Configured” error response when it receives the Delete Ended Session Op Code, if the Client Characteristic Configuration descriptor of the Physical Activity Session Descriptor characteristic is not configured for indications.

- Reference

  [3] 3.9.1.1.6

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - The IUT has an ended session (e.g., by executing test case PAMS/SR/PAMCP/BV-04-C [Stop Session Procedure]).
  - The Session ID of the ended session has been previously discovered by the Lower Tester (e.g., by executing test case PAMS/SR/PAMCP/BV-01-C [Enquire Sessions Procedure]) or is known to the Lower Tester by other means.

- Test Procedure

  1. The Lower Tester writes the Delete Ended Session Op Code value of 0x06 and the Session ID value of the ended session to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” value of 0xFD.

- Expected Outcome

  Pass verdict

  In step 2, the IUT sends an ATT error response of “Client Characteristic Configuration Descriptor Improperly Configured” to the Lower Tester.

PAMS/SR/SPE/BV-21-C [Set Average Activity – Invalid Type]

- Test Purpose

  Verify that the IUT will respond to calling the Set Average Activity Type procedure if the Scope parameter value received is in the RFU value range with an Invalid Type error response.

- Reference

  [3] 3.9.3.2.7

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - The IUT has a session running (e.g., by executing test case PAMS/SR/PAMCP/BV-03-C [Start Session/Sub-session Procedure]).

- Test Procedure

  1. The Lower Tester writes the Set Average Activity Type Op Code value of 0x07 with a Scope parameter set to an RFU value and User-Defined Activity Type parameter value of 0x0E on the IUT to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Invalid Type” value of 0x86.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “Invalid Type” to the Lower Tester.

PAMS/SR/SPE/BV-22-C [Activity Type Out Of Range]

- Test Purpose

  Verify that the IUT will respond to calling the Set Average Activity Type procedure if the User-Defined Activity Type parameter value received is in the RFU value range with an Activity Type Out Of Range Error Response.

- Reference

  [3] 3.9.3.2.10

- Initial Condition

  - Enable the IUT for use with the Physical Activity Monitor Control Point by performing the preamble described in Section 4.2.3.
  - The IUT has a session running (e.g., by executing test case PAMS/SR/PAMCP/BV-03-C [Start Session/Sub-session Procedure]).

- Test Procedure

  1. The Lower Tester writes the Set Average Activity Type Op Code value of 0x07 with a Scope parameter value of 0x01 and User-Defined Activity Type parameter set to an RFU value on the IUT to the Physical Activity Monitor Control Point characteristic.
  2. The IUT sends an *ATT_Application_Error* with error code “Activity Type Out Of Range” value of 0x89.

- Expected Outcome

  Pass verdict

  The IUT sends an error response of “Activity Type Out Of Range” to the Lower Tester.

5 Test Case Mapping

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

The columns for the TCMT are defined as follows:

Item: Contains a logical expression based on specific entries from the associated ICS document. Contains a logical expression (using the operators AND, OR, NOT as needed) based on specific entries from the applicable ICS document(s). The entries are in the form of y/x references, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS document for Physical Activity Monitor Service (PAMS.ICS) [4].

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

Test Case(s): The applicable test case identifiers required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported.

For the purpose and structure of the ICS/IXIT and instructions for completing the ICS/IXIT, refer to the Bluetooth ICS and IXIT Proforma document.

Item	Feature	Test Case(s)
PAMS 3/1	Physical Activity Monitor Service	PAMS/SR/SGGIT/SER/BV-01-C
PAMS 3/2	Physical Activity Monitor Features Characteristic	PAMS/SR/SGGIT/CHA/BV-02-C
PAMS 3/3	General Activity Instantaneous Data Characteristic	PAMS/SR/SGGIT/CHA/BV-03-C PAMS/SR/SEG/BV-01-C
PAMS 3/4	General Activity Summary Data Characteristic	PAMS/SR/SGGIT/CHA/BV-04-C PAMS/SR/SEG/BV-02-C
PAMS 3/5	CardioRespiratory Activity Instantaneous Data Characteristic	PAMS/SR/SGGIT/CHA/BV-05-C PAMS/SR/SEG/BV-03-C
PAMS 3/6	CardioRespiratory Activity Summary Data Characteristic	PAMS/SR/SGGIT/CHA/BV-06-C PAMS/SR/SEG/BV-04-C
PAMS 3/7	Step Counter Activity Summary Data Characteristic	PAMS/SR/SGGIT/CHA/BV-07-C PAMS/SR/SEG/BV-05-C
PAMS 3/8	Sleep Activity Instantaneous Data Characteristic	PAMS/SR/SGGIT/CHA/BV-08-C PAMS/SR/SEG/BV-06-C
PAMS 3/9	Sleep Activity Summary Data Characteristic	PAMS/SR/SGGIT/CHA/BV-09-C PAMS/SR/SEG/BV-07-C
PAMS 3/10	Physical Activity Monitor Control Point Characteristic	PAMS/SR/SGGIT/CHA/BV-10-C PAMS/SR/SPE/BV-01-C PAMS/SR/SPE/BV-10-C
PAMS 4/1	Enquire Sessions	PAMS/SR/PAMCP/BV-01-C PAMS/SR/SPE/BV-02-C PAMS/SR/SPE/BV-06-C PAMS/SR/SPE/BV-11-C

Item	Feature	Test Case(s)
PAMS 4/2	Enquire Sub-sessions	PAMS/SR/PAMCP/BV-02-C PAMS/SR/SPE/BV-03-C PAMS/SR/SPE/BV-12-C
PAMS 4/3 AND PAMS 3/3	Get Ended Session Data – General Activity Instantaneous Data	PAMS/SR/PAMCP/BV-05-C PAMS/SR/SPE/BV-13-C
PAMS 4/3 AND PAMS 3/4	Get Ended Session Data – General Activity Summary Data	PAMS/SR/PAMCP/BV-06-C PAMS/SR/SPE/BV-04-C PAMS/SR/SPE/BV-05-C PAMS/SR/SPE/BV-14-C
PAMS 4/3 AND PAMS 3/5	Get Ended Session Data – CardioRespiratory Activity Instantaneous Data	PAMS/SR/PAMCP/BV-07-C PAMS/SR/SPE/BV-15-C
PAMS 4/3 AND PAMS 3/6	Get Ended Session Data – CardioRespiratory Activity Summary Data	PAMS/SR/PAMCP/BV-08-C PAMS/SR/SPE/BV-16-C
PAMS 4/3 AND PAMS 3/7	Get Ended Session Data – Step Counter Activity Summary Data	PAMS/SR/PAMCP/BV-09-C PAMS/SR/SPE/BV-17-C
PAMS 4/3 AND PAMS 3/8	Get Ended Session Data – Sleep Activity Instantaneous Data	PAMS/SR/PAMCP/BV-10-C PAMS/SR/SPE/BV-18-C
PAMS 4/3 AND PAMS 3/9	Get Ended Session Data – Sleep Activity Summary Data	PAMS/SR/PAMCP/BV-11-C PAMS/SR/SPE/BV-19-C
PAMS 4/4	Start Session/Sub-session	PAMS/SR/PAMCP/BV-03-C PAMS/SR/SPE/BV-07-C PAMS/SR/SPE/BV-08-C
PAMS 4/5	Stop Session	PAMS/SR/PAMCP/BV-04-C PAMS/SR/SPE/BV-09-C
PAMS 4/6	Delete Ended Session	PAMS/SR/PAMCP/BV-12-C PAMS/SR/SPE/BV-20-C
PAMS 4/7 AND PAMS 2/25	Set Average Activity Type	PAMS/SR/PAMCP/BV-13-C PAMS/SR/SPE/BV-21-C PAMS/SR/SPE/BV-22-C
PAMS 3/11	Physical Activity Current Session Characteristic	PAMS/SR/SGGIT/CHA/BV-11-C
PAMS 3/12	Physical Activity Session Descriptor Characteristic	PAMS/SR/SGGIT/CHA/BV-12-C
PAMS 1/1	Service Supported over BR/EDR	PAMS/SR/SGGIT/SDP/BV-13-C

Table 5.1: Test Case Mapping Table

6 Revision History and Contributors

Revision History

Publication Number	Revision Number	Date	Comments
	D09r01–r10	2019-01-15 – 2019-11-06	Added references, test procedures, and pass verdicts where they were missing in previous revision. Consolidated tests to remove redundant test coverage. Reorganized test groups. Updated Test Case Mapping Table. Integrated GGIT. Deleted PAMS/SR/SPE/BV-10-C and renumber TCs. Updated TCMT. Updated references. Updated to the new template. Removed PAMS/SR/SD/BV-01-C because it is already covered by PAMS/SR/SGGIT/SER/BV-01-C based on GATT.TS TSE 11466. ERRATA 12174: • Fixed length for Current Session characteristic. ERRATA 12165: • Updated test procedure for PAMS/SR/PAMCP/BV-03-C and PAMS/SR/PAMCP/BV-13-C test cases. ERRATA 12182: • Updated initial condition for Generic GATT Integrated Tests test group, Segmentation of Data Records test group, Get Ended Session Data Procedure test group and PAMS/SR/PAMCP/BV-13-C. ERRATA 12398: • Updated test procedure and pass verdict for Get Ended Session Data Procedure test group and PAMS/SR/PAMCP/BV-13-C. ERRATA 12400: • Added new test case PAMS/SR/SPE/BV-22-C. ERRATA 12401: • Added new test case PAMS/SR/SPE/BV-21-C. • Updated test procedure for PAMS/SR/SPE/BV-10-C.

Publication Number	Revision Number	Date	Comments
			ERRATA 12819: • Renumbered TCMT items. ERRATA 12821: • Updated the Pass Verdict for 4.4 Segmentation of Data Records test group. ERRATA 12913: • Read property removed from Data characteristics. ERRATA 12915: • Operation Failed changed to 0x8A. ERRATA 12918: • Enhance existing test cases to check for RFU bits and RFU enumeration values. ERRATA 12965: • Remove requirement from 4.4 Segmentation of Data Records.
	p0r00–r07	2019-11-29 – 2020-11-27	Draft 1.0.0. Format tables using the new BTI proposed format. Remove heading numbers in all headings with TCIDs. Formatting changes to table-driven test cases. Added missing GGIT identifiers. Removed the reference in Setup Preambles and replaced with the actual operations. Added missing Service Type column in GGIT. Replaced “after Step X” to “In Step X+1” throughout the document. Updated Pass Verdict in 4.4 Segmentation of Data Records and PAMS/SR/PAMCP/BV-13-C for clarity. Added missing SDP GGIT test case PAMS/SR/SGGIT/SDP/BV-13-C [SDP Record – Physical Activity Monitor]. Updated TCMT with the SDP test case. Updated document numbering to reflect initial publication. ERRATA 16195: • Renamed ‘Current Session’ to ‘Physical Activity Current Session’ • Renamed ‘Session Descriptor’ to ‘Physical Activity Session Descriptor’ Fixed Table of Contents.

Publication Number	Revision Number	Date	Comments
0	p0	2020-12-22	Approved by BTI on 2020-12-07. PAMS v1.0 adopted by BoD on 2020-12-15. Prepared for publication.

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