Fitness Machine Profile (FTMP)

***Bluetooth*® Test Suite**

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1 Scope

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

2 References, definitions, and abbreviations

2.1 References

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

[1] Bluetooth Core Specification, Version 4.0 or later

[2] Test Strategy and Terminology Overview

[3] Fitness Machine Profile Specification, Version 1.0 or later

[4] Fitness Machine Service Specification, Version 1.0 or later

[5] Fitness Machine ICS, FTMP.ICS

[6] GATT Test Suite, GATT.TS

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

[8] IXIT Proforma for Fitness Machine Profiles

[9] Bluetooth Core Specification Supplement (CSS), Version 7

[10] Fitness Machine Characteristics, Version 1.0

[11] Device Information Service Specification, Version 1.1 or later

[12] User Data Service Specification, Version 1.0

[13] User Data Service Test Suite, UDS.TS

[14] Appropriate Language Mapping Tables document

[15] Fitness Machine Profile Specification, Version 1.0.1

2.2 Definitions

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

Certain terms that were identified as inappropriate have been replaced. For a list of the original terms and their replacement terms, see the Appropriate Language Mapping Tables document [14].

2.3 Acronyms and abbreviations

In this Bluetooth document, the definitions, acronyms, and abbreviations from [1] and [2] apply.

3 Test Suite Structure (TSS)

3.1 Overview

The Fitness Machine Profile requires the presence of GAP, SM, and GATT. This is illustrated in Figure 3.1.

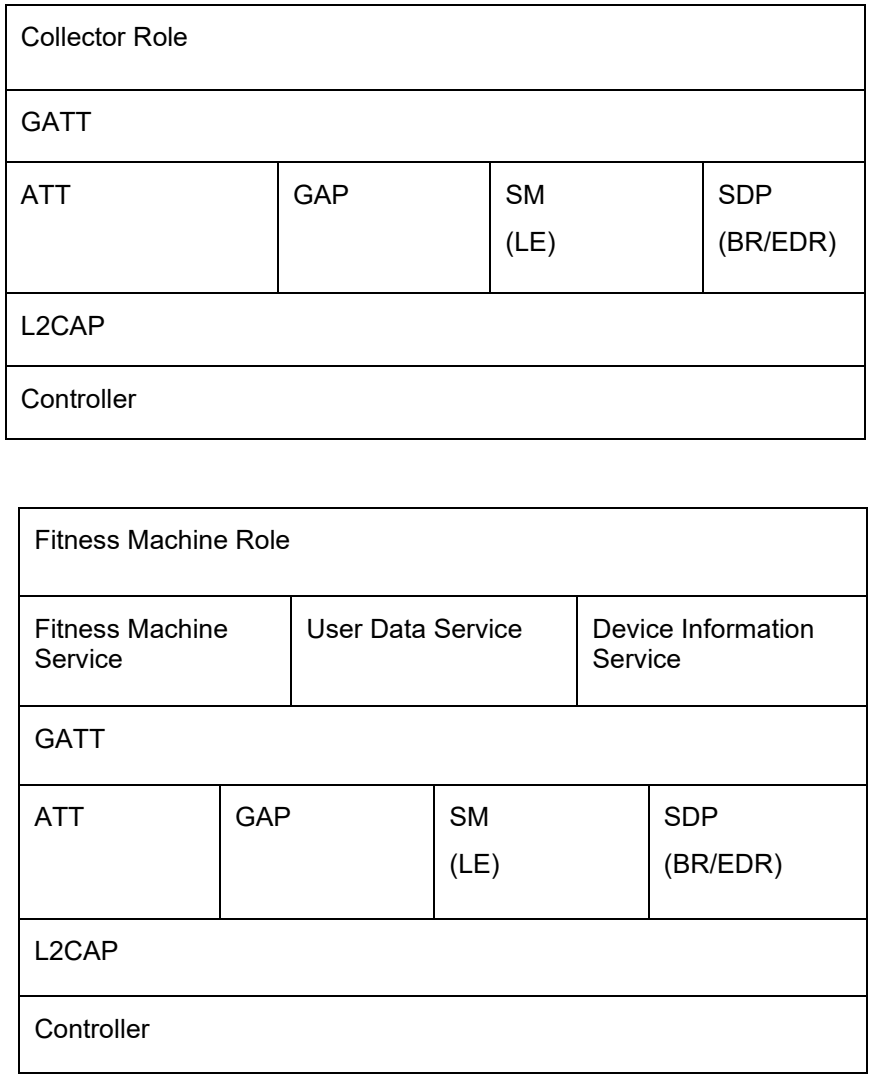

Figure 3.1: Fitness Machine Service test model

3.2 Test Strategy

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

The test equipment provides an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in this Test Suite. A Lower Tester acts as the IUT's peer device and interacts with the IUT over-the-air interface. The configuration, including the IUT, needs to implement similar capabilities to communicate with the test equipment. For some test cases, it is necessary to

stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, a Man Machine Interface (MMI), or another interface supported by the IUT.

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

3.2.1 Test database requirements

The following requirements apply to the set of databases used by the Lower Tester for testing of GATT Client functionality:

- The Lower Tester includes one instantiation of each of the services used by this profile including all defined characteristics.
- Each service instantiation also contains two «future» characteristics.
  - If possible, with one inserted before the first characteristic defined
  - If possible, with one appended after the last characteristic defined
- Each «future» characteristic has a 16-bit UUID randomly selected from unassigned UUIDs at the time of the test.

3.3 Test groups

The following test groups have been defined:

- Generic GATT Integrated Tests
- Discover Characteristics
- Discover Characteristics Descriptors
- Configure Indication and Notification
- Fitness Machine Features
- Receive Notifications
- Service Procedure

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 to through a TCID string using the following convention:
<spec abbreviation>/<IUT role>/<GGIT test group>/< GGIT class >/<xx>-<nn>-<y>.

Identifier Abbreviation	**Spec Abbreviation Identifier <spec abbreviation>**
FTMP	Fitness Machine Profile
Identifier Abbreviation	**IUT role Identifier <IUT role>**
COL	Collector Role
FTMR	Fitness Machine 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
ISFC	Indication Supported Features Characteristic
SDPNF	SDP Record Not Found
SER	Service
Identifier Abbreviation	**Feature Identifier <feat>**
CON	Configure Indication and Notification
DCCD	Discovery of Characteristic Configuration Descriptors
DCHR	Discovery of Characteristics
FTMF	Fitness Machine Features
NOT	Receive Notifications
SPCP	Service Procedure – Fitness Machine Control Point
SPE	Service Procedure – Error Handling
SPMS	Service Procedure – Fitness Machine Status
SPUD	Service Procedure – User Data Service

Table 4.1: Fitness Machine Profile 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 several L2CAP channels (PSM 0x001F) between the IUT and the Lower Tester over that BR/EDR transport.

4.2.3 Collector: Configure Fitness Machine Control Point

- Preamble Purpose

  Follow this preamble procedure to enable the IUT for use with the Fitness Machine Control Point.

- Preamble Procedure

  1. Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or 4.2.2 if using a BR/EDR transport.
  2. The handle of the Fitness Machine 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.
  3. The handle of the Client Configuration descriptor of the Fitness Machine 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. If the IUT requires bonding, then the Lower Tester performs a bonding procedure.
  5. The IUT configures the Fitness Machine Control Point characteristic for indications, and if the test case requires notifications, then the IUT configures these characteristics for notifications. Those configurations may happen in any order.

4.2.4 LE Collector: Scan to detect Advertisements and Initiate a Connection

- Preamble Purpose

  This LE preamble procedure specifies how the Collector scans for Fitness Machine advertisements and connects to the Fitness Machine.

- Reference

  [3] Section 5.2, [1] GAP 9.3.3, 9.3.4

- Preamble Procedure

  1. If applicable, configure the Collector to accept commands from the Upper Tester to receive Fitness Machine data.
  2. The Collector IUT is configured to initiate a connection and the Collector starts scanning.
  3. The Fitness Machine advertises to the Collector either using:
     - ALT 1: GAP Directed Connectable Mode (send ADV_DIRECT_IND packets)

  or

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

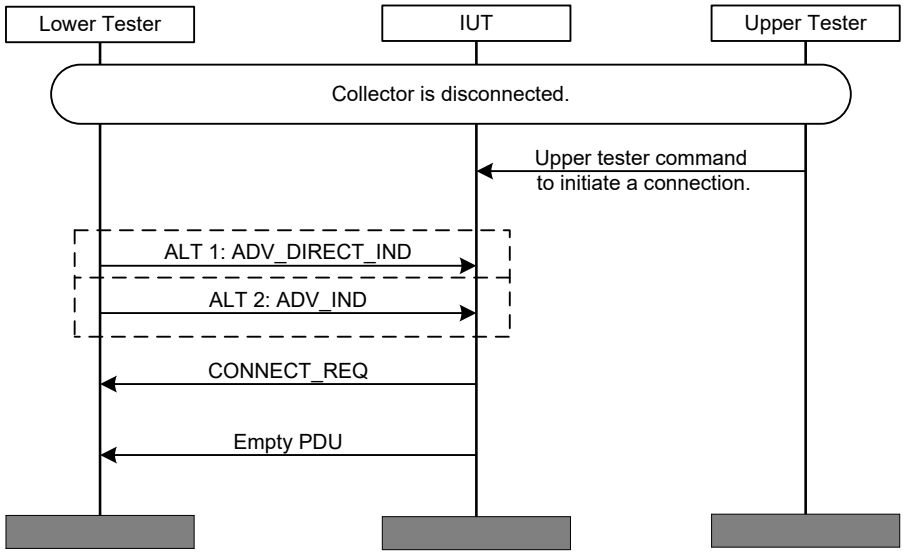

Figure 4.1: Example with IUT as Collector

4.2.5 BR/EDR Collector

4.2.5.1 Unbonded Devices

- Preamble Purpose

  This BR/EDR preamble procedure specifies how the Collector scans for the Fitness Machine.

- Reference

  [3] Section 5.3, [1] GAP 4.1, 4.2

- Preamble Procedure

  1. If applicable, configure the Collector IUT to accept commands from the Upper Tester to receive Fitness Machine data.
  2. Put the Fitness Machine in General Discoverable mode.
  3. The Collector is configured to initiate a connection and the Collector starts scanning.
  4. The Fitness Machine exposes the SDP record for the Fitness Machine Service.
  5. The Collector validates the SDP record and establishes a connection to the Fitness Machine.

The Collector uses the GAP General Discovery procedure to discover a Fitness Machine to establish a connection to a Fitness Machine.

4.2.5.2 Bonded Devices

- Preamble Purpose

  In the case of BR/EDR, either a Fitness Machine or Collector could initiate a connection when they are bonded. The device initiating the connection becomes a Central and is referred here as “Central to be” and the device accepting the connection becomes a Peripheral and is referred here as “Peripheral to be”.

  This BR/EDR preamble procedure specifies how a “Central to be” connects to “Peripheral to be”.

- Reference

  [3] Section 5.3, [1] GAP 4.1, 4.2

- Preamble Procedure

  1. If applicable, configure the Collector to accept commands from the Upper Tester to receive Fitness Machine data.
  2. Put the “Peripheral to be” in the connectable mode to accept a connection from the “Central to be”.
  3. The connection is initiated by “Central to be”.
  4. The “Peripheral to be” exposes the SDP record for the Fitness Machine Service.
  5. The “Central to be” validates the SDP record and establishes a connection to the “Peripheral to be”.

The “Central to be” uses the GAP Link Establishment Procedure to connect to any bonded device.

4.2.6 Configure Collector IUT for the User Control Point

- Preamble Purpose

  This preamble procedure specifies how the Lower Tester configures the Fitness Machine for use with the User Control Point and is valid for both LE and BR/EDR transports.

- Preamble Procedure

  1. Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  2. The handle of the User Control Point characteristic has been previously discovered in the test procedures in Section 4.4 or is known to the Lower Tester by other means.
  3. The handle of the Client Characteristic Configuration descriptor of the User Control Point characteristic has been previously discovered by the Lower Tester during the test procedures in Section 4.5 or is known to the Lower Tester by other means.
  4. Bonding is required.
  5. Once bonded, encryption is enabled, if not already enabled.
  6. The User Control Point characteristic is configured for indications.
  7. The Database Change Increment characteristic is configured for notifications.

4.2.7 Configure Fitness Machine IUT for the User Control Point

- Preamble Purpose

  This preamble procedure is for configuring the Fitness Machine for use with the User Control Point and is valid for both LE and BR/EDR transports.

- Preamble Procedure

  1. Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  2. The handle of the User Control Point characteristic has been previously discovered in the test procedures in UDS/SR/DEC/BV-30-C in [13] or is known to the IUT by other means.
  3. The handle of the Client Characteristic Configuration descriptor of the User Control Point characteristic has been previously discovered by the IUT during the test procedures in UDS/SR/DES/BV-02-C in [13] or is known to the IUT by other means.
  4. Bonding is required.
  5. Once bonded, encryption is enabled, if not already enabled.
  6. The User Control Point characteristic is configured for indications.
  7. The Database Change Increment characteristic is configured for notifications.

4.3 Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in [6] Section 6.3 Server Test Procedures and Section 6.4 Client Test Procedures using Table 4.2 below as input:

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
FTMP/COL/CGGIT/SER/BV-01-C [Service GGIT – Fitness Machine]	Fitness Machine Service	[3] 4.3.1	-	-	Primary Service
FTMP/COL/CGGIT/CHA/BV-01-C [Characteristic GGIT – Fitness Machine Feature]	Fitness Machine Feature Characteristic	[3] 4.4.1	0x22 (Read, Indicate)	8	-
FTMP/COL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Treadmill Data]	Treadmill Data Characteristic	[3] 4.4.2	0x10 (Notify)	Skip	-
FTMP/COL/CGGIT/CHA/BV-03-C [Characteristic GGIT – Cross Trainer Data]	Cross Trainer Data Characteristic	[3] 4.4.3	0x10 (Notify)	Skip	-
FTMP/COL/CGGIT/CHA/BV-04-C [Characteristic GGIT – Step Climber Data]	Step Climber Data Characteristic	[3] 4.4.4	0x10 (Notify)	Skip	-
FTMP/COL/CGGIT/CHA/BV-05-C [Characteristic GGIT – Stair Climber Data]	Stair Climber Data Characteristic	[3] 4.4.5	0x10 (Notify)	Skip	-
FTMP/COL/CGGIT/CHA/BV-06-C [Characteristic GGIT – Rower Data]	Rower Data Characteristic	[3] 4.4.6	0x10 (Notify)	Skip	-
FTMP/COL/CGGIT/CHA/BV-07-C [Characteristic GGIT – Indoor Bike Data]	Indoor Bike Data Characteristic	[3] 4.4.7	0x10 (Notify)	Skip	-
FTMP/COL/CGGIT/CHA/BV-08-C [Characteristic GGIT – Training Status]	Training Status Characteristic	[3] 4.4.8	0x12 (Read, Notify)	Variable	-
FTMP/COL/CGGIT/CHA/BV-09-C [Characteristic GGIT – Supported Speed Range]	Supported Speed Range Characteristic	[3] 4.4.9	0x02 (Read)	6	-
FTMP/COL/CGGIT/CHA/BV-10-C [Characteristic GGIT – Supported Inclination Range]	Supported Inclination Range Characteristic	[3] 4.4.10	0x02 (Read)	6	-
FTMP/COL/CGGIT/CHA/BV-11-C [Characteristic GGIT – Supported Resistance Level Range]	Supported Resistance Level Range Characteristic	[3] 4.4.11	0x02 (Read)	3	-
FTMP/COL/CGGIT/CHA/BV-12-C [Characteristic GGIT – Supported Power Range]	Supported Power Range Characteristic	[3] 4.4.12	0x02 (Read)	6	-

TCID	Service / Characteristic / Descriptor	Reference	Properties	Value Length (Octets)	Service Type
FTMP/COL/CGGIT/CHA/BV-13-C [Characteristic GGIT – Supported Heart Rate Range]	Supported Heart Rate Range Characteristic	[3] 4.4.13	0x02 (Read)	3	-
FTMP/COL/CGGIT/CHA/BV-14-C [Characteristic GGIT – Fitness Machine Control Point]	Fitness Machine Control Point Characteristic	[3] 4.4.14	0x20 (Indicate)	Skip	-
FTMP/COL/CGGIT/CHA/BV-15-C [Characteristic GGIT – Fitness Machine Status]	Fitness Machine Status Characteristic	[3] 4.4.15	0x10 (Notify)	Skip	-
FTMP/COL/CGGIT/SER/BV-02-C [Service GGIT – User Data]	User Data Service	[3] 4.3.2	-	-	Primary Service
FTMP/COL/CGGIT/SER/BV-03-C [Service GGIT – Device Information]	Device Information Service	[3] 4.3.3	-	-	Primary Service
FTMP/FTMR/SGGIT/SDPNF/BV-01-C [Not discoverable over BR/EDR – Fitness Machine Service]	Fitness Machine Service	[3] 4.2	-	-	-

Table 4.2: Input for the GGIT Server Test Procedure

4.3.1 Generic GATT Indication Supported Features characteristic

Execute the Generic GATT Indication Supported Features Characteristic Tests defined in Section 6.4, Client Test Procedures, in [6] using Table 4.3 Input for the GGIT Indication Supported Features Characteristic Tests below as input:

TCID	Characteristic	Reference	TC Configuration
FTMP/COL/CGGIT/ISFC/BV-01-C [Characteristic GGIT – Fitness Machine Feature indication]	Fitness Machine Feature	[15] 4.4.1	N/A

Table 4.3 Input for the GGIT Indication Supported Features Characteristic Tests

4.4 Discover Characteristics

The procedures defined in this test group verify that IUT in the Collector role discovers the characteristics exposed by a Fitness Machine via the Fitness Machine Service and read the characteristic when the read property is supported.

4.4.1 Discover Characteristics – User Data Service

The verification for characteristics exposed in the User Data Service is done one characteristic at a time, as enumerated in the test cases in Table 4.4, using this generic test procedure.

- Test Purpose

  Verify that an IUT Collector can discover the specified characteristic and read the characteristic when supported.

- Reference

  [3] 4.4.1

- Initial Condition

  - Run the preamble procedure for the IUT to initiate a connection to the Lower Tester included in Section 4.2.4, if using an LE transport, or 4.2.5, if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [12] including all defined characteristics.
  - The IUT has executed the FTMP/COL/CGGIT/SER/BV-02-C [Service GGIT – User Data] procedure and has saved the handle range for an instantiation of the User Data Service that contains an instantiation of the characteristics supported by the IUT.
  - Perform the Consent procedure in FTMP/COL/SPUD/BV-03-C [User Control Point – Consent] to establish consent for the user with User Index of 0x01.
  - The value of the Database Change Increment characteristic value exposed by the Lower Tester is set to 1.

- Test Case Configuration

Test Case	Characteristic Name	Read Supported	Expected Value
FTMP/COL/DCHR/BV-16-C [User Data Service – Discover User Index Characteristic]	User Index	Yes	0x01
FTMP/COL/DCHR/BV-17-C [User Data Service – Discover Database Change Increment Characteristic]	Database Change Increment	Yes	>0
FTMP/COL/DCHR/BV-18-C [User Data Service – Discover User Control Point Characteristic]	User Control Point	No	N/A

Table 4.4: Discover User Data Service Characteristics test cases

- Test Procedure

  1. The Upper Tester induces the IUT to execute either alternative 1A or 1B.
     Alternative 1A (Discover All Characteristics of a Service sub-procedure):
     1A: Discover All Characteristics of a Service using the specified handle range, with the Lower Tester instantiating the database specified in Section 3.2.1.
     Alternative 1B (Discover Characteristics by UUID sub-procedure):
     1B: Discover Characteristics by UUID using each of the UUIDs for the characteristics specified in Table 4.4, with the Lower Tester instantiating the database specified in Section 3.2.1.
  2. If the specified characteristic supports the Read property, execute steps 3–5.
  3. The Upper Tester induces the IUT to read the characteristic specified in step 1 from the Lower Tester.
  4. After receipt of the expected result by the Lower Tester from the IUT, send an *ATT_Read_Response* (0x0B) from the Lower Tester to the IUT containing a defined value of the characteristic specified in step 1.
  5. The Upper Tester receives the Expected Value of the characteristic.

- Expected Outcome

  The following Pass verdicts apply to the test cases as listed in Table 4.4.

  Pass verdict

  Verify that one attribute handle/value pair is received by the IUT containing the UUID of the characteristic specified in step 1.

  If Read is supported, verify that IUT receives the response from the Lower Tester and sends the Expected Value to the Upper Tester.

FTMP/COL/DCHR/BV-19-C [Discover User Data Service – UDS Characteristics]

- Test Purpose

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

- Reference

  [3] 4.5

- Initial Condition

  - All characteristics of the User Data Service supported by the IUT are specified in the IXIT [8].
  - Run the preamble procedure for the Collector to initiate a connection to a Fitness Machine included in Section 4.2.4 if using an LE transport, or 4.2.5 if using a BR/EDR transport.
  - The IUT has executed the FTMP/COL/CGGIT/SER/BV-02-C [Service GGIT – User Data] procedure and has saved the handle range for an instantiation of the User Data Service. The User Data Service contains one or more UDS characteristics.

- Test Procedure

  1. The Upper Tester issues a command to the IUT to discover all characteristics of the User Data Service supported by the IUT.
  2. The IUT executes either alternative 2A or 2B.
     Alternative 2A (Discover All Characteristics of a Service sub-procedure):
     2A: Discover All Characteristics of a Service using the specified handle range, with the Lower Tester instantiating the database specified in Section 3.2.1.
     Alternative 2B (Discover Characteristics by UUID sub-procedure):
     2B: Discover Characteristics by UUID using each of the UUIDs for the characteristics of the User Data Service supported by the IUT, with the Lower Tester instantiating the database specified in Section 3.2.1.

- Expected Outcome

  Pass verdict

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

FTMP/COL/DCHR/BV-20-C [Discover Device Information Service Characteristics]

- Test Purpose

  Verify that a Device Information Service characteristic can be discovered by the Collector IUT.

- Reference

  [3] 4.3.3

- Initial Condition

  - All characteristics of the Device Information Service supported by the IUT are specified in the IXIT [8].
  - Run the preamble procedure for the Collector to initiate a connection to a Fitness Machine included in the Section 4.2.4, if using an LE transport, or 4.2.5, if using a BR/EDR transport.
  - The IUT has executed the FTMP/COL/CGGIT/SER/BV-03-C [Service GGIT – Device Information] procedure and has saved the handle range. The instantiation contains an instantiation of the characteristic. The Device Information Service has one or more characteristics.

- Test Procedure

  1. The Upper Tester issues a command to the IUT to discover all characteristics of the Device Information Service supported by the IUT.
  2. The IUT executes either alternative 2A or 2B.
     Alternative 2A (Discover All Characteristics of a Service sub-procedure):
     2A: Discover All Characteristics of a Service using the specified handle range, with the Lower Tester instantiating the database specified in Section 3.2.1.
     Alternative 2B (Discover Characteristics by UUID sub-procedure):
     2B: Discover Characteristics by UUID using each of the UUIDs for the characteristics of the Device Information Service supported by the IUT, with the Lower Tester instantiating the database specified in Section 3.2.1.

- Expected Outcome

  Pass verdict

  For each characteristic supported by the IUT contained in the Lower Tester's instantiation of the Device Information Service, the IUT reports an attribute handle/value pair for each characteristic specified in the IXIT [8] to the Upper Tester.

FTMP/COL/DCHR/BV-21-C [Read Device Information Service Characteristics]

- Test Purpose

  Verify that a Collector IUT can read all characteristics of a Device Information Service supported by the IUT.

- Reference

  [3] 4.6

- Initial Condition

  - All characteristics of the Device Information Service supported by the Lower Tester are specified in the IXIT [8].
  - Run the preamble procedure for the Collector IUT to initiate a connection to a Fitness Machine 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 Device Information Service including all defined characteristics.
  - The IUT has previously executed the procedure included in FTMP/COL/DCHR/BV-20-C [Discover Device Information Service Characteristics] so it has the handle/value pairs for all characteristics of the Device Information Service supported by the IUT.
  - For string-based characteristics (i.e., Manufacturer Name String, Model Number String, Serial Number String, Hardware revision String, Firmware Revision String, and Software Revision String), the string initially includes only character values in the ASCII printable range (i.e., 0x20 – 0x7E).
  - For the System ID characteristic, the Manufacturer Identifier is set to 0xFFFE9ABCDE and the Organizationally Unique Identifier is set to 0x123456.
  - For the IEEE 11073020601 Regulatory Certification Data List characteristic, the Data field is set to 0x0000-0002-8008-0200-0001-0105-0008-0201-0012-0002.
  - For the PnP_ID characteristic, the Vendor ID Source is set to 0x01, the Vendor ID is set to 0x006B, the Product ID is set to 0x1234, and the Product Version is set to 0x0102.

- Test Procedure

  1. The Upper Tester issues a command to the IUT to discover all characteristics of the Device Information Service supported by the Lower Tester. There are two alternatives.
  2. For each characteristic of the Device Information Service supported by the Lower Tester, the IUT sends an *ATT_Read_Request* to the Lower Tester containing the handle specified by the Upper Tester.
  3. The IUT receives an *ATT_Read_Response* and reports the value to the Upper Tester.
  4. Repeat steps 1–3 with the string-based characteristics changed to include character values outside the ASCII printable range.

- Expected Outcome

  Pass verdict

  For each characteristic contained in the Lower Tester's instantiation of the Device Information Service supported by the IUT, the IUT reports the characteristic value for all characteristics specified in the IXIT [8] to the Upper Tester, including:

  - For string-based characteristics, any printable or non-printable ASCII values
  - For the System ID characteristic, the Manufacturer Identifier and Organizationally Unique Identifier.
  - For the IEEE 11073-20601 Regulatory Certification Data List characteristic, the IEEE 11073-20601 regulatory certification data list (note this value is defined in big endian format)
  - For the PnP_ID characteristic, the Vendor ID Source, the Vendor ID, the Product ID and the Product Version.

4.5 Discover Characteristic Descriptors

The procedures defined in this test group verify that the IUT in the Collector role discovers the characteristic descriptors exposed by the characteristics of the supported services on a Fitness Machine.

4.5.1 Discover Characteristic Descriptors – User Data Service

The verification for characteristic descriptors exposed by characteristics exposed by the User Data Service is done one characteristic at a time, as enumerated in the test cases in Table 4.5, using this generic test procedure.

- Test Purpose

  Verify that the Collector IUT can discover the client configuration descriptor for the specified characteristic of the User Data Service.

- Reference

  [3] 4.4.2

- Initial Condition

  - Run the preamble procedure for the Collector to initiate a connection to a Fitness Machine included in Section 4.2.4 if using an LE transport, or 4.2.5 if using a BR/EDR transport.
  - The Lower Tester includes one instantiation of the User Data Service [12] including all supported characteristics.
  - The IUT has executed the FTMP/COL/CGGIT/SER/BV-02-C [Service GGIT – User Data] procedure and has saved the handle range for an instantiation of the User Data Service that contains an instantiation of the Client Characteristic Configuration descriptor.

- Test Case Configuration

Test Case	Characteristic
FTMP/COL/DCCD/BV-10-C [User Data Service – Discover Database Change Increment Client Characteristic Configuration Descriptors]	Database Change Increment
FTMP/COL/DCCD/BV-11-C [User Data Service – Discover User Control Point Client Characteristic Configuration Descriptors]	User Control Point

Table 4.5: Discover User Data Service Client Characteristic Configuration descriptors

- Test Procedure

  1. The Upper Tester issues a command to the IUT to Discover All Characteristic descriptors using the handle range of the specified characteristic.
  2. The IUT executes the Discover All Characteristic Descriptors sub-procedure.

- Expected Outcome

  Pass verdict

  One attribute handle/value pair is returned containing the UUID «Client Characteristic Configuration».

4.6 Configure Indication and Notification

This test group contains test cases to verify compliant operation in response to enabling and disabling characteristic indication or notification. The verification is done one value at a time, as enumerated in the test cases in Table 4.6, using this generic test procedure.

- Reference

  [1] Vol 3, Part G 3.3.3.3

  [4] 4.4

- Initial Condition

  - The handle of each characteristic value referenced in the test cases below has been previously discovered by the IUT during the test procedure in Section 4.3 or is known to the IUT by other means.
  - The handle of the Client Characteristic Configuration descriptor of each characteristic referenced in the test cases below has been previously discovered by the IUT during the test procedure in Section 4.3 or is known to the IUT by other means.
  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If Lower Tester permissions for the characteristic descriptor require a specific security mode or security level, establish a connection meeting those requirements.

- Test Case Configuration

Test Case	Requirements
FTMP/COL/CON/BV-01-C [Configure Notification – Treadmill Data]	0x0001
FTMP/COL/CON/BV-02-C [Configure Notification – Cross Trainer Data]	0x0001
FTMP/COL/CON/BV-03-C [Configure Notification – Step Climber Data]	0x0001
FTMP/COL/CON/BV-04-C [Configure Notification – Stair Climber]	0x0001
FTMP/COL/CON/BV-05-C [Configure Notification – Rower Data]	0x0001
FTMP/COL/CON/BV-06-C [Configure Notification – Indoor Bike Data]	0x0001
FTMP/COL/CON/BV-07-C [Configure Notification – Training Status]	0x0001
FTMP/COL/CON/BV-08-C [Configure Indication – Fitness Machine Control Point]	0x0002
FTMP/COL/CON/BV-09-C [Configure Notification – Fitness Machine Status]	0x0001

Table 4.6: Configure Indication and Notification test cases

- Test Procedure

  1. Disable indication or notification by writing value 0x0000 to the Client Characteristic Configuration descriptor of the characteristic.
  2. If the test case is for notification, the Upper Tester sends a command to the IUT to send a correctly formatted *ATT_Write_Request* (Code = 0x12) with the handle of the characteristic descriptor and a value of 0x0001 to the Lower Tester.
  3. Otherwise, if the test case is for indication, the Upper Tester sends a command to the IUT to send a correctly formatted *ATT_Write_Request* (Code=0x12) with the handle of the characteristic descriptor and a value of 0x0002 to the Lower Tester.
  4. The Upper Tester sends a command to the IUT to read the value of the Client Characteristic Configuration descriptor.

- Expected Outcome

  Pass verdict

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

4.7 Fitness Machine Features

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

FTMP/FTMR/FTMF/BV-01-C [Fitness Machine Service UUID in AD]

- Test Purpose

  Verify that the Fitness Machine Service UUID is included in AD (Advertising Data) from a Fitness Machine when using the LE Transport.

- Reference

  [4] 3.1.1.1

- Initial Condition

  - The IUT is powered on in GAP Discoverable Mode.
  - The IUT is induced to generate Advertising Packets using the procedure in preamble 4.2.7.

- Test Procedure

  1. The Lower Tester listens for Advertising Packets from the IUT.

- Expected Outcome

  Pass verdict

  At least one received Advertising Packet contains the defined Service UUID for «Fitness Machine Service».

FTMP/FTMR/FTMF/BV-02-C [Service Data Included in AD]

- Test Purpose

  Verify that Service Data is included in AD (Advertising Data) or Scan Response data from a Fitness Machine when using the LE Transport.

- Reference

  [3] 3.1.1.5, 5.1.4

  [4] 3.1

- Initial Condition

  - The IUT is powered on in GAP Discoverable Mode.
  - The IUT is induced to generate Advertising Packets using the procedure in preamble 4.2.7.

- Test Procedure

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

- Expected Outcome

  Pass verdict

  The IUT sends an advertising packet.

  The IUT includes the Service Data AD type in the advertising packet with a format meeting the requirements of the service.

  In addition to the UUID of the Fitness Machine Service, the Service Data Type value includes a 1 octet Flags field with the Fitness Machine Available bit set and a 2 octet Fitness Machine Type field.

FTMP/FTMR/FTMF/BV-03-C [Local Name included in AD or Scan Response]

- Test Purpose

  Verify that the Local Name is included in Advertising Data from a Fitness Machine when using the LE Transport.

- Reference

  [3] 3.1.1.2

- Initial Condition

  - The IUT is powered on in GAP Discoverable Mode.
  - The IUT is induced to generate Advertising Packets using the procedure in preamble 4.2.7.

- Test Procedure

  1. The Lower Tester listens for Advertising Packets from the IUT.
  2. When the Lower Tester receives an Advertising 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.

FTMP/FTMR/FTMF/BV-04-C [Appearance included in AD or Scan Response]

- Test Purpose

  Verify that the Appearance characteristic value is included in AD (Advertising Data) or Scan Response data from a Fitness Machine when using the LE Transport.

- Reference

  [3] 3.1.1.4

- Initial Condition

  - The IUT is powered on in GAP Discoverable Mode.
  - The IUT is induced to generate Advertising Packets using the procedure in preamble 4.2.7.

- Test Procedure

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

FTMP/COL/FTMF/BV-01-C [Lost Bond Procedure when using LE transport]

- Test Purpose

  Verify that the Collector IUT starts encryption with a bonded Fitness Machine on reconnection and rediscovers and reconfigures the Fitness Machine if the bond is lost.

- Reference

  [3] 4.5.2.3

- Initial Condition

  - The IUT and the Lower Tester have previously bonded.
  - The IUT has configured the Lower Tester to enable notifications of the User Control Point characteristic of the Fitness Machine Service.
  - The Lower Tester has the «Service Changed» characteristic.
  - No connection is established between the IUT and Lower Tester.
  - The bond is deleted at the Lower Tester.

- Test Procedure

  1. The Lower Tester begins advertising using GAP undirected connectable mode.
  2. The IUT establishes a connection to the Lower Tester.
  3. The Lower Tester does not send any notifications to the IUT.
  4. Verify that the IUT starts encryption when the connection is established and rediscovers and reconfigures the Lower Tester upon detection of the lost bond.

- Expected Outcome

  Pass verdict

  The IUT starts encryption when the connection is established.

  The IUT rediscovers the Fitness Machine Service.

  The IUT reconfigures the Client Characteristic Configuration descriptors of the User Control Point characteristic.

FTMP/COL/FTMF/BV-02-C [Lost Bond Procedure when using BR/EDR transport]

- Test Purpose

  Verify that the Collector IUT reconfigures the Fitness Machine if the bond is lost.

  In the case of BR/EDR, either the Lower tester or Collector IUT could initiate connection are bonded. The device initiating the connection becomes a Central and is referred here as “Central to be” and the device accepting the connection becomes a Peripheral and is referred here as “Peripheral to be”. Verify that the “Central to be” starts encryption with a bonded “Peripheral to be” on reconnection.

- Reference

  [3] 4.5.2.3

- Initial Condition

  - The IUT and the Lower Tester have previously bonded.
  - The IUT has configured the Lower Tester to enable notifications on the Treadmill Data characteristic of the Lower Tester’s Fitness Machine Service.
  - The Lower Tester has the «Service Changed» characteristic.
  - No connection is established between the IUT and Lower Tester.
  - The bond is deleted at the Lower Tester.

- Test Procedure

  1. The “Peripheral to be” is in connectable mode.
  2. The “Central to be” establishes a connection to the “Peripheral to be”.
  3. The Lower Tester does not send any notifications to the IUT.
  4. The “Central to be” starts encryption when the connection is established.
  5. Verify that the IUT rediscovers and reconfigures the Fitness Machine upon detection of the lost bond.

- Expected Outcome

  Pass verdict

  The “Central to be” starts encryption when the connection is established.

  The IUT rediscovers the Fitness Machine Service.

  The IUT reconfigures the Client Characteristic Configuration descriptors of the Fitness Machine characteristic.

FTMP/COL/FTMF/BV-03-C [Read Fitness Machine Feature Characteristic with Bonding Enabled]

- Test Purpose

  Verify that, after the initial connection and bonding, the Collector IUT can read the Fitness Machine Feature characteristic.

- Reference

  [15] 4.4.1

- Initial Condition

  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The IUT is bonded with the Lower Tester.
  - The Upper Tester knows the handle of the Fitness Machine Feature characteristic contained in the Lower Tester.

- Test Procedure

  1. The Upper Tester commands the IUT to read the Fitness Machine Feature characteristic from the Lower Tester.
  2. The IUT sends an ATT_Read_Request to the Lower Tester containing the handle specified by the Upper Tester.
  3. The Lower Tester receives the ATT_Read_Request and then sends an ATT_Read_Response to the IUT containing the value of the characteristic.
  4. The IUT receives the ATT_Read_Response and reports the value to the Upper Tester.

- Expected Outcome

  Pass verdict

  The IUT reads the Fitness Machine Feature characteristic and reports its value to the Upper Tester.

  Reserved for future use bit values are ignored.

FTMP/COL/FTMF/BV-04-C [Enable Fitness Machine Feature Characteristic for Indication or Read Feature Characteristic Upon Reconnection]

- Test Purpose

  Verify that the Collector IUT can either enable the Fitness Machine Feature characteristic for indication or read the Fitness Machine Feature characteristic upon reconnection.

- Reference

  [15] 4.4.1

- Initial Condition
  - The handles of the Fitness Machine Feature characteristic and Client Characteristic Configuration descriptor have been previously discovered by the Upper Tester during the test procedures in Section 4.3.1 Generic GATT Indication Supported Features characteristic or are known to the Upper Tester by other means.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport, or Section 4.2.2 if using a BR/EDR transport.
  - The IUT is not paired and bonded with the Lower Tester.
- Test Procedure

  1. The Upper Tester orders the IUT to initiate pairing and bonding.
  2. The Upper Tester commands the IUT to perform either alternative 2A or 2B:

  Alternative 2A (Configure the Fitness Machine Feature characteristic for indication):
  2A.1. The IUT configures the Fitness Machine Feature characteristic for indication.

  Or,

  Alternative 2B (Read the Fitness Machine Feature characteristic upon reconnection):
  2B.1. The Upper Tester commands the IUT to disconnect, and the IUT terminates the connection with the Lower Tester.
  2B.2. The Upper Tester commands the IUT to reconnect to the Lower Tester.
  2B.3. The IUT reads the Fitness Machine Feature characteristic from the Lower Tester and reports the value to the Upper Tester.
- Expected Outcome

  Pass verdict

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

  In step 2A.1, the IUT enables the Fitness Machine Feature characteristic for indication.

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

  Reserved for future use bit values are ignored.

4.8 Receive Notifications

The procedures defined in this test group verify that IUT in the Collector role receives notifications for the characteristics exposed by services on the Fitness Machine when enabled.

FTMP/COL/NOT/BV-01-C [Receive Treadmill Data Notifications – Multiple Notifications]

- Test Purpose

  Verify that Collector IUT can receive notifications of the Treadmill Data characteristic that include the mandatory fields (i.e., Flags and Instantaneous Speed fields). The Collector IUT can receive Data Records sent in two or more notifications.
- Reference

  [4] 4.4.1.1, 4.4.1.2

- Initial Condition
  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Treadmill Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-01-C [Configure Notification – Treadmill Data]). The Data Record includes the Instantaneous Speed field.
  - The IUT knows the handle of the Treadmill Data characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If Lower Tester permissions for the Treadmill Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.
- Test Procedure
  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the Lower Tester, if not already done so prior to step 1.
  2. The Lower Tester sends a treadmill-related Data Record whose payload exceeds the ATT_MTU size and consists of two or more notifications of the Treadmill Data characteristic to the IUT.
  3. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the More Data bit is read as 0 (zero) for the notification of the Treadmill Data characteristic.
  4. Verify that characteristic value meets the requirements of the service.
  5. Repeat steps 2–4 until the IUT receives two or more treadmill-related Data Records, each consisting of two or more notifications.
  6. The Upper Tester sends a command to the IUT to disable notifications for the Treadmill Data characteristic on the Lower Tester.
  7. Repeat step 1 with notifications disabled.
  8. Verify that IUT does not receive an *ATT_Handle_Value_Notification* from the Lower Tester containing the Cross Trainer Data characteristic.
- Expected Outcome

  Pass verdict

  The IUT receives two or more *ATT_Handle_Value_Notifications* for each Data Record of the Treadmill Data characteristic.

  The Treadmill Data characteristic notifications contain at least the Flags field. The notifications include the Instantaneous Speed field when the More Data bit is set to 0 (zero).

  The value of each field of the characteristic meets the requirements of the service.

  The Lower Tester stops sending notifications of the Treadmill Data characteristic after the IUT configures the characteristic to disable notifications.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

4.8.1 Receive Treadmill Data Notifications – Supported Fields

The procedures defined in this test group verify that the IUT in the Collector role receives Treadmill Data notifications containing the specified fields for each row in Table 4.7.

- Test Purpose

  Verify that Collector IUT can receive Data Records, comprised of one or more notifications of the Treadmill Data characteristic, that include the specified field values.

- Reference

  [3] 4.4.2

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Treadmill Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-01-C [Configure Notification – Treadmill Data]). The Treadmill Data characteristic includes all specified Included Fields.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Treadmill Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Case Configuration

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-02-C [Receive Treadmill Data Notifications - Average Speed Supported]	[4] 4.4.1.3	Average Speed	Average Speed Present	Average Speed Supported
FTMP/COL/NOT/BV-03-C [Receive Treadmill Data Notifications - Total Distance Supported]	[4] 4.4.1.4	Total Distance	Total Distance Present	Total Distance Supported
FTMP/COL/NOT/BV-04-C [Receive Treadmill Data Notifications – Inclination Supported]	[4] 4.4.1.5 [4] 4.4.1.6	Inclination, Ramp Angle Setting	Inclination and Ramp Angle Setting Present	Inclination Supported
FTMP/COL/NOT/BV-05-C [Receive Treadmill Data Notifications – Elevation Gain Supported]	[4] 4.4.1.7	Positive Elevation Gain and Negative Elevation Gain Pair	Elevation Gain Present	Elevation Gain Supported
FTMP/COL/NOT/BV-06-C [Receive Treadmill Data Notifications – Pace Supported]	[4] 4.4.1.8 [4] 4.4.1.9	Instantaneous Pace, Average Pace	Instantaneous Pace Present	Pace Supported
FTMP/COL/NOT/BV-07-C [Receive Treadmill Data Notifications - Expended Energy Supported]	[4] 4.4.1.10 [4] 4.4.1.11 [4] 4.4.1.12	Total Energy, Energy per Hour, Energy per Minute	Expended Energy Present	Expended Energy Supported

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-08-C [Receive Treadmill Data Notifications - Heart Rate Measurement Supported]	[4] 4.4.1.13	Heart Rate	Heart Rate Present	Heart Rate Measurement Supported
FTMP/COL/NOT/BV-09-C [Receive Treadmill Data Notifications - Metabolic Equivalent Supported]	[4] 4.4.1.14	Metabolic Equivalent	Metabolic Equivalent Present	Metabolic Equivalent Supported
FTMP/COL/NOT/BV-10-C [Receive Treadmill Data Notifications - Elapsed Time Supported]	[4] 4.4.1.15	Elapsed Time	Elapsed Time Present	Elapsed Time Supported
FTMP/COL/NOT/BV-11-C [Receive Treadmill Data Notifications - Remaining Time Supported]	[4] 4.4.1.16	Remaining Time	Remaining Time Present	Remaining Time Supported
FTMP/COL/NOT/BV-12-C [Receive Treadmill Data Notifications - Force on Belt and Power Output Supported]	[4] 4.4.1.17 [4] 4.4.1.18	Force on Belt, Power Output	Force on Belt and Power Output Present	Force on Belt and Power Output Supported

Table 4.7: Receive Treadmill Data Notifications test cases

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
  2. The Lower Tester sends a treadmill-related Data Record that consists of one or more notifications of the Treadmill Data characteristic with the specified Included Fields present.
  3. The IUT is induced to read the Fitness Machine Feature characteristic.
  4. The IUT receives a Data Record, which consists of one or more *ATT_Handle_Value_Notifications,* from the Lower Tester containing the Treadmill Data characteristic handle and value along with the specified Included Fields.
  5. Verify that characteristic value meets the requirements of the service.
  6. Repeat steps 4–5 until the Lower Tester receives one or more additional Data Records.
  7. The Upper Tester sends a command to the IUT to disable notifications for the Treadmill Data characteristic on the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT receives one or more Data Records. Each Data Record contains the specified Included Fields.

  The values of the specified Included Fields meet the requirements of the service.

  The value of the specified Treadmill Data Characteristic Flags Bits is set to 1.

  The value of the specified Fitness Machine Features bit of the Fitness Machine Feature characteristic is set to 1.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-13-C [Treadmill Data Notifications – Discard Partial Data Record After Link Loss]

- Test Purpose

  Verify that the Collector IUT discards an incomplete Treadmill Data Record when experiencing a Link Loss before the last notification of the Treadmill Data Record and then reconnecting to the Fitness Machine and receiving a new Treadmill Data Record from the Fitness Machine.

- Reference

  [4] 4.4.1.1, 4.4.1.2, 4.18

- Initial Condition

  - The Treadmill Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-01-C [Configure Notification – Treadmill Data]). The Treadmill Data characteristic includes the Flags field and Instantaneous Speed field.
  - The IUT knows the handle of the Treadmill Data characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Treadmill Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the Lower Tester, if not previously established.
  2. The Lower Tester begins sending a Treadmill Data Record whose payload exceeds the ATT_MTU size to the IUT.
  3. The IUT receives, in one or more notifications, a partial Data Record.
  4. Before the last notification for the Data Record is received (with the More Data bit set to 0), perform an action on the Lower Tester that will cause the link to be lost.
  5. After several seconds, perform an action on the Lower Tester that allows the link to be restored.
  6. The Lower Tester begins sending a new Data Record whose payload exceeds the ATT_MTU size and is contained in multiple notifications to the IUT.
  7. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the IUT receives a Treadmill Characteristic notification with the More Data bit of the Flags field is set to 0 (zero).

- Expected Outcome

  Pass verdict

  The IUT discards the incomplete Treadmill Data Record sent prior to the link loss in step 4. Any values from the notifications sent before the link loss are ignored when receiving the new Treadmill Data Record.

  The Treadmill Data characteristic notifications contain at least the Flags field. The notification includes the Instantaneous Speed field when the More Data bit is set to 0 (zero).

  The value of each field of the characteristic meets the requirements of the service.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-14-C [Receive Cross Trainer Data Notifications – Multiple Notifications]

- Test Purpose

  Verify that Collector IUT can receive notifications of the Cross Trainer Data characteristic that include the mandatory fields (i.e., Flags and Instantaneous Speed fields). The Collector IUT can receive Data Records sent in two or more notifications.

- Reference

  [3] 4.4.3

  [4] 4.5.1.1, 4.5.1.2

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Cross Trainer Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-02-C [Configure Notification – Cross Trainer Data]). The Cross Trainer Data characteristic includes the Flags and Instantaneous Speed field.
  - The IUT knows the handle of the Cross Trainer characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If Lower Tester permissions for the Cross Trainer Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
  2. The Lower Tester sends a cross trainer-related Data Record whose payload exceeds the ATT_MTU size and consists of two or more notifications of the Cross Trainer Data characteristic to the IUT.
  3. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the More Data bit is read as 0 (zero) for the notification of the Cross Trainer Data characteristic.
  4. Verify that characteristic value meets the requirements of the service.
  5. Repeat steps 2–4 until two or more cross trainer-related Data Records are received by the IUT.
  6. The Upper Tester sends a command to the IUT to disable notifications for the Cross Trainer Data characteristic on the Lower Tester.
  7. Repeat step 1 with notifications disabled.
  8. Verify that IUT does not receive an *ATT_Handle_Value_Notification* from the Lower Tester containing the Cross Trainer Data characteristic.

- Expected Outcome

  Pass verdict

  The IUT receives two or more *ATT_Handle_Value_Notifications* for each Data Record of the Cross Trainer Data characteristic.

  The Cross Trainer Data characteristic notifications contain at least the Flags field. The notifications include the Instantaneous Speed field when the More Data bit is set to 0 (zero).

The value of each field of the characteristic meets the requirements of the service.

The Lower Tester stops sending notifications of the Cross Trainer Data characteristic after the IUT configures the characteristic to disable notifications.

In all cases, ensure that the RFU bits of the Flags field are set to zero.

4.8.2 Cross Trainer Data Notifications

The procedures defined in this test group verify that the IUT in the Collector role receives Cross Trainer Data notifications containing the specified fields for each row in Table 4.8.

- Test Purpose

  Verify that Collector IUT can receive Data Records, comprised of one or more notifications of the Cross Trainer Data characteristic, that include the specified field values.

- Reference

  [3] 4.4.2

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Cross Trainer Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-02-C [Configure Notification – Cross Trainer Data]). The Cross Trainer Data characteristic includes all specified Included Fields.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Cross Trainer Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Case Configuration

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-15-C [Receive Cross Trainer Data Notifications - Average Speed Supported]	[4] 4.5.1.3	Average Speed	Average Speed Present	Average Speed Supported
FTMP/COL/NOT/BV-16-C [Receive Cross Trainer Data Notifications - Total Distance Supported]	[4] 4.5.1.4	Total Distance	Total Distance Present	Total Distance Supported
FTMP/COL/NOT/BV-17-C [Receive Cross Trainer Data Notifications - Step Count Supported]	[4] 4.5.1.5 [4] 4.5.1.6	Step per Minute, Average Step Rate	Step Count Present	Step Count Supported
FTMP/COL/NOT/BV-18-C [Receive Cross Trainer Data Notifications - Stride Count Supported]	[4] 4.5.1.7	Stride Count	Stride Count Present	Stride Count Supported

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-19-C [Receive Cross Trainer Data Notifications – Elevation Gain Supported]	[4] 4.5.1.8	Positive Elevation Gain and Negative Elevation Gain	Elevation Gain Present	Elevation Gain Supported
FTMP/COL/NOT/BV-20-C [Receive Cross Trainer Data Notifications – Inclination Supported]	[4] 4.5.1.9 [4] 4.5.1.10	Inclination, Ramp Angle Setting	Inclination and Ramp Angle Setting Present	Inclination Supported
FTMP/COL/NOT/BV-21-C [Receive Cross Trainer Data Notifications - Resistance Level Supported]	[4] 4.5.1.11	Resistance Level	Resistance Level Present	Resistance Level Supported
FTMP/COL/NOT/BV-22-C [Receive Cross Trainer Data Notifications – Power Measurement Supported]	[4] 4.5.1.12 [4] 4.5.1.13	Instantaneous Power, Average Power	Instantaneous Power Present, Average Power Present	Power Measurement Supported
FTMP/COL/NOT/BV-23-C [Receive Cross Trainer Data Notifications – Expended Energy Supported]	[4] 4.5.1.14 [4] 4.5.1.15 [4] 4.5.1.16	Total Energy, Energy per Hour, Energy per Minute	Expended Energy Present	Expended Energy Supported
FTMP/COL/NOT/BV-24-C [Receive Cross Trainer Data Notifications - Heart Rate Measurement Supported]	[4] 4.5.1.17	Heart Rate	Heart Rate Present	Heart Rate Measurement Supported
FTMP/COL/NOT/BV-25-C [Receive Cross Trainer Data Notifications - Metabolic Equivalent Supported]	[4] 4.5.1.18	Metabolic Equivalent	Metabolic Equivalent Present	Metabolic Equivalent Supported
FTMP/COL/NOT/BV-26-C [Receive Cross Trainer Data Notifications - Elapsed Time Supported]	[4] 4.5.1.19	Elapsed Time	Elapsed Time Present	Elapsed Time Supported
FTMP/COL/NOT/BV-27-C [Receive Cross Trainer Data Notifications - Remaining Time Supported]	[4] 4.5.1.20	Remaining Time	Remaining Time Present	Remaining Time Supported

Table 4.8: Receive Cross Trainer Data Notifications test cases

- Test Procedure

1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
2. The Lower Tester sends a Cross Trainer-related Data Record that consists of one or more notifications of the Cross Trainer Data characteristic with the specified Included Fields present.
3. The IUT is induced to read the Fitness Machine Feature characteristic.

4. The IUT receives a Data Record, which consists of one or more *ATT_Handle_Value_Notifications,* from the Lower Tester containing the Cross Trainer Data characteristic handle and value along with the specified Included Fields.
5. Verify that characteristic values meet the requirements of the service.
6. Repeat steps 4–5 until the Lower Tester receives one or more Data Records.
7. The Upper Tester sends a command to the IUT to disable notifications for the Cross Trainer Data characteristic on the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT receives one or more Data Records. Each Data Record contains the specified Included Fields.

  The values of the specified Included Fields meet the requirements of the service.

  The value of the specified Cross Trainer Data Characteristic Flags Bits are set to 1.

  The value of the specified Fitness Machine Features bit of the Fitness Machine Feature characteristic is set to 1.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-28-C [Cross Trainer Data Notifications – Discard Partial Data Record After Link Loss]

- Test Purpose

  Verify that Collector IUT discards an incomplete Cross Trainer Data Record when experiencing a Link Loss before the last notification of the Cross Trainer Data Record and then reconnecting to the Fitness Machine and receiving a new Cross Trainer Data Record from the Fitness Machine.

- Reference

  [4] 4.5.1.1, 4.5.1.2, 4.18

- Initial Condition

  - The Lower Tester is configured to send Cross Trainer Data characteristic notifications.
  - The Cross Trainer Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-02-C [Configure Notification – Cross Trainer Data]). The Cross Trainer Data characteristic includes the Flags field, and the Instantaneous Speed field.
  - The IUT knows the handle of the Cross Trainer Data characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Treadmill Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the Lower Tester, if not previously established.
  2. The Lower Tester begins sending a Cross Trainer Data Record whose payload exceeds the ATT_MTU size to the IUT.
  3. The IUT receives, in one or more notifications, a partial Data Record.

4. Before the last notification for the Data Record is received (with the More Data bit set to 0), perform an action on the Lower Tester that will cause the link to be lost.
5. After several seconds, perform an action on the Lower Tester that allows the link to be restored.
6. The Lower Tester begins sending a new Cross Trainer Data Record whose payload exceeds the ATT_MTU size and is contained in multiple notifications to the IUT.
7. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the IUT receives a Cross Trainer Characteristic notification with the More Data bit of the Flags field is set to 0 (zero).

- Expected Outcome

  Pass verdict

  The IUT discards the incomplete Cross Trainer Data Record sent prior to the link loss in step 4. Any values from the notifications sent before the link loss are ignored when receiving the new Data Record for the Cross Trainer Data characteristic.

  The Cross Trainer Data characteristic notifications contain at least the Flags field. The notification includes the Instantaneous Speed field when the More Data bit is set to 0 (zero).

  The value of each field of the characteristic meets the requirements of the service.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-29-C [Receive Step Climber Data Notifications – Multiple Notifications]

- Test Purpose

  Verify that Collector IUT can receive notifications of the Step Climber Data characteristic that include the mandatory fields (i.e., Flags, Floors, and Step Count fields). The Collector IUT can receive Data Records sent in two or more notifications.

- Reference

  [3] 4.4.4

  [4] 4.6.1.1, 4.6.1.2, 4.6.1.3

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Step Climber Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-03-C [Configure Notification – Step Climber Data]). The Step Climber characteristic includes the Flags field, Floors field, and Step Count field.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If Lower Tester permissions for the Step Climber Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the Lower Tester, if not already done so prior to step 1.
  2. The Lower Tester sends a step climber-related Data Record whose payload exceeds the ATT_MTU size and consists of one or more notifications of the Treadmill Data characteristic to the IUT.

3. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the More Data bit is read as 0 (zero) for the notification of the Step Climber Data characteristic.
4. Verify that characteristic value meets the requirements of the service.
5. Repeat steps 2–4 until the IUT receives two or more additional Data Records, each consisting of one or more notifications.
6. The Upper Tester sends a command to the IUT to disable notifications for the Step Climber Data characteristic on the Lower Tester.
7. Repeat step 1 with notifications disabled.
8. Verify that IUT does not receive an *ATT_Handle_Value_Notification* from the Lower Tester containing the Step Climber Data characteristic.

- Expected Outcome

  Pass verdict

  The IUT sends two or more Data Records, consisting of one or more notifications of the Step Climber Data characteristic.

  The Step Climber Data characteristic contains at least the Flags field, and when the More Data bit is set, the Floors field, and the Steps Per Minute field are included.

  The value of each field of the characteristic meets the requirements of the service.

  The IUT stops sending notifications of the Step Climber Data characteristic after the Lower Tester configures the characteristic to disable notifications.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

4.8.3 Receive Step Climber Data Notifications – Supported Fields

The procedures defined in this test group verify that the IUT in the Collector role receives Step Climber Data notifications containing the specified fields for each row in Table 4.9.

- Test Purpose

  Verify that Collector IUT can receive Data Records, comprised of one or more notifications of the Step Climber Data characteristic, that include the specified field value.

- Reference

  [3] 4.4.2

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Step Climber Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-03-C [Configure Notification – Step Climber Data]). The Step Climber Data characteristic includes all specified Included Fields.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Step Climber Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Case Configuration

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-30-C [Receive Step Climber Data Notifications – Step Count Supported]	[4] 4.6.1.4 [4] 4.6.1.5	Step per Minute, Average Step Rate	Step per Minute Present, Step Count Present	Step Count Supported
FTMP/COL/NOT/BV-31-C [Receive Step Climber Data Notifications – Elevation Gain Supported]	[4] 4.6.1.6	Positive Elevation Gain	Positive Elevation Gain Present	Elevation Gain Supported
FTMP/COL/NOT/BV-32-C [Receive Step Climber Data Notifications – Expended Energy Supported]	[4] 4.6.1.7 [4] 4.6.1.8 [4] 4.6.1.9	Total Energy, Energy per Hour, Energy per Minute	Expended Energy Present	Expended Energy Supported
FTMP/COL/NOT/BV-33-C [Receive Step Climber Data Notifications – Heart Rate Measurement Supported]	[4] 4.6.1.10	Heart Rate	Heart Rate Present	Heart Rate Measurement Supported
FTMP/COL/NOT/BV-34-C [Receive Step Climber Data Notifications – Metabolic Equivalent Supported]	[4] 4.6.1.11	Metabolic Equivalent	Metabolic Equivalent Present	Metabolic Equivalent Supported
FTMP/COL/NOT/BV-35-C [Receive Step Climber Data Notifications – Elapsed Time Supported]	[4] 4.6.1.12	Elapsed Time	Elapsed Time Present	Elapsed Time Supported
FTMP/COL/NOT/BV-36-C [Receive Step Climber Data Notifications – Remaining Time Supported]	[4] 4.6.1.13	Remaining Time	Remaining Time Present	Remaining Time Supported

Table 4.9: Receive Step Climber Data Notifications test cases

- Test Procedure

1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
2. The Lower Tester sends a Step Climber-related Data Record that consists of one or more notifications of the Step Climber Data characteristic with the specified Included Fields present.
3. The IUT is induced to read the Fitness Machine Feature characteristic.
4. The IUT receives a Data Record, which consists of one or more *ATT_Handle_Value_Notifications,* from the Lower Tester containing the Step Climber Data characteristic handle and value along with the specified Included Fields.
5. Verify that characteristic value meets the requirements of the service.
6. Repeat steps 4–5 until the Lower Tester receives one or more additional Data Records.
7. The Upper Tester sends a command to the IUT to disable notifications for the Step Climber Data characteristic on the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT receives one or more Data Records. Each Data Record contains the specified Included Fields.

  The values of the specified Included Fields meet the requirements of the service.

  The value of the specified Step Climber Data Characteristic Flags Bits are set to 1.

  The value of the specified Fitness Machine Features bit of the Fitness Machine Feature characteristic is set to 1.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-37-C [Step Climber Data Notifications – Discard Partial Data Record After Link Loss]

- Test Purpose

  Verify that Collector IUT discards an incomplete Step Climber Data Record when experiencing a Link Loss before the last notification of the Step Climber Data Record and then reconnecting to the Fitness Machine and receiving a new Step Climber Data Record from the Fitness Machine.

- Reference

  [4] 4.6.1.1, 4.6.1.2, 4.6.1.3, 4.18

- Initial Condition

  - The Step Climber Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-03-C [Configure Notification – Step Climber Data]). The Step Climber characteristic includes the Flags field, Floors field, and Step Count field.
  - The IUT knows the handle of the Step Climber Data characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Step Climber Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the Lower Tester, if not previously established.
  2. The Lower Tester begins sending a Step Climber Data Record whose payload exceeds the ATT_MTU size to the IUT.
  3. The IUT receives, in one or more notifications, a partial Data Record.
  4. Before the last notification for the Data Record is received (with the More Data bit set to 0), perform an action on the Lower Tester that will cause the link to be lost.
  5. After several seconds, perform an action on the Lower Tester that allows the link to be restored.
  6. The Lower Tester begins sending a new Step Climber Data Record whose payload exceeds the ATT_MTU size and is contained in multiple notifications to the IUT.
  7. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the IUT receives a Step Climber Characteristic notification with the More Data bit of the Flags field is set to 0 (zero).

- Expected Outcome

  Pass verdict

  The IUT discards the incomplete Step Climber Data Record sent prior to the link loss in step 4. Any values from the notifications sent before the link loss are ignored when receiving the new Data Record for the Step Climber Data characteristic.

  The Step Climber Data contains at least the Flags field, and when the More Data bit is set, the Floors field, and the Steps per Minute field are included.

  The value of each field of the characteristic meets the requirements of the service.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-38-C [Receive Stair Climber Data Notifications – Multiple Notifications]

- Test Purpose

  Verify that Collector IUT can receive notifications of the Stair Climber Data characteristic that include the mandatory fields (i.e., Flags, and Floors fields). The Collector IUT can receive Data Records sent in two or more notifications.

- Reference

  [3] 4.4.5

  [4] 4.7.1.1, 4.7.1.2

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Stair Climber Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-04-C [Configure Notification – Stair Climber]). The Stair Climber Data characteristic includes the Flags field, and Floors field.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Stair Climber Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
  2. The Lower Tester sends a stair climber-related Data Record whose payload exceeds the ATT_MTU size and consists of two or more notifications of the Stair Climber Data characteristic to the IUT.
  3. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the More Data bit is read as 0 (zero) for the notification of the Stair Climber Data characteristic.
  4. Verify that characteristic value meets the requirements of the service.
  5. Repeat steps 2–4 until the IUT receives two or more additional Data Records, each consisting of one or more notifications.
  6. The Upper Tester sends a command to the IUT to disable notifications for the Stair Climber Data characteristic on the Lower Tester.

7. Repeat step 1 with notifications disabled.
8. Verify that IUT does not receive an *ATT_Handle_Value_Notification* from the Lower Tester containing the Stair Climber Data characteristic.

- Expected Outcome

  Pass verdict

  The IUT receives two or more *ATT_Handle_Value_Notifications* for each Data Record of the Stair Climber Data characteristic.

  The Stair Climber Data characteristic contains at least the Flags field, and when the More Data bit is set, the Floors field is also contined.

  The value of each field of the characteristic meets the requirements of the service.

  The IUT stops sending notifications of the Stair Climber Data characteristic after the Lower Tester configures the characteristic to disable notifications.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

4.8.4 Receive Stair Climber Data Notifications – Supported Fields

The procedures defined in this test group verify that the IUT in the Collector role receives Stair Climber Data notifications containing the specified fields for each row in Table 4.10.

- Test Purpose

  Verify that Collector IUT can receive Data Records, comprised of one or more notifications of the Stair Climber Data characteristic, that include the specified field values.

- Reference

  [3] 4.4.2

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Stair Climber Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-04-C [Configure Notification – Stair Climber]). The Stair Climber Data characteristic includes all specified Included Fields.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Stair Climber Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Case Configuration

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-39-C [Receive Stair Climber Data Notifications – Step Count Supported]	[4] 4.7.1.3 [4] 4.7.1.4	Step per Minute, Average Step Rate	Step per Minute Present, Step Count Present	Step Count Supported
FTMP/COL/NOT/BV-40-C [Receive Stair Climber Data Notifications – Elevation Gain Supported]	[4] 4.7.1.5	Positive Elevation Gain	Positive Elevation Gain Present	Elevation Gain Supported
FTMP/COL/NOT/BV-41-C [Receive Stair Climber Data Notifications – Stride Count Supported]	[4] 4.7.1.6	Stride Count	Stride Count Present	Stride Count Supported
FTMP/COL/NOT/BV-42-C [Receive Stair Climber Data Notifications – Expended Energy Supported]	[4] 4.7.1.7 [4] 4.7.1.8 [4] 4.7.1.9	Total Energy, Energy per Hour, Energy per Minute	Expended Energy Present	Expended Energy Supported
FTMP/COL/NOT/BV-43-C [Receive Stair Climber Data Notifications – Heart Rate Measurement Supported]	[4] 4.7.1.10	Heart Rate	Heart Rate Present	Heart Rate Measurement Supported
FTMP/COL/NOT/BV-44-C [Receive Stair Climber Data Notifications – Metabolic Equivalent Supported]	[4] 4.7.1.11	Metabolic Equivalent	Metabolic Equivalent Present	Metabolic Equivalent Supported
FTMP/COL/NOT/BV-45-C [Receive Stair Climber Data Notifications – Elapsed Time Supported]	[4] 4.7.1.12	Elapsed Time	Elapsed Time Present	Elapsed Time Supported
FTMP/COL/NOT/BV-46-C [Receive Stair Climber Data Notifications – Remaining Time Supported]	[4] 4.7.1.13	Remaining Time	Remaining Time Present	Remaining Time Supported

Table 4.10: Receive Stair Climber Data Notifications test cases

- Test Procedure

1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
2. The Lower Tester sends a Stair Climber-related Data Record that consists of one or more notifications of the Stair Climber Data characteristic with the specified Included Fields present.
3. The IUT is induced to read the Fitness Machine Feature characteristic.
4. The IUT receives a Data Record, which consists of one or more *ATT_Handle_Value_Notifications,* from the Lower Tester containing the Stair Climber Data characteristic handle and value along with the specified Included Fields.
5. Verify that characteristic value meets the requirements of the service.
6. Repeat steps 4–5 until the Lower Tester receives one or more additional Data Records.
7. The Upper Tester sends a command to the IUT to disable notifications for the Stair Climber Data characteristic on the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT receives one or more Data Records. Each Data Record contains the specified Included Fields.

  The values of the specified Included Fields meet the requirements of the service.

  The value of the specified Stair Climber Data Characteristic Flags Bits are set to 1.

  The value of the specified Fitness Machine Features bit of the Fitness Machine Feature characteristic is set to 1.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-47-C [Stair Climber Data Notifications – Discard Partial Data Record After Link Loss]

- Test Purpose

  Verify that Collector IUT discards an incomplete Stair Climber Data Record when experiencing a Link Loss before the last notification of the Stair Climber Data Record and then reconnecting to the Fitness Machine and receiving a new Stair Climber Data Record from the Fitness Machine.

- Reference

  [4] 4.7.1.1, 4.7.1.2, 4.18

- Initial Condition

  - The Stair Climber Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-04-C [Configure Notification – Stair Climber]). The Stair Climber Data characteristic includes the Flags field and Floors field.
  - The IUT knows the handle of the Stair Climber Data characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Stair Climber Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the Lower Tester, if not previously established.
  2. The Lower Tester begins sending a Stair Climber Data Record whose payload exceeds the ATT_MTU size to the IUT.
  3. The IUT receives, in one or more notifications, a partial Data Record.
  4. Before the last notification for the Data Record is received (with the More Data bit set to 0), perform an action on the Lower Tester that will cause the link to be lost.
  5. After several seconds, perform an action on the Lower Tester that allows the link to be restored.
  6. The Lower Tester begins sending a new Stair Climber Data Record whose payload exceeds the ATT_MTU size and is contained in multiple notifications to the IUT.
  7. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the IUT receives a Stair Climber Characteristic notification with the More Data bit of the Flags field is set to 0 (zero).

- Expected Outcome

  Pass verdict

  The IUT discards the incomplete Stair Climber Data Record sent prior to the link loss in step 4. Any values from the notifications sent before the link loss are ignored when receiving the new Data Record for the Stair Climber Data characteristic.

  The Stair Climber Data characteristic notifications contain at least the Flags field. The notifications include the Floors field when the More Data bit is set to 0 (zero).

  The value of each field of the characteristic meets the requirements of the service.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-48-C [Receive Rower Data Notifications – Multiple Notifications]

- Test Purpose

  Verify that Collector IUT can receive notifications of the Rower Data characteristic that include the mandatory fields (i.e., Flags, Stroke Rate, and Stroke Count fields).

- Reference

  [3] 4.4.6

  [4] 4.8.1.1, 4.8.1.2, 4.8.1.3

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Rower Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-05-C [Configure Notification – Rower Data]). The Rower Data characteristic includes the Flags field, Stroke Rate field, and Stroke Count field.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Rower Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
  2. The Lower Tester sends a rower-related Data Record whose payload exceeds the ATT_MTU size and consists of two or more notifications of the Rower Data characteristic.
  3. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the More Data bit is read as 0 (zero) for the notification of the Rower Data characteristic.
  4. Verify that characteristic value meets the requirements of the service.
  5. Repeat steps 4–5 until the IUT receives one or more additional Data Records, each consisting of one or more notifications.
  6. The Upper Tester sends a command to the IUT to disable notifications for the Rower Data characteristic on the Lower Tester.
  7. Repeat steps 1–2 with notifications disabled.
  8. Verify that IUT does not receive an *ATT_Handle_Value_Notification* from the Lower Tester containing the Rower Data characteristic.

- Expected Outcome

  Pass verdict

  The IUT receives two or more *ATT_Handle_Value_Notifications* of the Rower Data characteristic.

  The Rower Data characteristic notifications contain at least the Flags field. The notifications include the Stroke Rate field, and the Stroke Count field when the More Data bit is set to 0 (zero).

  The value of each field of the characteristic meets the requirements of the service.

  The Lower Tester stops sending notifications of the Rower Data characteristic after the Lower Tester configures the characteristic to disable notifications.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

4.8.5 Receive Rower Data Notifications – Supported Fields

The procedures defined in this test group verify that the IUT in the Collector role receives Rower Data notifications containing the specified fields for each row in Table 4.11.

- Test Purpose

  Verify that Collector IUT can receive Data Records, comprised of one or more notifications of the Rower Data characteristic, that include the specified field values.

- Reference

  [3] 4.4.2

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Rower Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-05-C [Configure Notification – Rower Data]). The Rower Data characteristic includes all specified Included Fields.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Rower Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Case Configuration

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-49-C [Receive Rower Data Notifications – Average Stroke Rate Supported]	[4] 4.8.1.4	Average Stroke Rate	Average Stroke Rate Present	Average Stroke Rate Supported
FTMP/COL/NOT/BV-50-C [Receive Rower Data Notifications – Total Distance Supported]	[4] 4.8.1.5	Total Distance	Total Distance Present	Total Distance Supported

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-51-C [Receive Rower Data Notifications – Pace Supported]	[4] 4.8.1.6 [4] 4.8.1.7	Instantaneous Pace, Average Pace	Instantaneous Pace Present, Average Pace Present	Pace Supported
FTMP/COL/NOT/BV-52-C [Receive Rower Data Notifications – Instantaneous Power Supported]	[4] 4.8.1.8	Instantaneous Power	Instantaneous Power Present	Instantaneous Power Supported
FTMP/COL/NOT/BV-53-C [Receive Rower Data Notifications – Average Power Supported]	[4] 4.8.1.9	Average Power	Average Power Present	Average Power Supported
FTMP/COL/NOT/BV-54-C [Receive Rower Data Notifications – Resistance Level Supported]	[4] 4.8.1.10	Resistance Level	Resistance Level	Resistance Level Supported
FTMP/COL/NOT/BV-55-C [Receive Rower Data Notifications – Expended Energy Supported]	[4] 4.8.1.11 [4] 4.8.1.12 [4] 4.8.1.13	Total Energy, Energy per Hour, Energy per Minute	Expended Energy Present	Expended Energy Supported
FTMP/COL/NOT/BV-56-C [Receive Rower Data Notifications – Heart Rate Measurement Supported]	[4] 4.8.1.14	Heart Rate	Heart Rate Present	Heart Rate Measurement Supported
FTMP/COL/NOT/BV-57-C [Receive Rower Data Notifications – Metabolic Equivalent Supported]	[4] 4.8.1.15	Metabolic Equivalent	Metabolic Equivalent Present	Metabolic Equivalent Supported
FTMP/COL/NOT/BV-58-C [Receive Rower Data Notifications – Elapsed Time Supported]	[4] 4.8.1.16	Elapsed Time	Elapsed Time Present	Elapsed Time Supported
FTMP/COL/NOT/BV-59-C [Receive Rower Data Notifications – Remaining Time Supported]	[4] 4.8.1.17	Remaining Time	Remaining Time Present	Remaining Time Supported

Table 4.11: Receive Rower Data Notifications test cases

- Test Procedure

1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
2. The Lower Tester sends a Rower Data-related Data Record that consists of one or more notifications of the Rower Data characteristic along with the specified Included Fields present.
3. The IUT is induced to read the Fitness Machine Feature characteristic.
4. The IUT receives a Data Record, which consists of one or more *ATT_Handle_Value_Notifications,* from the Lower Tester containing the Rower Data characteristic handle and value along with the specified Included Fields.
5. Verify that characteristic value meets the requirements of the service.

6. Repeat steps 4–5 until the Lower Tester receives one or more additional Data Records.
7. The Upper Tester sends a command to the IUT to disable notifications for the Rower Data characteristic on the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT receives one or more Data Records. Each Data Record contains the specified Included Fields.

  The values of the specified Included Fields meet the requirements of the service.

  The value of the specified Rower Data Characteristic Flags Bits is set to 1.

  The value of the specified Fitness Machine Features bit of the Fitness Machine Feature characteristic is set to 1.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-60-C [Rower Data Notifications – Discard Partial Data Record After Link Loss]

- Test Purpose

  Verify that Collector IUT discards an incomplete Rower Data Record when experiencing a Link Loss before the last notification of the Rower Data Record and then reconnecting to the Fitness Machine and receiving a new Rower Data Record from the Fitness Machine.

- Reference

  [4] 4.8.1.1, 4.8.1.2, 4.8.1.3, 4.18

- Initial Condition

  - The Rower Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-05-C [Configure Notification – Rower Data]). The Rower Data characteristic includes the Flags field, the Stroke Rate field, and the Stroke Count field.
  - The IUT knows the handle of the Rower Data characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Rower Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the Lower Tester, if not already done so prior to step 1.
  2. The Lower Tester begins sending a Rower Data Record whose payload exceeds the ATT_MTU size to the IUT.
  3. The IUT receives, in one or more notifications, a partial Data Record.
  4. Before the last notification for the Data Record is received (with the More Data bit set to 0), perform an action on the Lower Tester that will cause the link to be lost.
  5. After several seconds, perform an action on the Lower Tester that allows the link to be restored.

6. The Lower Tester begins sending a new Rower Data Record whose payload exceeds the ATT_MTU size and is contained in multiple notifications to the IUT.
7. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the IUT receives a Rower Characteristic notification with the More Data bit of the Flags field is set to 0 (zero).

- Expected Outcome

  Pass verdict

  The IUT discards the incomplete Rower Data Record sent prior to the link loss in step 4. Any values from the notifications sent before the link loss are ignored when receiving the new Data Record for the Rower Data characteristic.

  The Rower Data characteristic notifications contain at least the Flags field. The notifications include the Stroke Rate field and the Stroke Count field when the More Data bit is set to 0 (zero).

  The value of each field of the characteristic meets the requirements of the service.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-61-C [Receive Indoor Bike Data Notifications – Multiple Notifications]

- Test Purpose

  Verify that Collector IUT can receive notifications of the Indoor Bike Data characteristic that include the mandatory fields (i.e., Flags, Instantaneous Speed, and Instantaneous Cadence fields). The Collector IUT can receive Data Records sent in two or more notifications.

- Reference

  [3] 4.4.7

  [4] 4.9.1.1, 4.9.1.2, 4.9.1.3

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Indoor Bike Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-06-C [Configure Notification – Indoor Bike Data]). The Indoor Bike Data characteristic includes the Flags field, Instantaneous Speed field, and Instantaneous Cadence field.
  - The IUT knows the handle of the Indoor Bike characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If Lower Tester permissions for the Indoor Bike Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
  2. The Lower Tester sends a treadmill-related Data Record whose payload exceeds the ATT_MTU size and consists of two or more notifications of the Treadmill Data characteristic to the IUT.

3. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the More Data bit is read as 0 (zero) for the notification of the Treadmill Data characteristic.
4. Verify that characteristic value meets the requirements of the service.
5. Repeat steps 2–4 until the IUT receives two or more additional Data Records, each consisting of one or more notifications.
6. The Upper Tester sends a command to the IUT to disable notifications for the Indoor Bike Data characteristic on the Lower Tester.
7. Repeat step 1 with notifications disabled.
8. Verify that IUT does not receive an *ATT_Handle_Value_Notification* from the Lower Tester containing the Indoor Bike Data characteristic.

- Expected Outcome

  Pass verdict

  The IUT receives two or more *ATT_Handle_Value_Notifications* for each Data Record of the Indoor Bike Data characteristic.

  The Indoor Bike Data characteristics contain at least the Flags field, Instantaneous Speed, and Instantaneous Cadence field.

  The value of each field of the characteristic meets the requirements of the service.

  The Lower Tester stops sending notifications of the Indoor Bike Data characteristic after the IUT configures the characteristic to disable notifications.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

4.8.6 Receive Indoor Bike Data Notifications – Supported Fields

The procedures defined in this test group verify that the IUT in the Collector role receives Indoor Bike Data notifications containing the specified fields for each row in Table 4.12.

- Test Purpose

  Verify that Collector IUT can receive Data Records, comprised of one or more notifications of the Indoor Bike Data characteristic, that include the specified field values.

- Reference

  [3] 4.4.2

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Indoor Bike Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-06-C [Configure Notification – Indoor Bike Data]). The Indoor Bike Data characteristic includes all specified Included Fields.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Indoor Bike Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Case Configuration

Test Case	Reference	Included Fields	Flags Bits	Fitness Machine Features Bit
FTMP/COL/NOT/BV-62-C [Receive Indoor Bike Data Notifications – Average Speed Supported]	[4] 4.9.1.3	Average Speed	Average Speed Present	Average Speed Supported
FTMP/COL/NOT/BV-63-C [Receive Indoor Bike Data Notifications – Cadence Supported]	[4] 4.9.1.4 [4] 4.9.1.5	Instantaneous Cadence, Average Cadence	Instantaneous Cadence	Cadence Supported
FTMP/COL/NOT/BV-64-C [Receive Indoor Bike Data Notifications – Total Distance Supported]	[4] 4.9.1.6	Total Distance	Total Distance Present	Total Distance Supported
FTMP/COL/NOT/BV-65-C [Receive Indoor Bike Data Notifications – Resistance Level Supported]	[4] 4.9.1.7	Resistance Level	Resistance Level Present	Resistance Level Supported
FTMP/COL/NOT/BV-66-C [Receive Indoor Bike Data Notifications – Power Measurement Supported]	[4] 4.9.1.8	Instantaneous Power	Instantaneous Power Present	Power Measurement Supported
FTMP/COL/NOT/BV-67-C [Receive Indoor Bike Data Notifications – Average Power Supported]	[4] 4.9.1.9	Average Power	Average Power Present	Average Power Supported
FTMP/COL/NOT/BV-68-C [Receive Indoor Bike Data Notifications – Expended Energy Supported]	[4] 4.9.1.10 [4] 4.9.1.11 [4] 4.9.1.12	Total Energy, Energy per Hour, Energy per Minute	Expended Energy Present	Expended Energy Supported
FTMP/COL/NOT/BV-69-C [Receive Indoor Bike Data Notifications – Heart Rate Measurement Supported]	[4] 4.9.1.13	Heart Rate	Heart Rate Present	Heart Rate Measurement Supported
FTMP/COL/NOT/BV-70-C [Receive Indoor Bike Data Notifications – Metabolic Equivalent Supported]	[4] 4.9.1.14	Metabolic Equivalent	Metabolic Equivalent Present	Metabolic Equivalent Supported
FTMP/COL/NOT/BV-71-C [Receive Indoor Bike Data Notifications – Elapsed Time Supported]	[4] 4.9.1.15	Elapsed Time	Elapsed Time Present	Elapsed Time Supported
FTMP/COL/NOT/BV-72-C [Receive Indoor Bike Data Notifications – Remaining Time Supported]	[4] 4.9.1.16	Remaining Time	Remaining Time Present	Remaining Time Supported

Table 4.12: Receive Indoor Bike Data Notifications test cases

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
  2. The Lower Tester sends a treadmill-related Data Record that consists of one or more notifications of the Indoor Bike Data characteristic along with the specified field.
  3. The IUT is induced to read the Fitness Machine Feature characteristic.
  4. The IUT receives a Data Record, which consists of one or more *ATT_Handle_Value_Notifications,* from the Lower Tester containing the Rower Data characteristic handle and value along with the specified Included Fields.
  5. Verify that characteristic value meets the requirements of the service.
  6. Repeat steps 4–5 until the Lower Tester receives one or more additional Data Records.
  7. The Upper Tester sends a command to the IUT to disable notifications for the Indoor Bike Data characteristic on the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT receives one or more Data Records. Each Data Record contains the specified Included Fields.

  The values of the specified Included Fields meet the requirements of the service.

  The specified Indoor Bike Data Characteristic Flags Bits is set to 1.

  The specified Fitness Machine Features bit of the Fitness Machine Feature characteristic is set to 1.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-73-C [Indoor Bike Data Notifications – Discard Partial Data Record After Link Loss]

- Test Purpose

  Verify that Collector IUT discards an incomplete Indoor Bike Data Record when experiencing a Link Loss before the last notification of the Indoor Bike Data Record and then reconnecting to the Fitness Machine and receiving a new Indoor Bike Data Record from the Fitness Machine.

- Reference

  [4] 4.9.1.1, 4.9.1.2, 4.9.1.3, 4.18

- Initial Condition

  - The Lower Tester is configured to send Indoor Bike Data characteristic notifications.
  - The Indoor Bike Data characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-06-C [Configure Notification – Indoor Bike Data]). The Indoor Bike Data characteristic includes the Flags field, Instantaneous Speed field, and Instantaneous Cadence field.
  - The IUT knows the handle of the Indoor Bike Data characteristic.
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Treadmill Data characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the Lower Tester, if not previously established.
  2. The Lower Tester begins sending an Indoor Bike Data Record whose payload exceeds the ATT_MTU size to the IUT.
  3. The IUT receives, in one or more notifications, a partial Data Record.
  4. Before the last notification for the Data Record is received (with the More Data bit set to 0), perform an action on the Lower Tester that will cause the link to be lost.
  5. After several seconds, perform an action on the Lower Tester that allows the link to be restored.
  6. The Lower Tester begins sending a new Indoor Bike Data Record whose payload exceeds the ATT_MTU size and is contained in multiple notifications to the IUT.
  7. The IUT receives, in two or more notifications, the complete Data Record. The Data Record is complete when the IUT receives an Indoor Bike Characteristic notification with the More Data bit of the Flags field is set to 0 (zero).

- Expected Outcome

  Pass verdict

  The IUT discards the incomplete Indoor Bike Data Record sent prior to the link loss in step 4. Any values from the notifications sent before the link loss are ignored when receiving the new Data Record for the Indoor Bike Data characteristic.

  The Indoor Bike Data characteristic notifications contain at least the Flags field. The notifications include the Instantaneous Speed field and the Instantaneous Cadence field when the More Data bit is set to 0 (zero).

  The value of each field of the characteristic meets the requirements of the service.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

FTMP/COL/NOT/BV-74-C [Receive Training Status Notifications]

- Test Purpose

  Verify that Collector IUT can receive notifications of the Training Status characteristic with any of the defined Training Status values, a Training Status String value if present. as well as notifications with an Extended String present if the length of the Training Status String causes the characteristic to exceed the current MTU size.

- Reference

  [3] 4.4.8

  [4] 4.10.1.1, 4.10.1.3

- Initial Condition

  - If the Lower Tester requires a bonding procedure, then perform a bonding procedure.
  - The Training Status characteristic is configured for notification on the Lower Tester (e.g., by executing test case FTMP/COL/CON/BV-07-C [Configure Notification – Training Status]).
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Training Status characteristic require a specific security mode or security level, establish a connection meeting those requirements.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT meeting the security requirements of the IUT, if not already done so prior to step 1.
  2. The IUT reads the Fitness Machine Feature characteristic.
  3. The Lower Tester sends a Training Status notification to the IUT with no Training Status String present (Training Status String present bit set to 0 and Extended String present bit set to 0) and a valid Training Status field value.
  4. The IUT receives an *ATT_Handle_Value_Notification* from the Lower Tester containing a valid value in the Training Status field and no Training Status String present.
  5. Repeat steps 3 and 4 for each valid Training Status value.
  6. The Lower Tester sends a Training Status notification to the IUT with the Training Status String present bit set to 1 and the Extended String present bit set to 0, a valid Training Status field value, and a string value in the Training Status String field.
  7. The IUT receives an *ATT_Handle_Value_Notification* from the Lower Tester containing a valid value in the Training Status field and a Training Status String value.
  8. The Lower Tester sends a Training Status notification to the IUT with the Training Status String present bit set to 1 and the Extended String present bit set to 1, a valid Training Status field value, and a string value in the Training Status String field.
  9. The IUT receives an *ATT_Handle_Value_Notification* from the Lower Tester containing a valid value in the Training Status field and the first (ATT_MTU-3) octets of the Training Status String value.
  10. The IUT executes a GATT Read Long sub-procedure to read the entire extended string value.
  11. The Lower Tester configures the Training Status characteristic to disable notifications.

- Expected Outcome

  Pass verdict

  The IUT receives all notifications from the Lower Tester with valid values for each included characteristic value.

  In all cases, ensure that the RFU bits of the Flags field are set to zero.

4.9 Service Procedures – Fitness Machine Control Point

This test group contains test cases to verify that the IUT is able to handle the proper requirements of the Fitness Machine Control Point characteristic.

FTMP/COL/SPCP/BV-01-C [Fitness Machine Control Point – Request Control Procedure]

- Test Purpose

  Verify that Collector IUT can send a Fitness Machine Control Point write characteristic with Request Control Procedure Op Code and receive an indication from the Fitness Machine Control Point with the appropriate response.

- Reference

  [3] 4.4.14.2.1

  [4] 4.16.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.3.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT.
  2. The Upper Tester sends a command to the IUT to read the Fitness Machine Feature characteristic.
  3. The Upper Tester sends a command to the IUT to write the Request Control Procedure Op Code (0x00) to the Fitness Machine Control Point with no additional parameters.
  4. The Lower Tester sends the IUT an indication of the Fitness Machine Control Point characteristic with the Response Code Op Code (0x80), a Parameter Value representing Request Op Code (0x00) followed by the Result Code for 'Success' (0x01) without Response Parameter.
  5. The IUT sends an *ATT_Handle_Value_Confirmation* to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT receives one indication of the Fitness Machine Control Point characteristic with the Response Code Op Code containing a valid Parameter Value.

4.9.1 Fitness Machine Control Point Procedures

This is a generic procedure to test multiple procedures for writing Op Codes to the Fitness Machine Control Point and verifying the response. It is repeated for each row of Table 4.13.

- Test Purpose

  Verify that Collector IUT can send a Fitness Machine Control Point write characteristic with the specified Op Code and receive an indication from the Fitness Machine Control Point with the appropriate response.

- Reference

  See Table 4.13.

- Initial Condition

  - Perform the preamble described in Section 4.2.3.
  - The Collector IUT has successfully completed a Request Control Procedure (e.g., by executing test case FTMP/COL/SPCP/BV-01-C [Fitness Machine Control Point – Request Control Procedure]).

- Test Case Configuration

Test Case	Reference	Op Code	Op Code Parameter Value	Response Parameter
FTMP/COL/SPCP/BV-02-C [Fitness Machine Control Point – Reset Procedure]	[3] 4.4.14.2.2 [4] 4.16.2.2	0x01	N/A	N/A
FTMP/COL/SPCP/BV-03-C [Fitness Machine Control Point – Set Target Speed Procedure]	[3] 4.4.14.2.3 [4] 4.16.2.3	0x02	UINT16 value	N/A
FTMP/COL/SPCP/BV-04-C [Fitness Machine Control Point – Set Target Inclination Procedure]	[3] 4.4.14.2.4 [4] 4.16.2.4	0x03	SINT16 value	N/A

Test Case	Reference	Op Code	Op Code Parameter Value	Response Parameter
FTMP/COL/SPCP/BV-05-C [Fitness Machine Control Point – Set Target Resistance Level Procedure]	[3] 4.4.14.2.5 [4] 4.16.2.5	0x04	SINT16 value	N/A
FTMP/COL/SPCP/BV-06-C [Fitness Machine Control Point – Set Target Power Procedure]	[3] 4.4.14.2.6 [4] 4.16.2.6	0x05	SINT16 value	N/A
FTMP/COL/SPCP/BV-07-C [Fitness Machine Control Point – Set Target Heart Rate Procedure]	[3] 4.4.14.2.7 [4] 4.16.2.7	0x06	UINT8 value	N/A
FTMP/COL/SPCP/BV-08-C [Fitness Machine Control Point – Start or Resume Procedure]	[3] 4.4.14.2.8 [4] 4.16.2.8	0x07	N/A	N/A
FTMP/COL/SPCP/BV-09-C [Fitness Machine Control Point – Stop Procedure]	[3] 4.4.14.2.9 [4] 4.16.2.9	0x08	0x01	N/A
FTMP/COL/SPCP/BV-10-C [Fitness Machine Control Point – Pause Procedure]	[3] 4.4.14.2.9 [4] 4.16.2.9	0x08	0x02	N/A
FTMP/COL/SPCP/BV-11-C [Fitness Machine Control Point – Set Targeted Expended Energy Procedure]	[3] 4.4.14.2.10 [4] 4.16.2.10	0x09	UINT16	N/A
FTMP/COL/SPCP/BV-12-C [Fitness Machine Control Point – Set Targeted Number of Steps Procedure]	[3] 4.4.14.2.11 [4] 4.16.2.11	0x0A	UINT16 value	N/A
FTMP/COL/SPCP/BV-13-C [Fitness Machine Control Point – Set Targeted Number of Strides Procedure]	[3] 4.4.14.2.12 [4] 4.16.2.12	0X0B	UINT16 value	N/A
FTMP/COL/SPCP/BV-14-C [Fitness Machine Control Point – Set Targeted Distance Procedure]	[3] 4.4.14.2.13 [4] 4.16.2.13	0x0C	UINT24 value	N/A
FTMP/COL/SPCP/BV-15-C [Fitness Machine Control Point – Set Targeted Training Time Procedure]	[3] 4.4.14.2.14 [4] 4.16.2.14	0x0D	UINT16 value	N/A
FTMP/COL/SPCP/BV-16-C [Fitness Machine Control Point – Set Targeted Time in Two Heart Rate Zones Procedure]	[3] 4.4.14.2.15 [4] 4.16.2.15	0x0E	Targeted Time Array	N/A
FTMP/COL/SPCP/BV-17-C [Fitness Machine Control Point – Set Targeted Time in Three Heart Rate Zones Procedure]	[3] 4.4.14.2.16 [4] 4.16.2.16	0x0F	Targeted Time Array	N/A
FTMP/COL/SPCP/BV-18-C [Fitness Machine Control Point – Set Targeted Time in Five Heart Rate Zones Procedure]	[3] 4.4.14.2.17 [4] 4.16.2.17	0x10	Targeted Time Array	N/A

Test Case	Reference	Op Code	Op Code Parameter Value	Response Parameter
FTMP/COL/SPCP/BV-19-C [Fitness Machine Control Point – Set Indoor Bike Simulation Parameters]	[3] 4.4.14.2.18 [4] 4.16.2.18	0x11	Simulation parameter Array	N/A
FTMP/COL/SPCP/BV-20-C [Fitness Machine Control Point – Set Wheel Circumference Parameters]	[3] 4.4.14.2.19 [4] 4.16.2.19	0x12	UINT16 value	N/A
FTMP/COL/SPCP/BV-21-C [Fitness Machine Control Point – Spin Down Control Procedure]	[3] 4.4.14.2.20 [4] 4.16.2.20	0x13	0x01	Data structure containing two UINT16 values for Target Speed Low and Target Speed High
FTMP/COL/SPCP/BV-22-C [Fitness Machine Control Point – Set Targeted Cadence Procedure]	[3] 4.4.14.2.21 [4] 4.16.2.21	0x15	UINT16 value	N/A

Table 4.13: Fitness Machine Control Point Procedures test cases

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT.
  2. The Upper Tester sends a command to the IUT to write the specified Op Code to the Fitness Machine Control Point with parameter values as specified.
  3. The Lower Tester sends the IUT an indication of the Fitness Machine Control Point characteristic with the Response Code Op Code (0x80), a Parameter Value representing Request Op Code that matches the Op Code sent in step 2, followed by the Result Code for ‘Success’ (0x01) and the Response Parameter specified in Table 4.13.
  4. The IUT sends an *ATT_Handle_Value_Confirmation* to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT receives one indication of the Fitness Machine Control Point characteristic with the Response Code Op Code containing the expected values.

4.10 Service Procedure – Fitness Machine Status

This test group contains test cases to verify that the IUT can properly handle data within the Fitness Machine Status characteristic.

FTMP/COL/SPMS/BV-01-C [Fitness Machine Status – Parameter Field]

- Test Purpose

  Verify that the Collector IUT can receive notifications of the Fitness Machine Status characteristic from a Fitness Machine. Additionally, verify that the Collector can decode the Parameter field.

- Reference

  [3] 4.4.15

  [4] 4.17

- Initial Condition
  - The Fitness Machine Status characteristic has been configured for notifications (e.g., by executing test case FTMP/COL/CON/BV-09-C [Configure Notification – Fitness Machine Status]).
  - Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using an LE transport or Section 4.2.2 if using a BR/EDR transport.
  - If IUT permissions for the Fitness Machine Status characteristic require a specific security mode or security level, establish a connection meeting those requirements.
- Test Procedure
  1. The Lower Tester sends a notification of the Fitness Machine Status characteristic containing a valid Fitness Machine Status Op Code and a valid Parameter value, if a Parameter field value is required for the Op Code.
  2. The IUT receives a notification from the Lower Tester containing a valid Fitness Machine Status Op Code and valid Parameter value, if the Parameter is required for the specified Op Code.
  3. Repeat steps 1 and 2 for each set of values of Op Code field and Parameter field in Table 4.14.
  4. N/A indicates that there is no Parameter field included in a notification for the specified Op Code.

Op Code	Parameter
0x00	N/A
0x01	N/A
0x02	UINT value - 0x00, 0x01, or 0x02 are valid
0x03	N/A
0x04	N/A
0x05	50 km/hr
0x06	+1,0 %
0x07	5.0
0x08	+100 W
0x09	135 bpm
0x0A	500 Calories
0x0B	2000 steps
0x0C	2000 strides
0x0D	5000 m
0x0E	3600 s
0x0F	Targeted Time in Fat Burn Zone: 1800 s Targeted Time in Fitness Zone: 1800 s
0x10	Targeted Time in Light Zone: 500 s Targeted Time in Moderate Zone: 600 s Targeted Time in Hard Zone: 1800 s
0x11	Targeted Time in Very Light Zone: 600 s Targeted Time in Light Zone: 1200 s Targeted Time in Moderate Zone: 1200 s Targeted Time in Hard Zone: 600 s Targeted Time in Maximum Zone: 300 s

Op Code	Parameter
0x12	Simulation Parameter Array: Wind Speed: 10 mps Grade: 5% Crr: 1 Cw: 1 Kg/m
0x13	20.0 mm
0x14	Any value from 0x01 to 0x04
0x15	100 1/minute (with a resolution of 0.5 1/minute)

Table 4.14: Fitness Machine Status field values

- Expected Outcome

  Pass verdict

  The IUT receives each Fitness Machine Status notification from the Lower Tester.

  Each notification contains a valid Op Code, and if required by the Op Code, the Parameter field of the Fitness Machine Status characteristic is present and contains an appropriate and correctly formatted value.

4.11 Service Procedure – User Data Service

This test group contains test cases to verify that IUT can properly handle data and actions within the User Data Service.

FTMP/COL/SPUD/BV-01-C [User Data Service – Configure User Control Point Characteristic for Indication]

- Test Purpose

  Verify that Collector IUT can configure the User Control Point for indications.

- Reference

  [4] 4.5.2

- Initial Condition

  - Perform the preamble described in Section 4.2.4, if using an LE transport, or 4.2.5, if using a BR/EDR transport, to set up the transport and L2CAP channel and initiate connection.
  - Perform the preamble described in Section 4.2.6 to configure the Lower Tester for use of the User Control Point.

- Test Procedure

  1. Disable indication by writing value 0x0000 to the Client Characteristic Configuration descriptor of the User Control Point characteristic.
  2. The Upper Tester induces the IUT to send a correctly formatted *ATT_Write_Request* (Code=0x12) with the handle of the characteristic descriptor and a value of 0x0002 to the Lower Tester.
  3. The Upper Tester induces the IUT to read the value of the Client Characteristic Configuration descriptor.

- Expected Outcome

  Pass verdict

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

FTMP/COL/SPUD/BV-02-C [User Data Service – Register New User]

- Test Purpose

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

- Reference

  [4] 4.5.2.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.4, if using an LE transport, or 4.2.5, if using a BR/EDR transport, to set up the transport and L2CAP channel and initiate connection.
  - Perform the preamble described in Section 4.2.6 to configure the Lower Tester for use of the User Control Point.

- Test Procedure

  1. IUT writes the Register New User Op Code (0x01) to the User Control Point with a Parameter Value of 0x04D2 which represents the Consent Code “1234”.
  2. The Lower Tester, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value ‘success’ (0x01) with the Response Parameter set to the User Index value of 0x02.

- Expected Outcome

  Pass verdict

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

  The IUT receives the response from the user Control Point containing the User Index parameter value and sends an *ATT_Handle_Value_Confirmation* to the Lower Tester.

FTMP/COL/SPUD/BV-03-C [User Control Point – Consent]

- Test Purpose

  Verify that Collector IUT can perform the Consent procedure.

- Reference

  [4] 4.5.2.2.2

- Initial Condition
  - Perform the preamble described in Section 4.2.4, if using an LE transport, or 4.2.5, if using a BR/EDR transport, to set up the transport and L2CAP channel and initiate connection.
  - Perform the preamble described in Section 4.2.6 to configure the Lower Tester for use of the User Control Point.
  - The Lower Tester supports User Data Retention (i.e., in the Fitness Machine Feature characteristic, the User Data Retention Supported bit of the Fitness Machine Features field is set to 1).
  - A user with the User Index of 0x02 has previously been registered with Consent Code set to “1234” (0x04D2) in the Lower Tester.
- Test Procedure
  1. The Consent Code associated with the User Index may have been previously cached by the IUT or may be entered during this step. The IUT writes the Consent Op Code (0x02) to the User Control Point with a Parameter Value that contains the User Index value 0x02 followed by 0x04D2 which represent the Consent Code “1234”.
  2. The Lower Tester, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x02) followed by the Response Value ‘success’ (0x01) without a Response Parameter.
- Expected Outcome

  Pass verdict

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

  After receiving the indication of the User Control Point, the IUT sends an *ATT_Handle_Value_Confirmation* to the Lower Tester.

FTMP/COL/SPUD/BV-04-C [User Control Point – Delete User Data with User Data Retention Enabled]

- Test Purpose

  Verify that Collector IUT can perform the Delete User Data procedure to initiate the deletion of user data on the Fitness Machine Control Point when User Data Retention is enabled.
- Reference

  [4] 4.5.2.2.3
- Initial Condition
  - Perform the preamble described in Section 4.2.4, if using an LE transport, or 4.2.5, if using a BR/EDR transport, to set up the transport and L2CAP channel and initiate connection.
  - Perform the preamble described in Section 4.2.6 to configure the Lower Tester for use of the User Control Point.

- User Data Retention is enabled on the Lower Tester (the User Data Retention Supported bit is set to 1 in the Fitness Machine Features field of the Fitness Machine Feature characteristic).
- Perform the Consent procedure described in FTMP/COL/SPUD/BV-03-C [User Control Point – Consent] so that consent has been granted with respect to the user having User Index value 0x02 with Consent Code set to “1234” (0x04D2) in the Lower Tester.
- Maintain the connection for the purposes of running the following test procedure.

- Test Procedure

  1. IUT writes the Delete User Data Op Code (0x03) to the User Control Point without a Parameter Value.
  2. The Lower Tester, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x03) followed by the Response Value ‘success’ (0x01) without a Response Parameter.

- Expected Outcome

  Pass verdict

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

  After receiving the indication of the User Control Point, the IUT sends an *ATT_Handle_Value_Confirmation* to the Lower Tester.

FTMP/COL/SPUD/BV-05-C [User Data Service – Configure Notifications Database Change Increment Characteristic]

- Test Purpose

  Verify that the Collector IUT can configure a Fitness Machine to notify the Database Change Increment Characteristic.

- Reference

  [3] 4.5.1

- Initial Condition

  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The IUT has discovered the Client Characteristic Configuration Descriptor of the Database Change Increment characteristic contained in the Lower Tester.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to configure the Fitness Machine to notify the Database Change Increment characteristic.

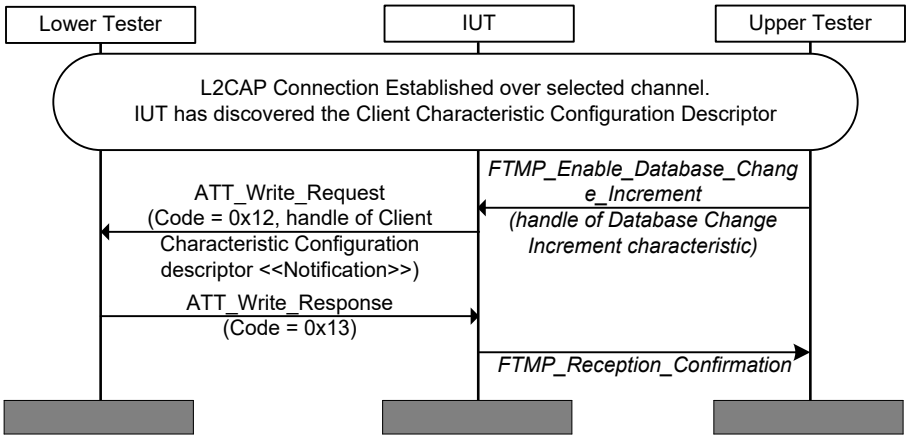

Figure 4.2: FTMP/COL/SPUD/BV-05-C [User Data Service – Configure Notifications Database Change Increment Characteristic]

- Expected Outcome

  Pass verdict

  The IUT sends a correctly formatted *ATT_Write_Request* (0x12) to the Lower Tester, with the handle set to that of the Client Characteristic Configuration descriptor for the Database Change Increment characteristic with the value set to «Notification».

FTMP/COL/SPUD/BV-06-C [User Data Service – Write Database Change Increment]

- Test Purpose

  Verify that the Collector IUT can write the Database Change Increment Characteristic.

- Reference

  [3] 4.5.1

- Initial Condition

  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The IUT has discovered the Client Characteristic Configuration Descriptor of the Database Change Increment characteristic contained in the Lower Tester.

- Test Procedure

  1. Send a command from the Upper Tester to request the IUT to write a Database Change Increment characteristic to the Lower Tester.
  2. After receipt of the expected result by the Lower Tester from the IUT, send an *ATT_Write_Response* (0x13) from the Lower Tester to the IUT.

- Expected Outcome

  Pass verdict

  The IUT sends a correctly formatted *ATT_Write_Request* (0x12) to the Lower Tester containing the handle specified by the Upper Tester.

  The IUT receives the response from the Lower Tester and sends the Database Change Increment value to the Upper Tester.

FTMP/COL/SPUD/BV-07-C [User Control Point – No Synchronization with Equal Database Change Increment Values]

- Test Purpose

  Verify that a Collector IUT does not perform any database synchronization when the Collector and Fitness Machine have equal Database Change Increment values.

- Reference

  [3] 4.5.4

- Initial Condition

  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The Lower Tester is configured to support User Data Retention (the User Data Retention Supported bit is set to 1 in the in the Fitness Machine Features field of the Fitness Machine Feature characteristic).
  - The User of the Collector IUT is registered in the Lower Tester.
  - The Database Change Increment value is the same on both the Collector IUT and the Lower Tester.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to read the Database Change Increment value of the Lower Tester.

- Expected Outcome

  Pass verdict

  The databases are synchronized and no action is taken by the IUT.

FTMP/COL/SPUD/BV-08-C [User Control Point – Synchronization When Fitness Machine Database Change Increment Value is Greater]

- Test Purpose

  Verify that a Collector IUT reads and caches all supported UDS characteristics from a Fitness machine when the Fitness Machine has a greater Database Change Increment value than on the Collector.

- Reference

  [3] 4.5.4

- Initial Condition
  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The Lower Tester is configured to support User Data Retention (the User Data Retention Supported bit is set to 1 in the in the Fitness Machine Features field of the Fitness Machine Feature characteristic).
  - The User of the Collector IUT is registered in the Lower Tester.
  - The Database Change Increment value on the Lower Tester is greater than the Database Change Increment value on the Collector IUT.
- Test Procedure
  1. The Upper Tester sends a command to the IUT to read the Database Change Increment value of the Lower Tester.
  2. The Lower Tester disconnect from IUT.
  3. After several seconds, initiate a connection between the Lower Tester and the IUT.
  4. The Upper Tester sends a command to the IUT to read the Database Change Increment value of the Lower Tester.
- Expected Outcome

  Pass verdict

  The IUT reads and caches all the UDS characteristics supported by the IUT.

  At step 4, the IUT caches the Database Change Increment value.

FTMP/COL/SPUD/BV-09-C [User Control Point – Synchronization When Collector Database Change Increment Value is Greater]

- Test Purpose

  Verify that a Collector IUT writes updated UDS characteristics to a Fitness machine when the Database Change Increment value on the Fitness Machine is less than the value on the Collector.
- Reference

  [3] 4.5.4
- Initial Condition
  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The Lower Tester is configured to support User Data Retention (the User Data Retention Supported bit is set to 1 in the in the Fitness Machine Features field of the Fitness Machine Feature characteristic).
  - The User of the Collector IUT is registered in the Lower Tester.
  - The Database Change Increment value on the Lower Tester is less than the Database Change Increment value on the Collector IUT by executing the procedure in FTMP/COL/SPUD/BV-06-C [User Data Service – Write Database Change Increment].

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write the Database Change Increment value of the Lower Tester.
  2. The Lower Tester disconnect from IUT.
  3. After several seconds, initiate a connection between the Lower Tester and the IUT.
  4. The Upper Tester sends a command to the IUT to write the Database Change Increment value of the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT writes updated UDS characteristics to the Lower Tester.

  At step 4, the IUT writes its local Database Change Increment value to the Lower Tester.

FTMP/COL/SPUD/BV-10-C [User Data Service – Database Change Increment Notification Received]

- Test Purpose

  Verify that the Collector IUT behavior on receipt of a notification of the Database Change Increment characteristic.

- Reference

  [3] 4.5.1

- Initial Condition

  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The IUT has executed the procedure in FTMP/COL/SPUD/BV-02-C [User Data Service – Register New User] to register a new user.
  - The IUT has executed the procedure in FTMP/COL/SPUD/BV-05-C [User Data Service – Configure Notifications Database Change Increment Characteristic] configures it to expect Database Change Increment notifications.

- Test Procedure

  1. The Lower Tester updates at least one UDS Characteristic value (e.g., the First Name characteristic value) and also increments the value of Database Change Increment characteristic.
  2. The Lower Tester sends a notification of the Database Change Increment characteristic.
  3. The IUT reads the UDS characteristics it supports.

- Expected Outcome

  Pass verdict

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

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

FTMP/COL/SPUD/BV-11-C [User Data Service – Read UDS Characteristics]

- Test Purpose

  Verify that the Collector IUT behavior can read all characteristics of the User Data Service supported by the IUT.

- Reference

  [3] 4.5.1

- Initial Condition

  - All characteristics of the User Data Service supported by the IUT are specified in the IXIT [8].
  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The Lower Tester includes one instantiation of the User Data Service including all defined characteristics.
  - The IUT has the handle/value pairs for all characteristics of the User Data Service exposed by the Lower Tester that are supported by the IUT.
  - The test values used for UTF-8 based characteristics include character values outside the ASCII printable range.
  - The length of each UDS Characteristic used in this test case is such that its value can be read in its entirety in a GATT Read transaction when the default ATT_MTU size is used.

- Test Procedure

  1. The Upper Tester issues a command to the IUT to read all characteristics of the User Data Service supported by the IUT.
  2. For each characteristic of the User Data Service supported by the IUT, the IUT sends an *ATT_Read_Request* to the Lower Tester containing the handle specified by the Upper Tester.

- Expected Outcome

  Pass verdict

  For each characteristic contained in the Lower Tester's instantiation of the User Data Service supported by the IUT, the IUT reports the characteristic value correctly for all characteristics specified in the IXIT [8] to the Upper Tester, including:

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

FTMP/COL/SPUD/BV-12-C [User Control Point – Read Long UDS Characteristics]

- Test Purpose

  Verify that a Collector IUT can use the GATT Read Long sub-procedure successfully to read UDS Characteristics that contain a value in UTF-8 format and may exceed the capacity of default ATT_MTU size (e.g., the First Name, Last Name or Email Address UDS Characteristic).

- Reference

  [3] 4.5.1

- Initial Condition

  - All characteristics of the User Data Service supported by the IUT that use UTF-8 format are specified in the IXIT [8].
  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The Lower Tester includes one instantiation of the User Data Service including all defined characteristics.
  - The IUT has the handle/value pairs for all characteristics of the User Data Service exposed by the Lower Tester that are supported by the IUT.
  - The Lower Tester does not permit an ATT_MTU size larger than the default ATT_MTU size for LE to be negotiated.
  - The length of the UDS Characteristic used in this test case is such that its value cannot be read in its entirety in a GATT Read transaction when the default ATT_MTU size is used and therefore requires the GATT Read Long procedure to be used.

- Test Procedure

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

- Expected Outcome

  Pass verdict

  For each UDS Characteristic using the UTF-8 format for which support was declared in the IXIT [8], the IUT reports the characteristic value correctly, including all the printable and non-printable ASCII values.

FTMP/COL/SPUD/BV-13-C [User Control Point – Write UDS Characteristics]

- Test Purpose

  Verify that a Collector IUT can write a new value to each writable UDS Characteristic supported by the IUT.

- Reference

  [3] 4.5.1

- Initial Condition

  - All UDS Characteristics for which the IUT supports writing are specified in the IXIT [8].
  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.

- The Lower Tester includes one instantiation of the User Data Service including all defined characteristics.
- The IUT has the handle/value pairs for all characteristics of the User Data Service exposed by the Lower Tester that are supported by the IUT.
- The test values used for UTF-8 based characteristics include character values outside the ASCII printable range.
- The length of the test value to be written is such that it can be written in its entirety in a GATT Write transaction, using the default minimum ATT_MTU size.

- Test Procedure

  1. The Upper Tester issues a command to the IUT to write a new value to a UDS Characteristic supported by the IUT, e.g., writing a new value for the 'Age', 'Gender' or 'Waist Circumference' UDS Characteristic.
  2. The IUT sends an *ATT_Write_Request* command to the Lower Tester with the value specified in step 1.

- Expected Outcome

  Pass verdict

  For each UDS Characteristic for which the IUT supports writing declared in the IXIT [8], the IUT writes the characteristic value(s) correctly to the Lower Tester, including:

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

FTMP/COL/SPUD/BV-14-C [User Control Point – Write Long UDS Characteristics]

- Test Purpose

  Verify that a Collector IUT can use the GATT Write Long sub-procedure successfully to write to UDS Characteristics that contain a value in UTF-8 format when the length of the value to be written exceeds the capacity of default ATT_MTU size (e.g., the First Name, Last Name or Email Address UDS Characteristic).

- Reference

  [3] 4.5.1

- Initial Condition

  - All UDS Characteristics for which the IUT supports writing that use a UTF-8 format are specified in the IXIT [8].
  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection to a Fitness Machine.
  - The Lower Tester includes one instantiation of the User Data Service including all defined characteristics.
  - The IUT has the handle/value pairs for all characteristics of the User Data Service exposed by the Lower Tester that are supported by the IUT.

- The test values used for UTF-8 based characteristics include character values outside the ASCII printable range.
- The length of the UDS Characteristic used in this test case is such that its value cannot be written in its entirety in a GATT Write transaction when the default ATT_MTU size is used and therefore requires the GATT Write Long procedure to be used.

- Test Procedure

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

- Expected Outcome

  Pass verdict

  For each UDS Characteristic using the UTF-8 format for which the IUT supports writing declared in the IXIT [8], the IUT writes the characteristic value correctly to the Lower Tester including, for string-based characteristics, any printable or non-printable ASCII values.

FTMP/COL/SPUD/BV-15-C [User Control Point – Link Loss without User Data Retention]

- Test Purpose

  The Collector IUT can access user data on the Fitness Machine if reconnecting after link loss within a short amount of time with successful Consent procedure. If the IUT fails to reconnect to the Fitness Machine within a short amount of time, then the user data will no longer be accessible.

- Reference

  [3] 4.8

- Initial Condition

  - Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection between the IUT and Lower Tester.
  - The IUT is configured not to support User Data Retention (the User Data Retention Supported bit is set to 0 (zero) in the Fitness Machine Features field of the Fitness Machine Feature characteristic).
  - Perform the Consent procedure described in FTMP/COL/SPUD/BV-03-C [User Control Point – Consent] so that consent has been granted with respect to the user having User Index value 0x02.
  - Maintain the connection to run the following test procedure.

- Test Procedure

  1. The Lower Tester performs an action that causes link loss.
  2. The Lower Tester restores the link to the IUT in less than 5 seconds.
  3. The IUT performs the consent procedure in FTMP/COL/SPUD/BV-02-C [User Data Service – Register New User] for the user having User Index value 0x02.
  4. The Lower Tester sends a success response to the IUT.
  5. The Lower Tester performs an action that causes link loss.
  6. The Lower Tester restores the link to the IUT after more than 10 seconds have passed.

7. The IUT performs the consent procedure in FTMP/COL/SPUD/BV-02-C [User Data Service – Register New User] for the user having User Index value 0x02.
8. The Lower Tester indicates failure to the IUT.

- Expected Outcome

  Pass verdict

  The IUT can successfully perform the Consent procedure when reconnecting to the Lower Tester within five seconds after the link is lost between the IUT and Lower Tester.

  The IUT cannot successfully perform the Consent procedure when reconnecting to the Lower Tester after ten seconds after the link is lost between the IUT and Lower Tester.

FTMP/FTMR/SPUD/BV-01-C [User Control Point – User Data Retained after Disconnect with User Data Retention Enabled]

- Test Purpose

  Verify that Fitness Machine IUT retains user data after disconnection when the User Data Retention feature is enabled.

- Reference

  [3] 3.2

- Initial Condition

  - Perform the preamble described in Section 4.2.4, if using an LE transport, or 4.2.5, if using a BR/EDR transport, to set up the transport and L2CAP channel and initiate connection.
  - Perform the preamble described in Section 4.2.7 to configure the IUT for use of the User Control Point.
  - User Data Retention is enabled on the IUT (the User Data Retention Supported bit is set to 1 in the Fitness Machine Features field of the Fitness Machine Feature characteristic).
  - The Lower Tester has successfully written the Consent Op Code to the User Control Point of the IUT for User Index value 0x02 and Consent Code 0x04D2 (“1234”).
  - The IUT has user data stored for user with User Index value 0x02.
  - Maintain the connection for the purposes of running the following test procedure.

- Test Procedure

  1. The Lower Tester disconnects from the IUT.
  2. After several seconds, initiate a connection between the Lower Tester and the IUT.
  3. Using a Consent Code that may have been previously cached or entered at this point, the Lower Tester writes the Consent Op Code (0x02) to the User Control Point for User Index 0x02 with a Consent Code of 0x04D2 (“1234”) and receives a User Control Point indication from the IUT with Response Value of 0x01 (success).
  4. The Lower Tester performs a read of a User Data Service characteristic supported by the IUT for the associated user.
  5. The Lower Tester receives the expected value from the read.

- Expected Outcome

  Pass verdict

  The Consent procedure is successful after the IUT and Lower Tester are reconnected.

  The IUT sends the expected value in response to the Lower Tester reading a supported characteristic of the User Data Service.

FTMP/FTMR/SPUD/BV-02-C [User Control Point – User Data Not Retained after Disconnect with User Data Retention Disabled]

- Test Purpose

  Verify that Fitness Machine IUT does not retain user data after disconnection when the User Data Retention feature is disabled.

- Reference

  [3] 3.1

- Initial Condition

  - Perform the preamble described in Section 4.2.4, if using an LE transport, or 4.2.5, if using a BR/EDR transport, to set up the transport and L2CAP channel and initiate connection.
  - Perform the preamble described in Section 4.2.7 to configure the IUT for use of the User Control Point.
  - User Data Retention is disabled on the IUT (the User Data Retention Supported bit is set to 0 in the Fitness Machine Features field of the Fitness Machine Feature characteristic).
  - The Lower Tester has successfully written the Consent Op Code to the User Control Point of the IUT for User Index value 0x02 and Consent Code 0x04D2 (“1234”).
  - Maintain the connection for the purposes of running the following test procedure.

- Test Procedure

  1. The Lower Tester disconnects from the IUT.
  2. After several seconds, initiate a connection between the Lower Tester and the IUT to register as a new user.
  3. The Lower Tester performs the consent procedure as in FTMP/COL/SPUD/BV-03-C [User Control Point – Consent] for the user having User Index value 0x02.
  4. The Lower Tester writes the Register New User Op Code (0x01) to the IUT with a Parameter Value of 0x04D2, which represents the Consent Code “1234”.
  5. The IUT, after sending a Write Response to acknowledge the write to the User Control Point, sends an indication of the User Control Point characteristic containing the Response Code Op Code (0x20), the Request Op Code (0x01) followed by the Response Value ‘success’ (0x01) with the Response Parameter set to the User Index value of 0x0.

- Expected Outcome

  Pass verdict

  The IUT sends a Write Response to acknowledge the Lower Tester’s write to the User Control Point.

  The IUT sends an indication with Response Value of “Success” after the Lower Tester performs a Register New User procedure.

FTMP/FTMR/SPUD/BV-03-C [User Control Point – Multiple Users Registered on Fitness Machine]

- Test Purpose

  Verify that Fitness Machine IUT provides the correct data for the current user when multiple users are registered on the same Fitness Machine.

- Reference

  [3] 3.2

- Initial Condition

  - The IUT is configured to support User Data Retention (the User Data Retention Supported bit is set to 1 in the in the Fitness Machine Features field of the Fitness Machine Feature characteristic).
  - There are two registered users registered on the IUT: “User A” and “User B”.

- Test Procedure

  1. Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection between the IUT and Lower Tester.
  2. The Lower Tester emulating Collector A initiates the Consent procedure and supplies the correct User ID and Consent Code parameters for User A.
  3. The IUT confirms to the Lower Tester emulating Collector A that the Consent procedure was completed successfully.
  4. The Lower Tester reads the value of the User Index characteristic and stores the value for assessment.
  5. The Lower Tester terminates the connection with the IUT.
  6. Run the preamble procedure defined in Section 4.2.1 if using LE Transport, or 4.2.2 if using BR/EDR transport to set up the transport and L2CAP channel and initiate connection between the IUT and Lower Tester.
  7. The Lower Tester emulating Collector B initiates the Consent procedure and supplies the correct User ID and Consent Code parameters for User B.
  8. The IUT confirms to the Lower Tester emulating Collector B that the Consent procedure was completed successfully.
  9. The Lower Tester reads the value of the User Index characteristic and stores the value for assessment.
  10. The Lower Tester terminates the connection with the IUT.

- Expected Outcome

  Pass verdict

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

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

4.12 Service Procedure – General Error Handling

FTMP/COL/SPE/BI-01-C [Unsupported Op Code]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives an ‘Op Code not supported’ Response Code from the Fitness Machine Control Point.

- Reference

  [3] 4.7

  [4] 4.16.2.21

- Initial Condition

  - Perform the preamble described in Section 4.2.3.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to write any Op Code to the Fitness Machine Control Point using an appropriate parameter for the Op Code.
  2. The Lower Tester sends a Response Indication of the Fitness Machine Control Point characteristic with the Response Code Op Code (0x80) and the Request Op Code sent in step 1, followed by the Result Code for ‘Op Code not supported’ (0x02) without any following Response Parameters.

- Expected Outcome

  Pass verdict

  The indication from the Lower Tester contains the Response Value of 0x02, ‘Op Code not supported’.

  The IUT considers the procedure to have failed.

  The IUT returns to a stable state and can process commands normally.

FTMP/COL/SPE/BI-02-C [Invalid Parameter]

- Test Purpose

  Verify that Collector IUT behaves appropriately when it receives an ‘Invalid Parameter’ Response Code from the Fitness Machine Control Point.

- Reference

  [3] 4.7

  [4] 4.16.2.21

- Initial Condition

  - Perform the preamble described in Section 4.2.3.

- Test Procedure

  1. IUT writes the Reset Op Code (0x01) to the Fitness Machine Control Point using any parameter values.
  2. The Lower Tester sends a Response Indication of the Fitness Machine Control Point characteristic with the Response Code Op Code (0x80) and a Parameter representing Request Op Code (0x01) followed by the Response Code Value for ‘Invalid Parameter’ (0x03).

- Expected Outcome

  Pass verdict

  The IUT returns to a stable state and can process commands normally.

FTMP/COL/SPE/BI-03-C [Operation Failed]

- Test Purpose

  Verify that Collector IUT behaves appropriately when it receives an “Operation Failed” Response Code from the Fitness Machine Control Point.

- Reference

  [3] 4.7

  [4] 4.16.2.21

- Initial Condition

  - Perform the preamble described in Section 4.2.3.

- Test Procedure

  1. IUT writes any Op Code to the Fitness Machine Control Point using an appropriate Parameter for the Op Code.
  2. The Lower Tester sends an indication of the Fitness Machine Control Point characteristic with the Response Code Op Code (0x20) and a Parameter representing Request Op Code followed by the Response Code Value for ‘Operation Failed’ (0x04) (i.e., the Lower Tester simulates a failed operation).

- Expected Outcome

  Pass verdict

  The IUT considers the procedure to have failed.

  The IUT returns to a stable state and can process commands normally.

FTMP/COL/SPE/BI-04-C [Control Not Permitted]

- Test Purpose

  Verify that Collector IUT responds appropriately when receiving a ‘Control Not Permitted’ response from the Fitness Machine Control Point after performing a Request Control Procedure.

- Reference

  [4] 4.4.14.2.1

- Initial Condition

  - Perform the preamble described in Section 4.2.3.

- Test Procedure

  1. Establish a connection between the Lower Tester and IUT.
  2. The Upper Tester sends a command to the IUT to read the Fitness Machine Feature characteristic.
  3. The Upper Tester sends a command to the IUT to write the Request Control Procedure Op Code (0x00) to the Fitness Machine Control Point with no additional parameters.

4. The Upper Tester sends a command to the IUT to write the Start Procedure Op Code (0x07) to the Fitness Machine Control Point with no additional parameters.
5. The Lower Tester sends the IUT an indication of the Fitness Machine Control Point characteristic with the Response Code Op Code (0x80), a Parameter Value representing Request Control Op Code (0x00) followed by the Result Code for 'Control Not Permitted' (0x05) without Response Parameter.
6. The IUT sends an *ATT_Handle_Value_Confirmation* to the Lower Tester.

- Expected Outcome

  Pass verdict

  The IUT considers the procedure to have failed.

  The IUT returns to a stable state and can process commands normally.

FTMP/COL/SPE/BI-05-C [Procedure Already In Progress]

- Test Purpose

  Verify that Collector IUT responds appropriately when it receives a 'Procedure Already in Progress' error code from the Fitness Machine Control Point.

- Reference

  [3] 4.7

  [4] 4.16.2.21

- Initial Condition

  - Perform the preamble described in Section 4.2.3.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to send a Write Request to write a valid Op Code to the Fitness Machine Control Point characteristic (e.g., by executing the test case described in FTMP/COL/SPCP/BV-03-C [Fitness Machine Control Point – Set Target Speed Procedure] or by other means).
  2. The Lower Tester sends an Attribute Protocol Error response with the error code set to Procedure Already In Progress (0xFE). The Lower Tester does not indicate the Fitness Machine Control Point characteristic (i.e., the Lower Tester simulates that a control point procedure was already in progress)

- Expected Outcome

  Pass verdict

  The IUT considers the procedure to have failed.

  The IUT returns to a stable state and can process commands normally.

FTMP/COL/SPE/BI-06-C [Client Characteristic Descriptor Improperly Configured]

- Test Purpose

  Verify that Collector IUT responds appropriately when it receives a 'Client Characteristic Configuration Descriptor Improperly Configured' error code.

- Reference

  [3] 4.7

  [4] 4.16.2.21

- Initial Condition

  - Perform the preamble described in Section 4.2.3 except for Step 5.

- Test Procedure

  1. The Upper Tester sends a command to the IUT to send a Write Request to write a valid Op Code to the Fitness Machine Control Point characteristic (e.g., by executing the test case described in FTMP/COL/SPCP/BV-03-C [Fitness Machine Control Point – Set Target Speed Procedure] or by other means).
  2. The Lower Tester sends an Attribute Protocol Error response with the error code set to 'Client Characteristic Configuration Descriptor Improperly Configured' (0xFD). The Lower Tester does not indicate the Fitness Machine Control Point characteristic.
  3. Verify that the IUT response meets the requirements of the service.

- Expected Outcome

  Pass verdict

  The IUT considers the procedure to have failed.

  The IUT returns to a stable state and can process commands normally.

FTMP/COL/SPE/BI-07-C [User Data Access Not Permitted]

- Test Purpose

  Verify that the Collector IUT behaves appropriately when it receives the Application ATT Error Code: User Data Access Not Permitted.

- Reference

  [3] 4.7

  [4] 4.16.2.21

- Initial Condition

  - Perform the preamble described in Section 4.2.3.

  - The Consent procedure of the User Data Control Point is not executed.

- Test Procedure

  1. IUT attempts to read any supported UDS Characteristic, using the procedure described in FTMP/COL/SPUD/BV-11-C [User Data Service – Read UDS Characteristics].
  2. The Lower Tester sends an Attribute Protocol Application Error response with the error code 0x80, meaning 'User Data Access Not Permitted'.

- Expected Outcome

  Pass verdict

  The IUT returns to a stable state and can process commands normally.

FTMP/COL/SPE/BI-08-C [Fitness Machine Control Point Procedure Timeout]

- Test Purpose

  Verify that if the Collector IUT does not receive a response to a Fitness Machine Control Point Op Code, it times out after the Attribute Protocol transaction timeout.

- Reference

  [4] 4.16.4

- Initial Condition

  - Perform the preamble described in Section 4.2.3.
  - The Consent procedure of the User Data Control Point is not executed.

- Test Procedure

  1. The Upper Tester induces the IUT to write any of the supported Op Codes to the User Data Control Point.
  2. The IUT writes the required Op Code to the Fitness Machine Control Point along with an appropriate Parameter if one is required by the Op Code.
  3. The Lower Tester does not send an indication of the Fitness Machine Control Point characteristic for at least longer than the Attribute Protocol transaction timeout.
  4. After the specified timeout has expired, the IUT notifies the Upper Tester that the Attribute Protocol transaction timeout has expired and the IUT considers the procedure to have failed.
  5. The Upper Tester attempts to induce the IUT to perform a further GATT operation by attempting to read the value of the Fitness Machine Feature characteristic exposed by the Lower Tester.

- Expected Outcome

  Pass verdict

  The GATT operation in step 5 either fails completely or induces the IUT to establish a new ATT Bearer before the operation is performed.

  If a new ATT Bearer is not established, the IUT does not attempt to read the value of the Fitness Machine Feature characteristic.

  If a new ATT Bearer is established, the IUT may read the value of the Fitness Machine Feature characteristic.

  The IUT returns to a stable state and can process commands normally.

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 Fitness Machine Profile (FTMP) [5].

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

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

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

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

Item	Feature	Test Case(s)
FTMP 8/1	Discover Fitness Machine Service	FTMP/COL/CGGIT/SER/BV-01-C
FTMP 2/1 AND FTMP 3/2 AND NOT FTMP 3/1 AND GATT 1a/4	Fitness Machine Service not discoverable over BR/EDR	FTMP/FTMR/SGGIT/SDPNF/BV-01-C
FTMP 8/2 AND FTMP 9/2	Discover User Data Service	FTMP/COL/CGGIT/SER/BV-02-C
FTMP 8/3 AND FTMP 9/3	Discover Device Information Service	FTMP/COL/CGGIT/SER/BV-03-C
FTMP 9/4 AND FTMP 9/8 AND FTMP 12/1	Discover FTM Feature Characteristic, Read FTM Feature Characteristic	FTMP/COL/CGGIT/CHA/BV-01-C
FTMP 12a/1	Characteristic GGIT – Fitness Machine Feature indication	FTMP/COL/CGGIT/ISFC/BV-01-C
FTMP 12a/2 AND FTMP 23/4	Read Fitness Machine Feature characteristic – Bonding enabled	FTMP/COL/FTMF/BV-03-C
(FTMP 12a/1 OR FTMP 12a/2) AND FTMP 23/4	Enable Fitness Machine Feature characteristic for indication or read characteristic upon reconnection	FTMP/COL/FTMF/BV-04-C
FTMP 9/9	Discover Treadmill Data Characteristic	FTMP/COL/CGGIT/CHA/BV-02-C
FTMP 9/10	Discover Cross Trainer Data Characteristic	FTMP/COL/CGGIT/CHA/BV-03-C
FTMP 9/11	Discover Step Climber Data Characteristic	FTMP/COL/CGGIT/CHA/BV-04-C
FTMP 9/12	Discover Stair Climber Data Characteristic	FTMP/COL/CGGIT/CHA/BV-05-C
FTMP 9/13	Discover Rower Data Characteristic	FTMP/COL/CGGIT/CHA/BV-06-C

Item	Feature	Test Case(s)
FTMP 9/14	Discover Indoor Bike Data Characteristic	FTMP/COL/CGGIT/CHA/BV-07-C
FTMP 9/15	Discover Indoor Training Status Characteristic	FTMP/COL/CGGIT/CHA/BV-08-C
FTMP 9/16 AND FTMP 12/3	Discover and Read Supported Speed Range Characteristic	FTMP/COL/CGGIT/CHA/BV-09-C
FTMP 9/17 AND FTMP 12/4	Discover and Read Supported Inclination Range Characteristic	FTMP/COL/CGGIT/CHA/BV-10-C
FTMP 9/18 AND FTMP 12/5	Discover and Read Supported Resistance Level Range Characteristic	FTMP/COL/CGGIT/CHA/BV-11-C
FTMP 9/19 AND FTMP 12/6	Discover and Read Supported Power Range Characteristic	FTMP/COL/CGGIT/CHA/BV-12-C
FTMP 9/20 AND FTMP 12/7	Discover and Read Supported Heart Rate Range Characteristic	FTMP/COL/CGGIT/CHA/BV-13-C
FTMP 9/21 AND FTMP 12/8	Discover Fitness Machine Control Point Characteristic	FTMP/COL/CGGIT/CHA/BV-14-C
FTMP 9/22 AND FTMP 12/9	Discover Fitness Machine Status Characteristic	FTMP/COL/CGGIT/CHA/BV-15-C
FTMP 10/5	Discover User Index Characteristic	FTMP/COL/DCHR/BV-16-C
FTMP 10/1 AND FTMP 20/4	Discover and Read Database Change Increment Characteristic	FTMP/COL/DCHR/BV-17-C
FTMP 10/3	Discover User Data Control Point Characteristic	FTMP/COL/DCHR/BV-18-C
FTMP 9/5	Discover UDS Characteristics	FTMP/COL/DCHR/BV-19-C
FTMP 9/6	Discover Device Information Service Characteristics	FTMP/COL/DCHR/BV-20-C FTMP/COL/DCHR/BV-21-C
FTMP 10/2	Discover Database Change Increment Client Characteristic Configuration Descriptor	FTMP/COL/DCCD/BV-10-C
FTMP 10/4	Discover User Control Point Client Characteristic Configuration Descriptor	FTMP/COL/DCCD/BV-11-C
FTMP 13/1	Configure Treadmill Data characteristic notifications	FTMP/COL/CON/BV-01-C
FTMP 14/1	Configure Cross Trainer Data characteristic for notification	FTMP/COL/CON/BV-02-C
FTMP 15/1	Configure Step Climber Data characteristic notifications	FTMP/COL/CON/BV-03-C
FTMP 16/1	Configure Stair Climber Data characteristic notifications	FTMP/COL/CON/BV-04-C
FTMP 17/1	Configure Rower Data characteristic notifications	FTMP/COL/CON/BV-05-C
FTMP 18/1	Configure Indoor Bike Data characteristic notifications	FTMP/COL/CON/BV-06-C
FTMP 9/15	Configure Training Status notifications	FTMP/COL/CON/BV-07-C

Item	Feature	Test Case(s)
FTMP 19/1 AND FTMP 19/2	Configure FTM Control Point indication	FTMP/COL/CON/BV-08-C
FTMP 9/22	Configure Fitness Machine Status notification	FTMP/COL/CON/BV-09-C
FTMP 4/2 AND FTMP 4/8	Additional Requirements for the Low Energy Transport - AD Type	FTMP/FTMR/FTMF/BV-01-C FTMP/FTMR/FTMF/BV-02-C
FTMP 4/3 AND FTMP 4/4	Local Name included in AD, Local Name in Scan Response Data	FTMP/FTMR/FTMF/BV-03-C
FTMP 4/6 AND FTMP 4/7	Appearance included in AD	FTMP/FTMR/FTMF/BV-04-C
FTMP 23/5 AND FTMP 3/2	Bonding Procedure – LE Transport	FTMP/COL/FTMF/BV-01-C
FTMP 23/5 AND FTMP 3/1	Bonding Procedure – BR/EDR Transport	FTMP/COL/FTMF/BV-02-C
FTMP 13/1 AND FTMP 13/2	Treadmill Data Notifications	FTMP/COL/NOT/BV-01-C FTMP/COL/NOT/BV-02-C FTMP/COL/NOT/BV-03-C FTMP/COL/NOT/BV-04-C FTMP/COL/NOT/BV-05-C FTMP/COL/NOT/BV-06-C FTMP/COL/NOT/BV-07-C FTMP/COL/NOT/BV-08-C FTMP/COL/NOT/BV-09-C FTMP/COL/NOT/BV-10-C FTMP/COL/NOT/BV-11-C FTMP/COL/NOT/BV-12-C FTMP/COL/NOT/BV-13-C
FTMP 14/1 AND FTMP 14/2	Cross Trainer Data Notifications	FTMP/COL/NOT/BV-14-C FTMP/COL/NOT/BV-15-C FTMP/COL/NOT/BV-16-C FTMP/COL/NOT/BV-17-C FTMP/COL/NOT/BV-18-C FTMP/COL/NOT/BV-19-C FTMP/COL/NOT/BV-20-C FTMP/COL/NOT/BV-21-C FTMP/COL/NOT/BV-22-C FTMP/COL/NOT/BV-23-C FTMP/COL/NOT/BV-24-C FTMP/COL/NOT/BV-25-C FTMP/COL/NOT/BV-26-C FTMP/COL/NOT/BV-27-C FTMP/COL/NOT/BV-28-C

Item	Feature	Test Case(s)
FTMP 15/1 AND FTMP 15/2	Step Climber Data Notifications	FTMP/COL/NOT/BV-29-C FTMP/COL/NOT/BV-30-C FTMP/COL/NOT/BV-31-C FTMP/COL/NOT/BV-32-C FTMP/COL/NOT/BV-33-C FTMP/COL/NOT/BV-34-C FTMP/COL/NOT/BV-35-C FTMP/COL/NOT/BV-36-C FTMP/COL/NOT/BV-37-C
FTMP 16/1 AND FTMP 16/2	Stair Climber Data Notifications	FTMP/COL/NOT/BV-38-C FTMP/COL/NOT/BV-39-C FTMP/COL/NOT/BV-40-C FTMP/COL/NOT/BV-41-C FTMP/COL/NOT/BV-42-C FTMP/COL/NOT/BV-43-C FTMP/COL/NOT/BV-44-C FTMP/COL/NOT/BV-45-C FTMP/COL/NOT/BV-46-C FTMP/COL/NOT/BV-47-C
FTMP 17/1 AND FTMP 17/2	Rower Data Notifications	FTMP/COL/NOT/BV-48-C FTMP/COL/NOT/BV-49-C FTMP/COL/NOT/BV-50-C FTMP/COL/NOT/BV-51-C FTMP/COL/NOT/BV-52-C FTMP/COL/NOT/BV-53-C FTMP/COL/NOT/BV-54-C FTMP/COL/NOT/BV-55-C FTMP/COL/NOT/BV-56-C FTMP/COL/NOT/BV-57-C FTMP/COL/NOT/BV-58-C FTMP/COL/NOT/BV-59-C FTMP/COL/NOT/BV-60-C
FTMP 18/1 AND FTMP 18/2	Indoor Bike Data Notifications	FTMP/COL/NOT/BV-61-C FTMP/COL/NOT/BV-62-C FTMP/COL/NOT/BV-63-C FTMP/COL/NOT/BV-64-C FTMP/COL/NOT/BV-65-C FTMP/COL/NOT/BV-66-C FTMP/COL/NOT/BV-67-C FTMP/COL/NOT/BV-68-C FTMP/COL/NOT/BV-69-C FTMP/COL/NOT/BV-70-C FTMP/COL/NOT/BV-71-C FTMP/COL/NOT/BV-72-C FTMP/COL/NOT/BV-73-C
FTMP 12/2	Receive Training Status Characteristic for Notification	FTMP/COL/NOT/BV-74-C

Item	Feature	Test Case(s)
FTMP 19/3	Fitness Machine Control Point Collector Role – Request Control	FTMP/COL/SPCP/BV-01-C
FTMP 19/4	Fitness Machine Control Point Collector Role – Reset	FTMP/COL/SPCP/BV-02-C
FTMP 19/5	Fitness Machine Control Point Collector Role – Set Target Speed Procedure	FTMP/COL/SPCP/BV-03-C
FTMP 19/6	Fitness Machine Control Point Collector Role – Set Target Inclination	FTMP/COL/SPCP/BV-04-C
FTMP 19/7	Fitness Machine Control Point Collector Role – Set Target Resistance Level	FTMP/COL/SPCP/BV-05-C
FTMP 19/8	Fitness Machine Control Point Collector Role – Set Target Power	FTMP/COL/SPCP/BV-06-C
FTMP 19/9	Fitness Machine Control Point Collector Role – Set Target Heart Rate	FTMP/COL/SPCP/BV-07-C
FTMP 19/10	Fitness Machine Control Point Collector Role – Start or Resume	FTMP/COL/SPCP/BV-08-C
FTMP 19/11	Fitness Machine Control Point Collector Role – Stop	FTMP/COL/SPCP/BV-09-C
FTMP 19/12	Fitness Machine Control Point Collector Role – Pause	FTMP/COL/SPCP/BV-10-C
FTMP 19/13	Fitness Machine Control Point Collector Role – Set Targeted Expended Energy	FTMP/COL/SPCP/BV-11-C
FTMP 19/14	Fitness Machine Control Point Collector Role – Set Targeted Number of Steps	FTMP/COL/SPCP/BV-12-C
FTMP 19/15	Fitness Machine Control Point Collector Role – Set Targeted Number of Strides	FTMP/COL/SPCP/BV-13-C
FTMP 19/16	Fitness Machine Control Point Collector Role – Set Targeted Distance	FTMP/COL/SPCP/BV-14-C
FTMP 19/17	Fitness Machine Control Point Collector Role – Set Targeted Training Time	FTMP/COL/SPCP/BV-15-C
FTMP 19/18	Fitness Machine Control Point Collector Role – Set Targeted Time in Two Heart Rate Zones	FTMP/COL/SPCP/BV-16-C
FTMP 19/19	Fitness Machine Control Point Collector Role – Set Targeted Time in Three Heart Rate Zones	FTMP/COL/SPCP/BV-17-C

Item	Feature	Test Case(s)
FTMP 19/20	Fitness Machine Control Point Collector Role – Set Targeted Time in Five Heart Rate Zones	FTMP/COL/SPCP/BV-18-C
FTMP 19/21	Fitness Machine Control Point Collector Role – Set Indoor Bike Simulation	FTMP/COL/SPCP/BV-19-C
FTMP 19/22	Fitness Machine Control Point Collector Role – Set Wheel Circumference	FTMP/COL/SPCP/BV-20-C
FTMP 19/23	Fitness Machine Control Point Collector Role – Spin Down Control	FTMP/COL/SPCP/BV-21-C
FTMP 19/27	Fitness Machine Control Point Collector Role – Set Targeted Cadence	FTMP/COL/SPCP/BV-22-C
FTMP 19/25 AND FTMP 19/26	Write to FTM Status characteristic – Client Characteristic Configuration descriptor, Receive Multiple Notification of the FTM Status and Decode the Parameter field	FTMP/COL/SPMS/BV-01-C
FTMP 20/1 AND FTMP 20/7 AND FTMP 21/1	Writing of UDS Characteristic Values, User Data Control Point, Register New User when connection established	FTMP/COL/SPUD/BV-01-C FTMP/COL/SPUD/BV-02-C
FTMP 20/7 AND FTMP 20/9 AND FTMP 21/2	User Data Control Point, Caching of Consent Code, Consent	FTMP/COL/SPUD/BV-03-C
FTMP 20/7 AND FTMP 20/8 AND FTMP 21/3	User Data Control Point, User Index, Delete User before terminating connection	FTMP/COL/SPUD/BV-04-C
FTMP 2/1 AND FTMP 4/9 AND NOT FTMP 4/1a	User Data not retained	FTMP/FTMR/SPUD/BV-02-C
FTMP 2/1 AND FTMP 4/9 AND FTMP 4/1a	User Data Retention	FTMP/FTMR/SPUD/BV-01-C FTMP/FTMR/SPUD/BV-03-C
FTMP 20/2	Configure Database Change Increment – Client Characteristic	FTMP/COL/SPUD/BV-05-C
FTMP 20/5	Write Database Change Increment Characteristic	FTMP/COL/SPUD/BV-06-C
FTMP 20/11 AND FTMP 22/15	Read Long UDS Characteristic	FTMP/COL/SPUD/BV-12-C
FTMP 20/3	Receive Database Change Increment Notifications	FTMP/COL/SPUD/BV-10-C
FTMP 10/6 AND FTMP 20/10 AND FTMP 20/6	Read UDS Characteristic, User Data Synchronization Feature	FTMP/COL/SPUD/BV-11-C

Item	Feature	Test Case(s)
FTMP 20/6	User Data Synchronization Feature	FTMP/COL/SPUD/BV-07-C FTMP/COL/SPUD/BV-08-C FTMP/COL/SPUD/BV-09-C
FTMP 20/1 AND FTMP 20/6	Writing of UDS Characteristic, User Data Synchronization Feature	FTMP/COL/SPUD/BV-13-C
FTMP 20/12 AND FTMP 20/6 AND FTMP 22/16	Write Long UDS Characteristic, User Data Synchronization Feature	FTMP/COL/SPUD/BV-14-C
FTMP 20/7	User Data Control Point	FTMP/COL/SPUD/BV-15-C
FTMP 19/28	General Error Handling - Control Point Error Codes	FTMP/COL/SPE/BI-01-C FTMP/COL/SPE/BI-02-C FTMP/COL/SPE/BI-03-C FTMP/COL/SPE/BI-04-C FTMP/COL/SPE/BI-05-C FTMP/COL/SPE/BI-06-C
FTMP 19/28 AND FTMP 20/10	General Error Handling – User Data Control Point Error Code	FTMP/COL/SPE/BI-07-C
FTMP 19/24	Fitness Machine Control Point Characteristic Collector Role – Procedure Timeout	FTMP/COL/SPE/BI-08-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2017-02-17	Prepared for publication by Bluetooth SIG staff.
	1.0.1r00	2017-08-21	TSE 9487: For FTMP/COL/SPCP/BV-05-I, revised Op Code Parameter Value in the Test Case Table.
1	1.0.1	2017-11-28	Approved by BTI. Prepared for TCRL 2017-2 publication.
	1.0.2r01	2018-05-09	TSE 10669 (rating 2): Deleted "Test Case Applicable" from Section 5 (Test Case Mapping). Fixed mapping for FTMP/COL/FTMF/BV-01-I and FTMP/COL/FTMF/BV-02-I in the TCMT.
2	1.0.2	2018-06-27	Approved by BTI. Prepared for TCRL 2018-1 publication.
	1.0.3r00	2018-10-02	TSE 10679 (rating 2): Updated mapping for FTMP/FTMR/SPUD/BV-01-I - 03-I.
3	1.0.3	2018-11-21	Approved by BTI. Prepared for TCRL 2018-2 publication.
	p4r00–r02	2020-09-15 – 2020-11-17	TSE 15029 (rating 2): Updated TCMT Item and Feature column entries for TCs FTMP/FTMR/FTMF/BV-01-I and -02-I. TSE 15049 (rating 2): Updated TCMT Item column for TCs FTMP/FTMR/SPUD/BV-01-I – -03-I. TSE 16061 (rating 1): Per Erratum 15788, changed “master” to “Central” and “slave” to “Peripheral”. Consistency Checker fixes template-based editorials, including new copyright language and logo, new Conformance and Pass/Fail Verdict verbiage, moving Rev History and Contributors to end of doc, updating to TCID heading styles, and assigning publication number 3 to previous v1.0.3 and updating doc number, and adding a reference for the Appropriate Language Mapping Table.
4	p4	2020-12-22	Approved by BTI on 2020-12-02. Prepared for TCRL 2020-1 publication.
	p5r00–r04	2022-03-17 – 2022-05-18	TSE 17261 (rating 2): Converted tests to GGIT: the new GGIT TCIDs are: FTMP/COL/CGGIT/CHA/BV -01-C – -15-C, FTMP/COL/CGGIT/SER/BV-01-C – -03-C, and FTMP/FTMR/SGGIT/SDPNF/BV-01-C – -03-C; the deleted TCIDs are FTMP/COL/DSVC/BV-01-I – -04-I, FTMP/FTMR/DSVC/BV-01-I – -03-I, FTMP/COL/DCHR/BV-01-I – -15-I, and FTMP/COL/DCCD/BV-01-I – -09-I. Added a “Test database requirements” section, updated the “Test groups” section, and added the GGIT material to the TCID conventions section. Updated the Initial Condition for FTMP/COL/DCHR/BV-16-I – -20-I, and FTMP/COL/DCCD/BV-10-I and -11-I to cite a GGIT test case. Updated a test step for FTMP/COL/NOT/BV-02-I – -12-I, -15-I – -27-I, -30-I –

Publication Number	Revision Number	Date	Comments
			-36-I, -39-I – -46-I, -49-I – -59-I, -62-I – -72-I, and -74-I; FTMP/COL/SPCP/BV-01-I; and FTMP/COL/SPE/BI-04-C. Updated references from the deleted Discover Services section to the new GATT Integrated Tests section globally. Updated TCMT accordingly. TSE 18430 (rating 1): Removed direct references to GATT test cases in FTMP/COL/DCHR/BV-16-I – -21-I; FTMP/COL/DCCD/BV-10-I and -11-I; FTMP/COL/CON/BV-01-C – -09-C; FTMP/COL/NOT/BV-74-I; FTMP/COL/SPUD/BV-01-I, -08-I, -09-I, and -11-I – -14-I; and FTMP/FTMR/SPUD/BV-01-I, and in the Preambles sections for ATT Bearer on LE Transport and ATT Bearer on BR/EDR Transport. TSE 18718 (rating 1): Editorials to align the document with the latest TS template in anticipation of a future .Z release. Performed template-related formatting fixes. Aligned copyright page with v2 of the DNMD. Consistency checker update.
5	p5	2022-06-28	Approved by BTI on 2022-05-31. Prepared for TCRL 2022-1 publication.
	p6r00–r01	2023-10-22 – 2024-03-19	TSE 23271 (rating 1): Converted -I tests to -C tests as appropriate; updated the TCMT and TCRL accordingly. TSE 25099 (rating 2): In the TCMT, replaced two references to FTMS 3/17 with references to the newly added ILD (FTMP 4/1a). Deleted draft revision history comments prior to p0.
6	p6	2024-07-01	Approved by BTI on 2024-04-21. Prepared for TCRL 2024-1 publication.
	p7r00–r02	2024-07-30 – 2024-08-28	TSE 17240 (rating 4): Per E17170, added new test group ISFC. Added test cases FTMP/COL/CGGIT/ISFC/BV-01-C, FTMP/COL/FTMF/BV-03-C, and -04-C, and updated the TCMT accordingly. Updated FTMP/COL/CGGIT/CHA/BV-01-C Properties value. Added a reference to FMPS version 1.0.1. Added Section 4.3.1 for Generic GATT Indication Supported Features characteristic, including Table 4.3, and renumbered tables accordingly.
7	p7	2024-10-08	Approved by BTI on 2024-09-11. FTMP v1.0.1 adopted by the BoD on 2024-10-01. Prepared for TCRL 2024-2-addition publication.

Publication Number	Revision Number	Date	Comments
	p8r00–r01	2025-07-10 – 2025-08-11	TSE 27517 (rating 2): Removed references to GAP 0/3 in the TCMT. TSE 27602 (rating 2): Deleted TCs FTMP/FTMR/SGGIT/SDPNF/BV-02-C and -03-C. Updated the TCMT accordingly. TSE 27713 (rating 2): Updated the test purpose, initial condition, and test procedure for FTMP/COL/SPE/BI-06-C and updated the TCMT entry for FTMP/COL/SPE/BI-07-C to correct the mapping for UDS test cases.
8	p8	2025-11-04	Approved by BTI on 2025-10-02. Prepared for TCRL publication.

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Name	Company
Dejan Berec	Bluetooth SIG, Inc.
Jeff Drake	Bluetooth SIG, Inc.
Jim Harper	Bluetooth SIG, Inc.
Jawid Mirani	Bluetooth SIG, Inc.
Nathaniel Roby	Bluetooth SIG, Inc.
Josh Toole	Bluetooth SIG, Inc.