

Find Me Profile (FMP)

Bluetooth® Test Suite

- **Revision:** FMP.TS.p3
- **Revision Date:** 2023-06-29
- **Prepared By:** BTI
- **Published during TCRL:** TCRL.2023-1



This document, regardless of its title or content, is not a Bluetooth Specification as defined in the Bluetooth Patent/Copyright License Agreement ("PCLA") and Bluetooth Trademark License Agreement. Use of this document by members of Bluetooth SIG is governed by the membership and other related agreements between Bluetooth SIG Inc. ("Bluetooth SIG") and its members, including the PCLA and other agreements posted on Bluetooth SIG's website located at www.bluetooth.com.

THIS DOCUMENT IS PROVIDED "AS IS" AND BLUETOOTH SIG, ITS MEMBERS, AND THEIR AFFILIATES MAKE NO REPRESENTATIONS OR WARRANTIES AND DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY, TITLE, NON-INFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, THAT THE CONTENT OF THIS DOCUMENT IS FREE OF ERRORS.

TO THE EXTENT NOT PROHIBITED BY LAW, BLUETOOTH SIG, ITS MEMBERS, AND THEIR AFFILIATES DISCLAIM ALL LIABILITY ARISING OUT OF OR RELATING TO USE OF THIS DOCUMENT AND ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING LOST REVENUE, PROFITS, DATA OR PROGRAMS, OR BUSINESS INTERRUPTION, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY, AND EVEN IF BLUETOOTH SIG, ITS MEMBERS, OR THEIR AFFILIATES HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

This document is proprietary to Bluetooth SIG. This document may contain or cover subject matter that is intellectual property of Bluetooth SIG and its members. The furnishing of this document does not grant any license to any intellectual property of Bluetooth SIG or its members.

This document is subject to change without notice.

Copyright © 2012–2023 by Bluetooth SIG, Inc. The Bluetooth word mark and logos are owned by Bluetooth SIG, Inc. Other third-party brands and names are the property of their respective owners.



Contents

1	Scope	4
2	References, definitions, and abbreviations	5
2.1	References	5
2.2	Definitions	5
2.3	Acronyms and abbreviations	5
3	Test Suite Structure (TSS)	6
3.1	Overview	6
3.2	Test Strategy	6
3.3	Test groups	7
4	Test cases (TC)	8
4.1	Introduction	8
4.1.1	Test case identification conventions	8
4.1.2	Conformance	8
4.1.3	Pass/Fail verdict conventions	9
4.2	Setup preambles	9
4.2.1	ATT Bearer on BR/EDR Transport	9
4.2.2	ATT Bearer on LE Transport	9
4.3	Generic GATT Integrated Tests	10
	FMP/CL/CGGIT/SER/BV-01-C [Service GGIT – Immediate Alert]	10
	FMP/CL/CGGIT/CHA/BV-01-C [Characteristic GGIT – Alert Level]	10
4.4	Find Me Profile Features	11
	FMP/CL/FMF/BV-01-I [Alert Peer Device]	11
	FMP/CL/FMF/BV-02-I [Cancel Alert on Peer Device]	11
	FMP/CL/FMF/BV-03-I [Verify Bond Status on Reconnection]	12
5	Test case mapping	13
6	Revision history and acknowledgments	14

1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and test cases to test the implementation of the Bluetooth Find Me 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.

- [1] Test Strategy and Terminology Overview
- [2] Bluetooth Core Specification, Version 4.0 or later
- [3] Find Me Profile Specification, Version 1.0
- [4] ICS Proforma for Find Me Profile, FMP.ICS
- [5] GAP Test Suite, GAP.TS
- [6] GATT Test Suite, GATT.TS
- [7] Immediate Alert Service, Version 1.0
- [8] Immediate Alert Service Test Suite, IAS.TS

2.2 Definitions

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

2.3 Acronyms and abbreviations

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

3 Test Suite Structure (TSS)

3.1 Overview

The Find Me Profile is a client of GAP, SDP (BR/EDR), SM (LE) and GATT. This is illustrated in Figure 3.1.

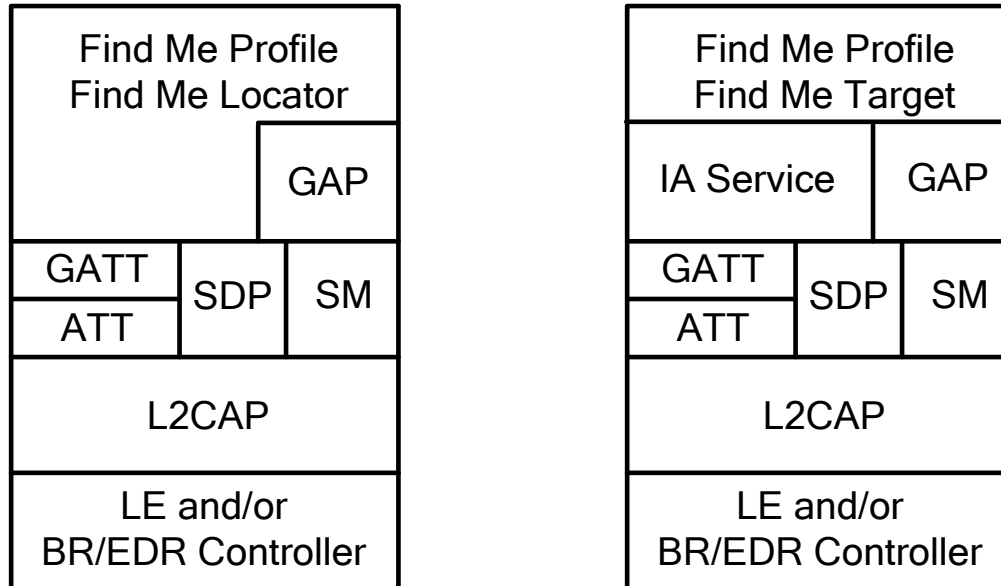


Figure 3.1: Find Me Test Model

3.2 Test Strategy

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

The test equipment provides an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in this Test Suite. A Lower Tester acts as the IUT's peer device and interacts with the IUT over-the-air interface. The configuration, including the IUT, needs to implement similar capabilities to communicate with the test equipment. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, a Man Machine Interface (MMI), or another interface supported by the IUT. This is illustrated in Figure 3.2.

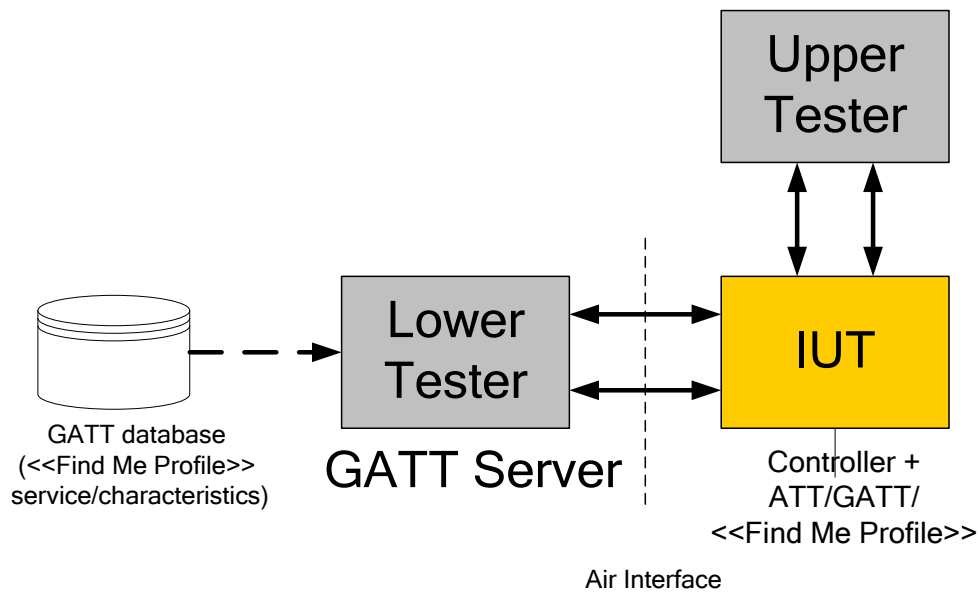


Figure 3.2: Find Me Profile Client Test Configuration

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

The test suite structure is a tree with the first level representing the protocol groups listed in Section 3.3.

3.3 Test groups

The following test groups have been defined:

- Generic GATT Integrated Tests
- Features

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

Test cases are assigned unique identifiers per the conventions in [1]. The convention used here is:

<spec abbreviation>/<IUT role>/<class>/<feat>/<func>/<subfunc>/<cap>/<xx>-<nn>-<y>.

Additionally, testing of this specification includes tests from the GATT Test Suite [6] referred to as Generic GATT Integrated Tests (GGIT); when used, the GGIT tests are referred to through a TCID string using the following convention:

<spec abbreviation>/<IUT role>/<GGIT test group>/< GGIT class >/<xx>-<nn>-<y>.

Identifier Abbreviation	Spec Identifier <spec abbreviation>
FMP	Find Me Profile
Identifier Abbreviation	Role Identifier <IUT role>
CL	Client role
Identifier Abbreviation	Reference Identifier <GGIT test group>
CGGIT	Client Generic GATT Integrated Tests
Identifier Abbreviation	Reference Identifier <GGIT test group>
CHA	Characteristic
SER	Service
Identifier Abbreviation	Feature Identifier <feat>
CL	Find Me Locator Role
FMF	Features

Table 4.1: FMP TC 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 Launch Studio, with the test case as described in the Test Suite, or with the test system utilized, the member is required to notify the responsible party via an erratum request such that the issue may be addressed.

4.1.3 Pass/Fail verdict conventions

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

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

4.2 Setup preambles

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

4.2.1 ATT Bearer on BR/EDR Transport

Follow the preamble procedure described in [6] Section 4.2.1.1.

4.2.2 ATT Bearer on LE Transport

Follow the preamble procedure described in [6] Section 4.2.1.2.

4.3 Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in Section 6.4, Client test procedures (CGGIT), in [6] using Table 4.2 below as input:

TCID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Service Type
FMP/CL/CGGIT/SER/BV-01-C [Service GGIT – Immediate Alert]	Immediate Alert Service	[3] 4.1	-	-	Primary Service
FMP/CL/CGGIT/CHA/BV-01-C [Characteristic GGIT – Alert Level]	Alert Level Characteristic	[3] 4.2	0x04 (Write Without Response)	1	-

Table 4.2: Input for the GGIT Client test procedure

4.4 Find Me Profile Features

The procedures defined in this test group verify Find Me Locator IUT implementation of the Features defined in the Find Me Profile Specification [3] by a Find Me Locator IUT.

FMP/CL/FMF/BV-01-I [Alert Peer Device]

- Test Purpose

The Find Me Locator writes a Mild Alert or High Alert in the Alert Level characteristic of the Immediate Alert service to cause an alert on the Find Me Target.
- Reference

[3] 4.3
- Initial Condition
 - Establish an ATT Bearer connection between the Lower Tester and IUT, see 4.2.
 - The Lower Tester has set its Alert Level characteristic to No Alert.
- Test Procedure

Send a command from the Upper Tester to request the IUT to trigger an immediate alert.
- Expected Outcome

Pass verdict

The IUT uses the Write Without Response procedure to write the Alert Level characteristic of the Immediate Alert Service in the Lower Tester with the value of Mild Alert or High Alert.

FMP/CL/FMF/BV-02-I [Cancel Alert on Peer Device]

- Test Purpose

After a Mild Alert or High Alert on the Find Me Target, the Find Me Locator writes a No Alert in the Alert Level characteristic of the Immediate Alert service to cancel the alert on the Find Me Target.
- Reference

[3] 4.3
- Initial Condition
 - Establish an ATT Bearer connection between the Lower Tester and IUT, see 4.2.
 - An Alert level value of Mild Alert or High Alert has previously been written to the Alert Level characteristic of the Immediate Alert Service in the Lower Tester.
- Test Procedure

Send a command from the Upper Tester to request the IUT to stop the immediate alert.
- Expected Outcome

Pass verdict

The IUT uses the Write Without Response procedure to write the Alert Level characteristic of the Immediate Alert Service in the Lower Tester with the value No Alert.

FMP/CL/FMF/BV-03-I [Verify Bond Status on Reconnection]

- Test Purpose

Verify that the Find Me Locator starts encryption with a previously bonded Find Me Target on reconnection.
- Reference

[\[3\]](#) 5.2.3
- Initial Condition
 - The IUT and the Lower Tester are bonded.
 - No connection is established between the IUT and Lower Tester.
- Test Procedure
 1. The Lower Tester begins advertising using GAP undirected connectable mode.
 1. The IUT establishes a connection to the Lower Tester.
 2. The IUT starts encryption when the connection is established.
- Expected Outcome

Pass verdict

The IUT starts encryption when the connection is established.

5 Test case mapping

The Test Case Mapping Table (TCMT) maps test cases to specific capabilities 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 the Find Me Profile (FMP) [4].

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

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

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

Item	Feature	Test Case(s)
FMP 7/1	Write alert level to cause an alert	FMP/CL/FMF/BV-01-I
FMP 7/2	Write alert level to cancel an alert	FMP/CL/FMF/BV-02-I
FMP 8/1	Discover Immediate Alert Service	FMP/CL/CGGIT/SER/BV-01-C
FMP 8/2	Alert Level characteristic for Immediate Alert	FMP/CL/CGGIT/CHA/BV-01-C
FMP 8/3	Verify Bond Status on Reconnection	FMP/CL/FMF/BV-03-I

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2011-06-26	Prepare for publication.
	1.0.1r1	2012-08-31	TSE 4926: Change all test case IDs to -I.
1	1.0.1	2012-10-30	Prepare for Publication
	1.0.2r00	2016-05-24	Converted to new Test Case ID conventions as defined in TSTO v4.1.
	1.0.2r01	2016-06-01	Converted to current Test Spec template.
2	1.0.2	2016-07-14	Prepared for TCRL 2016-1 publication.
	1.0.2 edition 2r00	2018-11-29	Editorial changes only. Template updated. Revision History and contributors moved to the end of the document.
	1.0.2 edition 2	2019-12-03	Updated copyright page and confidentiality markings to support new Documentation Marking Requirements, performed minor formatting updates, and accepted all tracked changes to prepare for edition 2 publication.
	p3r00-r01	2023-04-12 – 2023-05-01	TSE 22824 (rating 2): Converted the following test cases to GGIT: FMP/CL/FMS/BV-01-I – -03-I. The new GGIT converted TCIDs are: FMP/CL/CGGIT/SER/BV-01-C and FMP/CL/CGGIT/CHA/BV-01-C. Updated the TCMT accordingly. Added a Publication Number column to the Revision History. Revised the document numbering convention, setting the last release publication of 1.0.2 as p2. Performed other editorials to align the document with the latest TS template, including updates to the scope, references, Test Strategy, test groups, test case identification conventions, conformance, Pass/Fail verdict conventions, setup preambles, and TCMT introductory text. Changed section titles for single test cases to Heading 8 per the TS template. Replaced the Bluetooth logo in the footer and updated the copyright page to align with v2 of the DNMD.
3	p3	2023-06-29	Approved by BTI on 2023-05-28. Prepared for TCRL 2023-1 publication.

Acknowledgments

Name	Company
Victor Zhodzishsky	Broadcom
Josselin De La Broise	Marvell
Steve Davies	Nokia
Frank Berntsen	Nordic
Jason Hillyard	Wicentric

