

Find Me Profile

Bluetooth® Test Specification



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- **Abstract**

This document defines test structures and procedures for conformance test of products implementing the Find Me Profile.

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1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and Test Cases (TC) to test the Bluetooth Find Me Profile Specification.

The objective of this test specification is to provide a basis for interoperability tests for Bluetooth devices giving a high probability of air interface interoperability between different manufacturers' Bluetooth devices.

2 References, Definitions, and Abbreviations

2.1 References

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

- [1] Bluetooth Test Strategy and Terminology Overview
- [2] Bluetooth Core Specification, Version 4.0 or later
- [3] Find Me Profile Specification v1.0
- [4] ICS Proforma for Find Me Profile, FMP.ICS
- [5] GAP Test Specification, GAP.TS
- [6] GATT Test Specification, GATT.TS
- [7] Immediate Alert Service v1.0
- [8] Immediate Alert Service Test Specification, IAS.TS

2.2 Definitions

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

2.3 Abbreviations

For the purpose of this Bluetooth document, the definitions 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](#).

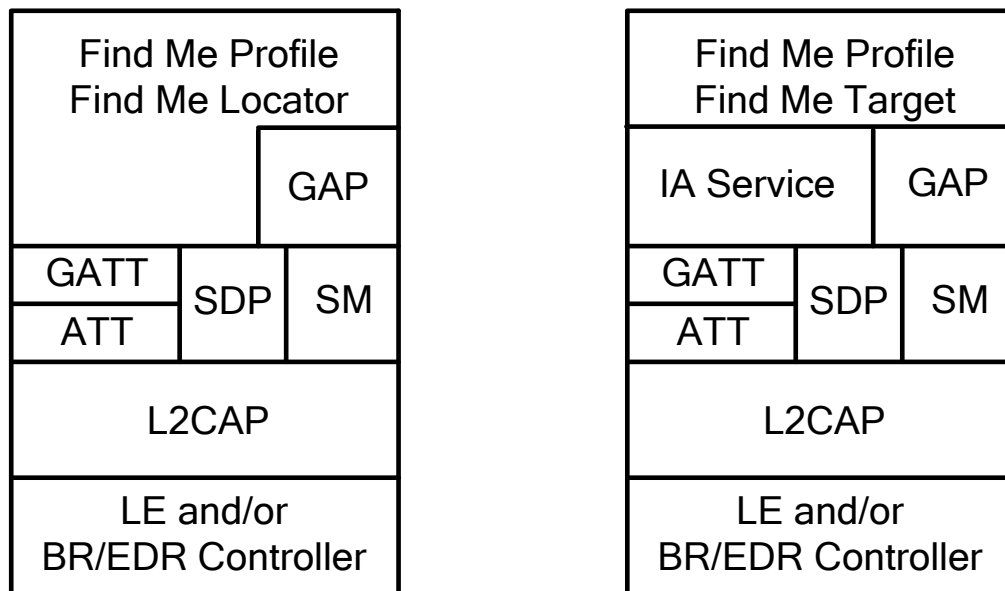


Figure 3.1: Find Me Test Model

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 is to cover mandatory and optional requirements in the profile specification and to match these to the support of the IUT as described in the ICS Proforma.

The basis for the test approach is the general concepts and conformance testing principles defined in ISO/ IEC 9646-1 and ISO/IEC 9646-2; both are part of the OSI Conformance Testing Methodology and Framework (CTMF).

The conformance test equipment shall provide an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in the Find Me Profile Test Specification. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, an MMI, or another interface supported by the IUT. This is illustrated in [Figure 3.2](#).

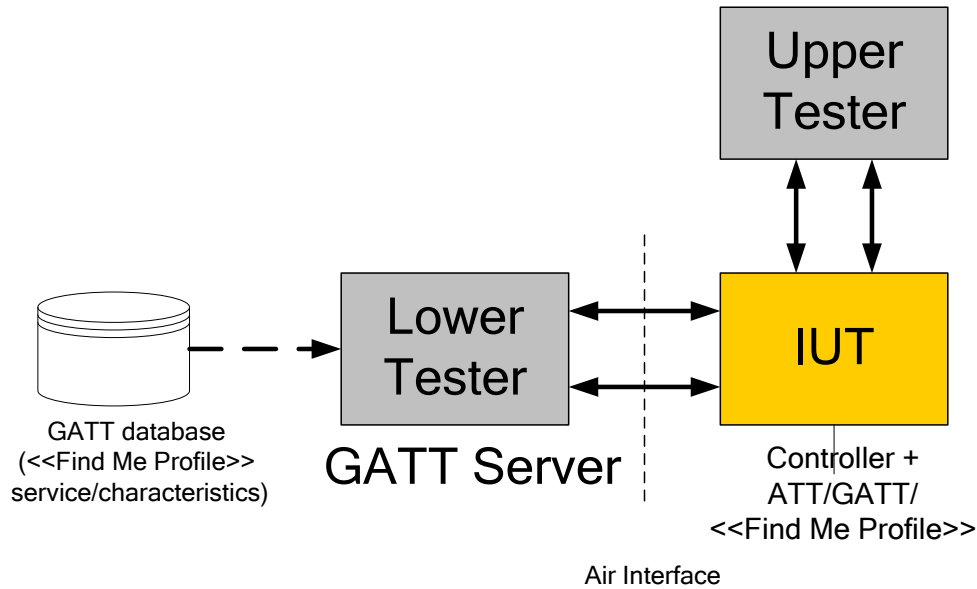


Figure 3.2: Find Me Profile Client Test Configuration

The Find Me 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.

3.3.1 Discovery of Services and Characteristics

This group tests IUT discovery of the Immediate Alert Service and Characteristics. Where applicable these tests are included by reference from [8].

3.3.2 Features

This group tests IUT implementation of Find Me Profile Features.

4 Test Cases

4.1 Introduction

4.1.1 Test Case Naming Conventions

Test cases shall be assigned unique identifiers per the conventions in [1]. The convention used here is <spec abbreviation>/<IUT role>/<class>/<xx>-<nn>-<y>.

Test group abbreviations for class, feature, function, sub-function or capability (as applicable to this test specification) are defined in Table 4.1.

Identifier	Class Identifier <class>
FMP	Find Me Profile
FMS	Discovery of Services and Characteristics
FMF	Features
CL	Find Me Locator Role

Table 4.1: Find Me Profile Test Case Naming Convention

4.1.2 Conformance

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

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

Such tests may verify:

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

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

In any case, where a member finds an issue with the Test Plan Generator, the Test Case as described in the Test Specification, or with the Test System utilized, the Member is required to notify the responsible party via an errata request such that the issue may be addressed.

4.1.3 Pass/Fail Verdict Conventions

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

The convention in this test specification 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 and in case this occurs the outcome of the test shall be the Fail Verdict.

4.2 Setup Preambles

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

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 Discover Services and Characteristics

The procedures defined in this test group verify IUT discovery of the Service and Characteristics defined in the Find Me Profile Specification [3] by a Find Me Locator IUT.

4.3.1 FMP/CL/FMS/BV-01-I [Discover Immediate Alert Service using SDP]

- Test Purpose

Verify that the Find Me Locator IUT can discover the Immediate Alert Service using SDP.

- Reference

[3] 4.1

- Initial Condition

Establish an ATT Bearer connection on BR/EDR transport between the Lower Tester and IUT, see 4.2.

The Lower Tester includes one instantiation of the Immediate Alert Service, [7], accessible over BR/EDR.

- Test Procedure

The Upper Tester uses the procedure GATT/CL/GAD/BV-08-C described in [6] with the UUID to «Immediate Alert» to perform service discovery using SDP.

The IUT sends one or more SDP protocol requests to the Lower Tester.

- Expected Outcome

Pass verdict

The IUT discovers the Immediate Alert Service.

4.3.2 FMP/CL/FMS/BV-02-I [Discover Immediate Alert Service using GATT for LE]

- Test Purpose

Verify that the Immediate Alert Service can be detected by the Find Me Locator IUT using GATT for LE.

- Reference

[3] 4.1

- Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT, see 4.2.

The Lower Tester includes one instantiation of the Immediate Alert Service, [7].

- Test Procedure

The Upper Tester issues a command to the IUT to discover primary services. There are two alternatives:

1. Execute the procedure defined in GATT.TS [6] Discover All Primary Services, GATT/CL/GAD/BV-01-C.
2. Execute the procedure defined in GATT.TS [6] Discover Primary Services by Service UUID, GATT/CL/GAD/BV-02-C, with the service UUID set to "Immediate Alert".

- Expected Outcome

Pass verdict

The IUT successfully discovers one instance of the Immediate Alert Service.

4.3.3 FMP/CL/FMS/BV-03-I [Discover Alert Level Characteristic for Immediate Alert]

- Test Purpose

Verify that the Alert Level Characteristic for the Immediate Alert service can be detected by the Find Me Locator IUT.

- Reference

[3] 4.2

- Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT, see 4.2.

The Lower Tester includes one instantiation of the Immediate Alert Service, [7], which includes the Alert Level Characteristic.

The IUT has executed the procedure defined in FMP/CL/FMS/BV-01-I [Discover Immediate Alert Service using SDP] or FMP/CL/FMS/BV-02-I [Discover Immediate Alert Service using GATT for LE], and has saved the handle range for an instantiation of the Immediate Alert Service.

- Test Procedure

The Upper Tester issues a command to the IUT to discover the Alert Level Characteristic for Immediate Alert Service.

The IUT executes one of the following procedures:

1. Execute the procedure defined in GATT.TS [6], Discover Characteristic by UUID, GATT/CL/GAD/BV-05-C, with the Service UUID set to «Alert Level Characteristic».
2. Execute the procedure defined in GATT.TS [6], Discover All Characteristics of a Service, GATT/CL/GAD/BV-04-C.

- Expected Outcome

Pass verdict

The IUT successfully discovers the Alert Level Characteristic of the Immediate Alert Service.

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.

4.4.1 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.

4.4.2 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.

4.4.3 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.
2. The IUT establishes a connection to the Lower Tester.
3. 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. Profiles, protocols and services may define multiple roles, and it is possible that a product may implement more than one role. The product shall be tested in all roles for which support is declared in the ICS document.

The columns for the TCMT are defined as follows:

Item: contains an y/x reference, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS Proforma for the Find Me Profile (FMP) [4]. If the item is defined with Protocol, Profile or Service abbreviation before y/x, the table and feature number referenced are defined in the abbreviated ICS proforma document.

Feature: recommended to be the primary feature defined in the ICS being tested or may be the test case name.

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

Test Case Applicable: may be used to note if a test is required based on the supported features.

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

Item	Feature	Test Case(s)	Test Case Applicable
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 AND 2/1	Uses Immediate Alert Service over BR/EDR	FMP/CL/FMS/BV-01-I	
FMP 8/1 AND 2/2	Uses Immediate Alert Service over LE	FMP/CL/FMS/BV-02-I	
FMP 8/2	Discover Alert Level characteristic for Immediate Alert	FMP/CL/FMS/BV-03-I	
FMP 8/3	Verify Bond Status on Reconnection	FMP/CL/FMF/BV-03-I	

Table 5.1: Test Case Mapping