Alert Notification Profile (ANP)

Bluetooth® Test Suite

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1 Scope

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

The objective of this test suite is to provide a basis for interoperability 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] ICS Proforma for Alert Notification Profile
[5] GAP Test Suite, GAP.TS
[6] GATT Test Suite, GATT.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 Alert Notification Profile is a user (client) of the Generic Attribute Profile (GATT). This is illustrated in Figure 3.1.

![Alert Notification Profile Test Model]

Figure 3.1: Alert Notification Profile Test Model

3.2 Test Strategy

The test objectives are to verify functionality of the Alert Notification Profile 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 Alert Notification Profile Test Suite. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, an MMI, or another interface supported by the IUT.
The following configuration is recommended for testing Alert Notification client IUT:

![Diagram of Alert Notification Profile Client Test Configuration]

**Figure 3.2: Alert Notification Profile Client Test Configuration**

The Alert Notification Profile 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 Discover Services and Characteristics and Descriptors

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

#### 3.3.2 Configuration Features

This group tests IUT implementation of the Alert Notification Write Features.

#### 3.3.3 Read Features

This group tests IUT implementation of the Alert Notification Profile Read features.

#### 3.3.4 Write Features

This group tests IUT implementation of the Alert Notification Profile Write features.

#### 3.3.5 Notify Features

This group tests IUT implementation of the Alert Notification Profile Notify features.

#### 3.3.6 Setup Features

This group tests IUT implementation of the Alert Notification Profile setup features.
4 Test Cases (TC)

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>/<feat>/<func>/<subfunc>/<cap>/<xx><nn><y>.

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

<table>
<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Spec Identifier &lt;spec abbreviation&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANP</td>
<td>Alert Notification Profile</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Role Identifier &lt;IUT role&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL</td>
<td>Client</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Feature Identifier &lt;feat&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANPCF</td>
<td>Configure Features</td>
</tr>
<tr>
<td>ANPD</td>
<td>Discovery of Services and Characteristics and Descriptors</td>
</tr>
<tr>
<td>ANPNF</td>
<td>Notify Features</td>
</tr>
<tr>
<td>ANPRF</td>
<td>Read Features</td>
</tr>
<tr>
<td>ANPSF</td>
<td>Setup Features</td>
</tr>
<tr>
<td>ANPWF</td>
<td>Write Features</td>
</tr>
</tbody>
</table>

Table 4.1: Alert Notification 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 Qualification Program.

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

Such tests may verify:

* That claimed capabilities may be used in any order and any number of repetitions that is not excluded by the Specification, 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 Suite, or with the Test System utilized, the Member is required to notify the responsible party via an errata request such that the issue may be addressed.

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

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

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

4.2.1 Set up LE Transport
Follow the preamble procedure described in [6] Section 3.2.1.2.

4.3 Discover Services and Characteristics and Descriptors
The procedures defined in this test group verify Alert Notification Client IUT discovery of the Service and Characteristics and descriptors defined in the Alert Notification Service Specification [7] by an Alert Notification Client IUT.

4.3.1 ANP/CL/ANPD/BV-02-I [Discover Alert Notification Service]
• Test Purpose

Verify that the Alert Notification Service can be detected by the Alert Notification Client IUT.

• Reference

[4] 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 Alert Notification Service [7].
• Test Procedure

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

Execute the procedure defined in GATT.TS [6] Discover All Primary Services, GATT/CL/GAD/BV-01-C once, with the database specified in [7].

Execute the procedure defined in GATT.TS [6] Discover Primary Services by Service UUID, GATT/CL/GAD/BV-02-C once, with the service UUID set to “Alert Notification Service”, with the database specified in [7].

• Expected Outcome

Pass verdict

Exactly one attribute handle range is returned, containing the starting handle and the ending handle of instantiation of an Alert Notification Service definition.
4.3.2 ANP/CL/ANPD/BV-03-I [Discover Supported New Alert Category Characteristic]

- **Test Purpose**
  Verify that the Supported New Alert Category Characteristic can be detected by the Alert Notification Client IUT.

- **Reference**
  [4] 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 Alert Notification Service [7], which includes the Supported New Alert Category Characteristic.

  The IUT has executed the procedure defined in ANP/CL/ANPD/BV-02-I [Discover Alert Notification Service], and has saved the handle range for an instantiation of the Alert Notification Service. That instantiation contains an instantiation of the Supported New Alert Category Characteristic.

- **Test Procedure**
  The Upper Tester issues a command to the IUT to discover the Supported New Alert Category Characteristic. There are two alternatives:


  ![Diagram]

  Execute the procedure defined in GATT.TS [6] Discover Characteristics by UUID, GATT/CL/GAD/BV-05-C once, with the characteristic UUID set to «Supported New Alert Category Characteristic» with the database specified in initial conditions.
• Expected Outcome

Pass verdict

Exactly one attribute handle is returned for the Supported New Alert Category Characteristic implemented in the Lower Tester.

4.3.3 ANP/CL/ANPD/BV-04-I [Discover Alert Notification Control Point Characteristic]

• Test Purpose

Verify that the Alert Notification Control Point Characteristic can be detected by the Alert Notification Client IUT.

• Reference

[4] 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 Alert Notification Service [7], which includes the Alert Notification Control Point Characteristic.

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-02-I [Discover Alert Notification Service], and has saved the handle range for an instantiation of the Alert Notification Service. That instantiation contains an instantiation of the Alert Notification Control Point Characteristic.

• Test Procedure

The Upper Tester issues a command to the IUT to discover the Supported Unread Alert Category Characteristic. There are two alternatives:

Execute the procedure defined in GATT.TS [6] Discover Characteristics by UUID, GATT/CL/GAD/BV-05-C once, with the characteristic UUID set to « Alert Notification Control Point Characteristic» with the database specified in initial conditions.

• Expected Outcome

Pass verdict

Exactly one attribute handle is returned for the Alert Notification Control Point Characteristic implemented in the Lower Tester.

4.3.4 ANP/CL/ANPD/BV-05-I [Discover New Alert Characteristic]

• Test Purpose

Verify that the New Alert Characteristic can be detected by the Alert Notification Client IUT.

• Reference

[4] 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 Alert Notification Service [7], which includes the New Alert Characteristic.

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-02-I [Discover Alert Notification Service], and has saved the handle range for an instantiation of the Alert Notification Service. That instantiation contains an instantiation of the New Alert Characteristic.

• Test Procedure

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


Execute the procedure defined in GATT.TS [6] Discover Characteristics by UUID, GATT/CL/GAD/BV-05-C once, with the characteristic UUID set to « New Alert Characteristic» with the database specified in initial conditions.

• Expected Outcome

Pass verdict

Exactly one attribute handle is returned for the New Alert Characteristic implemented in the Lower Tester.
4.3.5 ANP/CL/ANPD/BV-06-I [Discover New Alert - Client Characteristic Configuration Descriptor]

- Test Purpose

Verify that the Alert Notification Client IUT can discover the Client Characteristic Configuration descriptor of the New Alert Characteristic.

- Reference

[4] 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 Alert Notification Service [7], which includes the New Alert Characteristic and an associated Client Characteristic Configuration descriptor.

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-02-I [Discover Alert Notification Service], and ANP/CL/ANPD/BV-05-I [Discover New Alert Characteristic], and has saved the handle range for an instantiation of the Alert Notification Service and the New Alert Characteristic.

- Test Procedure

The Upper Tester issues a command to the IUT to Discover All Characteristic Descriptors using the handle range returned after running the procedure defined in ANP/CL/ANPD/BV-05-I [Discover New Alert Characteristic] above.

The IUT executes one pass of the procedure defined in GATT.TS [6] Discover all Characteristic Descriptors, GATT/CL/GAD/BV-06-C using the specified handle range.

- Expected Outcome

Pass verdict

At least one attribute handle/UUID pair is returned with UUID = «Client Characteristic Configuration Descriptor».
4.3.6 **ANP/CL/ANPD/BV-07-I [Discover Unread Alert Status Characteristic]**

- **Test Purpose**
  
  Verify that the Unread Alert Status Characteristic can be detected by the Alert Notification Client IUT.

- **Reference**
  
  [4] 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 Alert Notification Service [7], which includes the Unread Alert Status Characteristic.

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-02-I [Discover Alert Notification Service], and has saved the handle range for an instantiation of the Alert Notification Service. That instantiation contains an instantiation of the Unread Alert Status Characteristic.

- **Test Procedure**
  
  The Upper Tester issues a command to the IUT to discover characteristics. There are two alternatives:


  Execute the procedure defined in GATT.TS [6] Discover Characteristics by UUID, GATT/CL/GAD/BV-05-C once, with the characteristic UUID set to «Unread Alert Status Characteristic», with the database specified in initial conditions.

- **Expected Outcome**
  
  **Pass verdict**

  Exactly one attribute handle is returned for the Unread Alert Status Characteristic implemented in the Lower Tester.

4.3.7 **ANP/CL/ANPD/BV-08-I [Discover Unread Alert Status – Client Characteristic Configuration Descriptor]**

- **Test Purpose**
  
  Verify that the Alert Notification Client IUT can discover the Client Characteristic Configuration descriptor of the Unread Alert Status Characteristic.

- **Reference**
  
  [4] 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 Alert Notification Service [7], which includes the Unread Alert Status Characteristic and an associated Client Characteristic Configuration descriptor.

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-02-I [Discover Alert Notification Service], and ANP/CL/ANPD/BV-07-I [Discover Unread Alert Status Characteristic], and has saved the handle range for an instantiation of the Alert Notification Service and the Unread Alert Status Characteristic.

• Test Procedure

The Upper Tester issues a command to the IUT to Discover All Characteristic Descriptors using the handle range returned after running the procedure defined in ANP/CL/ANPD/BV-07-I [Discover Unread Alert Status Characteristic] above.

The IUT executes one pass of the procedure defined in GATT.TS [6], Discover all Characteristic Descriptors, GATT/CL/GAD/BV-06-C using the specified handle range.

• Expected Outcome

Pass verdict

At least one attribute handle/UUID pair is returned with UUID = «Client Characteristic Configuration Descriptor».

4.3.8 ANP/CL/ANPD/BV-09-I [Discover Supported Unread Alert Category Characteristic]

• Test Purpose

Verify that the Supported Unread Alert Category Characteristic can be detected by the Alert Notification Client IUT.

• Reference

[4] 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 Alert Notification Service [7], which includes the Supported Unread Alert Category Characteristic.

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-02-I [Discover Alert Notification Service], and has saved the handle range for an instantiation of the Alert Notification Service. That instantiation contains an instantiation of the Supported Unread Alert Category Characteristic.

• Test Procedure

The Upper Tester issues a command to the IUT to discover the Supported Unread Alert Category Characteristic. There are two alternatives:

Execute the procedure defined in GATT.TS [6] Discover Characteristics by UUID, GATT/CL/GAD/BV-05-C, with the characteristic UUID set to «Supported Unread Alert Category Characteristic», with the database specified in initial conditions.

- Expected Outcome
  
  Pass verdict

Exactly one attribute handle is returned for the Supported Unread Alert Category Characteristic implemented in the Lower Tester.

### 4.4 Configuration Features

The procedures defined in this test group verify Alert Notification Client IUT implementation of the configuration Features defined in the Alert Notification Profile Specification [4] by an Alert Notification Client IUT.

#### 4.4.1 ANP/CL/ANPCF/BV-01-I [New Alert – Client Characteristic Configuration, write with 0x0001]

- Test Purpose
  
  Verify that the Alert Notification Client IUT can configure the Client Characteristic Configuration descriptor of New Alert Characteristic.

- Reference
  
  [4] 4.6

- Initial Condition
  
  Establish an ATT Bearer connection between the Lower Tester and IUT; see 4.2.

  The IUT has executed the procedure defined in ANP/CL/ANPD/BV-06-I [Discover New Alert - Client Characteristic Configuration Descriptor], and has saved the handle of the Client Characteristic Configuration descriptor for New Alert Characteristic.

- Test Procedure
  
  The Upper Tester issues a command to the IUT to configure to receive a New Alert: i.e. write 0x0001 to Client Characteristic Configuration Descriptor.

  The IUT executes the procedure defined in GATT.TS [6] Write Characteristic Descriptors, GATT/CL/GAW/BV-08-C using the specified handle.
• Expected Outcome

Pass verdict

The IUT sends a correctly formatted ATT_Write_Request to the Lower Tester, containing the handle specified by the Upper Tester, and the value set to <0x0001, Notification>.

The IUT receives an ATT_Write_Response from the Lower Tester and sends the WriteResponse to the Upper Tester.

4.4.2   ANP/CL/ANPCF/BV-02-I [New Alert – Client Characteristic Configuration, write with 0x0000]

• Test Purpose

Verify that the Alert Notification Client IUT can configure the Client Characteristic Configuration descriptor of New Alert Characteristic.

• Reference

[4] 4.6

• Initial Condition

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

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-06-I [Discover New Alert - Client Characteristic Configuration Descriptor], and has saved the handle of the Client Characteristic Configuration descriptor for New Alert Characteristic.

• Test Procedure

The Upper Tester issues a command to the IUT to configure not to receive a New Alert: write 0x0000 to the Client Characteristic Configuration Descriptor.

The IUT executes the procedure defined in GATT.TS [6] Write Characteristic Descriptors, GATT/CL/GAW/BV-08-C using the specified handle.
• Expected Outcome

**Pass verdict**

The IUT sends a correctly formatted ATT_Write_Request to the Lower Tester, containing the handle specified by the Upper Tester, and the value set to <0x0000, disable all>.

The IUT receives an ATT_Write_Response from the Lower Tester and sends the WriteResponse to the Upper Tester.

### 4.4.3 ANP/CL/ANPCF/BV-03-I [Unread Alert Status – Client Characteristic Configuration, write with 0x0001]

• **Test Purpose**

Verify that the Alert Notification Client IUT can configure the Client Characteristic Configuration descriptor of the Unread Alert Status Characteristic.

• **Reference**

[4] 4.8

• **Initial Condition**

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

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-08-I [Discover Unread Alert Status – Client Characteristic Configuration Descriptor], and has saved the handle of the Client Characteristic Configuration for Unread Alert Status Characteristic.

• **Test Procedure**

The Upper Tester issues a command to the IUT to configure to receive an Unread Alert Status: i.e. write 0x0001 to Client Characteristic Configuration Descriptor.

The IUT executes the procedure defined in GATT.TS [6] Write Characteristic Descriptors, GATT/CL/GAW/BV-08-C using the specified handle.
• Expected Outcome

Pass verdict

The IUT sends a correctly formatted ATT_Write_Request to the Lower Tester, containing the handle specified by the Upper Tester, and the value set to <0x0001, Notification>.

The IUT receives an ATT_Write_Response from the Lower Tester and sends the WriteResponse to the Upper Tester.

4.4.4 ANP/CL/ANPCF/BV-04-I [Unread Alert Status – Client Characteristic Configuration, write with 0x0000]

• Test Purpose

Verify that the Alert Notification Client IUT can configure the Client Characteristic Configuration descriptor of Unread Alert Status Characteristic.

• Reference

[4] 4.8

• Initial Condition

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

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-08-I [Discover Unread Alert Status – Client Characteristic Configuration Descriptor], and has saved the handle of the Client Characteristic Configuration for Unread Alert Status Characteristic.

• Test Procedure

The Upper Tester issues a command to the IUT to configure not to receive an Unread Alert Status: i.e. write 0x0000 to Client Characteristic Configuration Descriptor.

The IUT executes the procedure defined in GATT.TS [6] Write Characteristic Descriptors, GATT/CL/GAW/BV-08-C using the specified handle.

• Expected Outcome

Pass verdict

The IUT sends a correctly formatted ATT_Write_Request to the Lower Tester, containing the handle specified by the Upper Tester, and the value set to <0x0000, disable all>.

The IUT receives an ATT_Write_Response from the Lower Tester and sends the WriteResponse to the Upper Tester.

4.5 Read Features

The procedures defined in this test group verify Alert Notification Client IUT implementation of the read feature defined in the Alert Notification Profile Specification [4] by an Alert Notification Client IUT.
4.5.1 ANP/CL/ANPRF/BV-01-I [Supported New Alert Category Characteristic read]

• Test Purpose
Verify that the Alert Notification Client IUT can read the Supported New Alert Category Characteristic value.

• Reference
[4] 4.3

• Initial Condition
Establish an ATT Bearer connection between the Lower Tester and IUT; see 4.2.

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-03-I [Discover Supported New Alert Category Characteristic], and has saved the handle of the Supported New Alert Category Characteristic.

• Test Procedure
The Upper Tester issues a command to the IUT to read a Supported New Alert Category Characteristic.

Execute the procedure defined in GATT.TS [6] Read Characteristic Value, GATT/CL/GAR/-01-C using the specified handle.

```
ATT_Bearer established over LE transport.
ANP/CL/ANPD/BV-03-I has been executed.

ATT_Read_Request
(Code = 0x0A, Handle)

ATT_Read_Response
(Code = 0x0B, value)

ReadRequest
(handle)

ReadResponse
(value)
```

• Expected Outcome
Pass verdict

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

The IUT receives an ATT_Read_Response from the Lower Tester and sends the ReadResponse containing the correct Supported New Alert Category value to the Upper Tester.
The received Supported New Alert Category value matches the one sent by the Lower Tester.

4.5.2 ANP/CL/ANPBF/BV-02-I [Supported Unread Alert Category Characteristic read]

• Test Purpose

Verify that the Alert Notification Client IUT can read the Supported Unread Alert Category Characteristic value.

• Reference

[4] 4.4

• Initial Condition

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

The IUT has executed the procedure defined in ANP/CL/ANPBF/BV-09-I [Discover Supported Unread Alert Category Characteristic], and has saved the handle of the Supported Unread Alert Category Characteristic.

• Test Procedure

The Upper Tester issues a command to the IUT to read a Supported Unread Alert Category Characteristic.


• Expected Outcome

Pass verdict

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

The IUT receives a correctly ATT_Read_Response from the Lower Tester and sends the ReadResponse containing the correct Supported Unread Alert Category value to the Upper Tester.

The received Supported Unread Alert Category value matches the one sent by the Lower Tester.

4.6 Write Feature

The procedures defined in this test group verify Alert Notification Client IUT implementation of the write feature defined in the Alert Notification Profile Specification [4] by an Alert Notification Client IUT.

4.6.1 ANP/CL/ANPWF/BV-01-I [Alert Notification Control Point Characteristic write]

• Test Purpose

Verify that the Alert Notification Client IUT can write the Alert Notification Control Point Characteristic.
• Reference
[4] 4.9

• Initial Condition
Establish an ATT Bearer connection between the Lower Tester and IUT; see 4.2.

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-04-I [Discover Alert Notification Control Point Characteristic], and has saved the handle of an Alert Notification Control Point characteristic.

• Test Procedure
The Upper Tester issues a command to the IUT to write an Alert Notification Control Point characteristic with a valid Alert Notification Control Point value.


• Expected Outcome
Pass verdict

The IUT sends a correctly formatted ATT_Write_Request to the Lower Tester, containing the handle of the Alert Notification Control Point Characteristic, and with the Alert Notification Control Point value specified by the Upper Tester.

The received Alert Notification Control Point value matches the one sent by the IUT.

4.7 Notify Feature
The procedures defined in this test group verify Alert Notification Client IUT Notification of the Features defined in the Alert Notification Profile Specification [4] by an Alert Notification Client IUT.

4.7.1 ANP/CL/ANPNF/BV-01-I [New Alert Characteristic, Notify]
• Test Purpose
Verify that the Alert Notification Client IUT can receive notification of the New Alert characteristic.
• Reference

[4] 4.5, 4.6, 4.9

• Initial Condition

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

The IUT has executed the procedure defined in ANP/CL/ANPD/BV-05-I [Discover New Alert Characteristic] and ANP/CL/ANPD/BV-06-I [Discover New Alert - Client Characteristic Configuration Descriptor] and ANP/CL/ANPD/BV-04-I [Discover Alert Notification Control Point Characteristic], and has saved the handle of a New Alert characteristic and an associated Client Characteristic Configuration descriptor and an Alert Notification Control Point Characteristic.

The IUT has executed the procedure defined in ANP/CL/ANPCF/BV-01-I [New Alert – Client Characteristic Configuration, write with 0x0001] to enable a New Alert notify.

• Test Procedure

The Upper Tester issues a command with a valid Alert Notification Control Point value to the IUT to enable a New Alert notify.

The IUT executes the procedure defined in ANP/CL/ANPWF/BV-01-I [Alert Notification Control Point Characteristic write] with specified handle and value by the Upper Tester.

The Lower Tester sends an ATT_Handle_Value_Notification containing a New Alert Characteristic value to the IUT.

The Upper Tester reports the received value of the Incoming Alert Notification from the IUT.

Repeat procedures if the Upper Tester needs any other category notification.

• Expected Outcome

Pass verdict

The reported New Alert Characteristic value matches the one sent by the Lower Tester.
**4.7.2 ANP/CL/ANPNF/BV-02-I [Unread Alert Status Characteristic, Notify]**

- **Test Purpose**
  Verify that the Alert Notification Client IUT can receive notification of the Unread Alert Status characteristic.

- **Reference**
  [4] 4.7, 4.8, 4.9

- **Initial Condition**
  Establish an ATT Bearer connection between the Lower Tester and IUT; see 4.2.

The IUT has executed the procedure defined in **ANP/CL/ANPD/BV-07-I** [Discover Unread Alert Status Characteristic] and **ANP/CL/ANPD/BV-08-I** [Discover Unread Alert Status – Client Characteristic Configuration Descriptor] and **ANP/CL/ANPD/BV-04-I** [Discover Alert Notification Control Point Characteristic], and has saved the handle of an Unread Alert Status Characteristic and an associated Client Characteristic Configuration descriptor and an Alert Notification Control Point Characteristic. The IUT has executed the procedure defined in **ANP/CL/ANPCF/BV-03-I** [Unread Alert Status – Client Characteristic Configuration, write with 0x0001] to enable an Unread Alert Status notify.

- **Test Procedure**
  The Upper Tester issues a command with a valid Alert Notification Control Point value to the IUT to enable an Unread Alert Status notify.

  The IUT executes the procedure defined in **ANP/CL/ANPW/BV-01-I** [Alert Notification Control Point Characteristic write] with specified handle and value by the Upper Tester.

  The Lower Tester sends an ATT_Handle_Value_Notification containing an Unread Alert Status Characteristic value to the IUT.

  The Upper Tester reports the received value of the Unread Alert Status from the IUT.

  Repeat procedures if the Upper Tester needs any other category status.

- **Expected Outcome**
  **Pass verdict**
  The reported Unread Alert Status Characteristic value matches the one sent by the Lower Tester.

**4.8 Features**

**4.8.1 ANP/CL/ANPSF/BV-01-I [Recovery from Connection Loss for New Alerts]**

- **Test Purpose**
  Verify that the Alert Notification Client IUT checks the Unread Alert Status characteristic value and does not alert the user if the value of the Unread Alert Status has not changed from the previous value when connected.
• Reference

[4] 4.10

• Initial Condition

The Lower Tester and IUT have been already bonded.

• Test Procedure

2. Disconnect the Lower Tester and IUT.
3. The Lower Tester connects to the IUT and starts connection setup (including service discovery, service search and encryption).

• Expected Outcome

Pass verdict

The IUT writes one or more “Enable New Alert Category” commands to the Alert Notification Control Point exposed by the Lower Tester.

The IUT writes the command “Notify New Alert Immediately” with 0xFF in the target category field to the Alert Notification Control Point exposed by the Lower Tester.

The IUT successfully receives the notification of the New Alert characteristic.

If the reported New Alert value sent by the Lower Tester matches the one that is saved on the IUT in previous connection, the IUT doesn’t alert the user.

4.8.2 ANP/CL/ANPSF/BV-02-I [Recovery from Connection Loss for Unread Alerts]

• Test Purpose

Verify that the Alert Notification Client IUT checks the New Alert characteristic value and does not alert the user if the value of the New Alert has not changed from the previous value when connected.

• Reference

[4] 4.10

• Initial Condition

The Lower Tester and IUT have been already bonded.

The Lower Tester and IUT are disconnected.

• Test Procedure


Disconnect the Lower Tester and IUT.
The Lower Tester connects to the IUT and starts connection setup (including service discovery, service search and encryption).

- Expected Outcome
  
  **Pass verdict**

  The IUT writes one or more “Enable Unread Alert Category” commands to the Alert Notification Control Point exposed by the Lower Tester.

  The IUT writes the command “Notify Unread Alert Status Immediately” with ‘0xFF’ for the target category field to the Alert Notification Control Point exposed by the Lower Tester.

  The IUT successfully receives the notification of the Unread Alert Status characteristic.

  If the reported Unread Alert Status value sent by the Lower Tester matches the one that is saved on the IUT in previous connection, the IUT doesn’t alert the user.

**4.8.3 ANP/CL/ANPSF/BV-03-I [Check the Supported Categories for New Alerts after Connection]**

- Test Purpose
  
  Verify that the Alert Notification Client IUT checks the Supported New Alert Category characteristic value when connected.

- Reference
  

- Initial Condition
  
  The Lower Tester and IUT are disconnected.

- Test Procedure
  
  The Lower Tester connects to the IUT and starts connection setup (including service discovery, service search and encryption).

- Expected Outcome
  
  **Pass verdict**

  The IUT reads the Supported New Alert Category characteristic exposed by the Lower Tester.

**4.8.4 ANP/CL/ANPSF/BV-04-I [Check the Supported Categories for Unread Alert after Connection]**

- Test Purpose
  
  Verify that the Alert Notification Client IUT checks the Supported Unread Alert Category characteristic value when connected.
• Reference


• Initial Condition

The Lower Tester and IUT are disconnected.

• Test Procedure

The Lower Tester connects to the IUT and starts connection setup (including service discovery, service search and encryption).

• Expected Outcome

Pass verdict

The IUT reads the Supported Unread Alert Category characteristic exposed by the Lower Tester.

4.8.5 ANP/CL/ANPSF/BV-05-I [Verify Bond Status on Reconnection]

• Test Purpose

Verify that the Alert Notification Server establishes a re-connection with encryption with a previously bonded Alert Notification Client on reconnection and the Alert Notification Client responds correctly.

• Test Case IDs

ANP/CL/ANPSF/BV-05-I
ANP/SR/ANPSF/BV-05-I

• Reference

[4] 5.1.3, 5.2.3

• Initial Condition

The IUT and the Lower Tester are bonded.

The IUT has configured the Lower Tester to enable notification.

No connection is established between the IUT and the Lower Tester.

• Test Procedure

The IUT establishes a connection to the Lower Tester.

The IUT encrypts the connection.

• Expected Outcome

Pass verdict

The IUT establishes a connection with encryption.
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 Alert Notification Profile (ANP) [3]. 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.

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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Feature</th>
<th>Test Case(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANP 7/1</td>
<td>Use Alert Notification Service</td>
<td>ANP/CL/ANPD/BV-02-I</td>
</tr>
<tr>
<td>ANP 7/2</td>
<td>Discover Supported New Alert Category characteristic</td>
<td>ANP/CL/ANPD/ANPC/BV-03-I</td>
</tr>
<tr>
<td>ANP 7/3</td>
<td>Discover Supported Unread Alert Category characteristic</td>
<td>ANP/CL/ANPD/ANPC/BV-09-I</td>
</tr>
<tr>
<td>ANP 7/4</td>
<td>Discover Alert Notification CP characteristic</td>
<td>ANP/CL/ANPD/ANPC/BV-04-I</td>
</tr>
<tr>
<td>ANP 7/5</td>
<td>Discover New Alert characteristic</td>
<td>ANP/CL/ANPD/ANPC/BV-05-I</td>
</tr>
<tr>
<td>ANP 7/6</td>
<td>Discover New Alert characteristic- Client Characteristic Configuration Descriptor</td>
<td>ANP/CL/ANPD/ANPC/BV-06-I</td>
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<tr>
<td>ANP 7/7</td>
<td>Discover Unread Alert Status characteristic</td>
<td>ANP/CL/ANPD/ANPC/BV-07-I</td>
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<tr>
<td>ANP 7/8</td>
<td>Discover Unread Alert Status characteristic- Client Characteristic Configuration Descriptor</td>
<td>ANP/CL/ANPD/BV-08-I</td>
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<tr>
<td>ANP 8/1</td>
<td>Supported New Alert Category characteristic, read using handle</td>
<td>ANP/CL/ANPRF/BV-01-I</td>
</tr>
<tr>
<td>Item</td>
<td>Feature</td>
<td>Test Case(s)</td>
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<td>-----------</td>
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<td>-----------------------------------</td>
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<td>ANP 8/2</td>
<td>Supported Unread Alert Category characteristic, read using handle</td>
<td>ANP/CL/ANPRF/BV-02-I</td>
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<tr>
<td>ANP 8/3</td>
<td>Alert Notification Control Point characteristic, write</td>
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<td>New Alert characteristic configuration</td>
<td>ANP/CL/ANPCF/BV-01-I</td>
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<td>New Alert characteristic configuration, disable notifications.</td>
<td>ANP/CL/ANPCF/BV-02-I</td>
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<tr>
<td>ANP 8/5</td>
<td>Notify New Alert characteristic</td>
<td>ANP/CL/ANPNF/BV-01-I</td>
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<tr>
<td>ANP 8/6</td>
<td>Unread Alert Status characteristic configuration</td>
<td>ANP/CL/ANPCF/BV-03-I</td>
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<tr>
<td>ANP 8/6a</td>
<td>Unread Alert Status characteristic configuration, disable notifications.</td>
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</tr>
<tr>
<td>ANP 8/9</td>
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</tr>
<tr>
<td>ANP 8/10</td>
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</tr>
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<td>ANP 8/11</td>
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<tr>
<td>ANP 4/1</td>
<td>Verify Bonded Status on Reconnection (Server IUT)</td>
<td>ANP/SR/ANPSF/BV-05-I</td>
</tr>
<tr>
<td>ANP 8/12 AND ANP 10/2</td>
<td>Verify Bonded Status on Reconnection (Client IUT)</td>
<td>ANP/CL/ANPSF/BV-05-I</td>
</tr>
</tbody>
</table>

*Table 5.1: Test Case Mapping*
# 6 Revision History and Contributors

## Revision History

<table>
<thead>
<tr>
<th>Revision History</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0.0</td>
<td>2011-09-15</td>
<td>Adopted by the Bluetooth SIG Board of Directors</td>
</tr>
</tbody>
</table>
| 1.0.1r1          | 2012-08-29| TSE: 4832 Change to ANP/CL/ANPCF/BV-02-C and ANP/CL/ANPCF/BV-04-C (legacy ID: TP/ANPCF/ANPC/BV-02-C and TP/ANPCF/ANPC/BV-04-C) from mandatory to optional. Changes in the TCMT.  
TSE: 4925 Change all test cases from –C to –I. |
| 1.0.1            | 2012-10-30| Prepare for Publication                                                                                                                   |
| 1.0.2r00         | 2016-05-20| 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.                                                                                                     
TSE 7204: Change test case ID to ANP/CL/ANPSF/BV-05-I (legacy ID: TP/ANPSF/BV-01-I) to avoid duplication when it is renamed for the new test case convention |
| 1.0.2r02         | 2016-06-13| Split TP/ANPSF/BV-01-I (Verify Bond Status) into two test cases for Client and Server roles following test case ID conversion               |
| 1.0.2            | 2016-07-14| Prepared for TCRL 2016-1 publication.                                                                                                       |
| 1.0.3r00         | 2016-07-28| TSE 7061 and TSE 7782: In TCMT, removed duplicate test case mapping of ANP/CL/ANPCF/BV-04-I from mapping to ANP 8/6 and changed "ANP/CL/ANPCF/BV-03-C" to "…03-I." |
| 1.0.3            | 2018-12-13| Approved by BTI. Prepared for TCRL 2016-2 publication.                                                                                     |
| 1.0.3 edition 2r00| 2018-11-26| Editorial changes only. Template updated. Revision History and Contributors moved to the end of the document.                                |
| 1.0.3 edition 2  | 2019-11-11| 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. |

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</table>