

Calendar Tasks and Notes Profile (CTN)

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 Calendar Tasks and Notes Profile with the objective to provide a high probability of air interface interoperability between the tested implementation and other manufacturers' Bluetooth devices.

Basic test cases are defined in the Generic PIM Profile (GPP) Test Suite and are mandatory for CTN.

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], [2], and [3].

- [1] Bluetooth Core Specification, Version 2.1 or later
- [2] Test Strategy and Terminology Overview
- [3] Calendar Tasks and Notes Profile Specification
- [4] ICS Proforma for Calendar, Tasks and Notes Profile
- [5] Generic PIM Profile (GPP) Specification
- [6] Generic PIM Profile (GPP) Test Suite, GPP.TS
- [7] Bluetooth Specification Guidelines
- [8] ITU-T X.290 series, OSI CONFORMANCE TESTING METHODOLOGY AND FRAMEWORK
PROTOCOL RECOMMENDATIONS FOR ITU-T APPLICATIONS, ITU Recommendation X.290
series (equivalent to ISO 9646)
- [9] Generic Object Exchange Profile (GOEP) Test Suite, GOEP.TS
- [10] SDP Test Suite, SDP.TS

2.2 Definitions

In this Bluetooth document, the definitions from [1], [2], and [3] apply.

2.3 Acronyms and abbreviations

In this Bluetooth document, the definitions, acronyms, and abbreviations from [1], [2], and [3] apply.

Acronyms and abbreviations	Definition
CAS	CTN Access Service
CNS	CTN Notification Service
GPP	Generic PIM Profile
PAS	PIM Access Service
PIM	Personal Information Management
PNS	PIM Notification Service

Table 2.1: Acronyms and abbreviations

3 Test Suite Structure (TSS)

3.1 Overview

The test objectives are to verify functionality of the Calendar Tasks and Notes 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. This is being done through a combination of tests defined in this document together with a set of referenced tests defined either in the [6] GPP.TS or the [9] GOEP.TS.

Whenever a test case defined by this document requires functionality from external networks, such as receiving or sending CTN objects, this can be performed by a real network or a suitable network simulator.

3.2 Test groups

The following test groups have been defined:

- Generic SDP Integrated Tests
- CTN account handling
- Notification
- Browsing
- Object handling

3.3 References to Generic PIM Profile Test Suite test cases

The Generic PIM Profile specifies generic function definitions that are further defined at the higher profile layer. Please refer to the CTN specification for the definitions of the functions and how they are used in CTN to meet the Qualification testing requirements for the CTN profile. The CTN function definitions are found in Section 5 of the CTN specification [3].

This Test Suite reuses test case definitions from the Generic PIM Profile Test Suite (GPP TS) [6]. If the test procedure references a GPP TS test case, then the 'Initial Condition', 'Test Procedure', and 'Expected Outcome', including Pass verdicts of the referenced GPP TS test case, apply.

Additional steps and requirements are listed in each applicable test case and are applied when performing the CTN test case. If additional pass verdicts are listed, the test case is passed only if the additional Pass verdicts are met.

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>.

Testing of CTN functionality includes a set of tests from the GOEP Test Suite and the GPP Test Suite.

The required GOEP tests are referred to in this TCMT per the following convention:

<spec abbreviation>/<IUT role>/GOEP/<GOEP TC Identifier>.

The required GPP tests are referred to in this TCMT per the following convention:

<spec abbreviation>/<IUT role>/GPP/<GPP TC Identifier>.

Additionally, testing of this specification includes tests from the SDP Test Suite [10] referred to as Generic SDP Integrated Tests (GSIT); when used, the test cases in GSIT are referred to through a TCID string using the following convention:

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

Identifier Abbreviation	Spec Identifier <spec abbreviation>
CTN	Calendar Tasks and Notes Profile
Identifier Abbreviation	Role Identifier <IUT role>
CCE	CTN Client Equipment Role
CSE	CTN Server Equipment Role
Identifier Abbreviation	Reference Identifier <GSIT test group>
CGSIT	Client Generic SDP Integrated Tests
SGSIT	Server Generic SDP Integrated Tests
Identifier Abbreviation	Reference Identifier <GSIT class>
ATTR	Attribute
OFFS	Attribute ID Offset String
SERR	Service Record
SFC	SDP Future Compatibility
Identifier Abbreviation	Feature Identifier <feat>
CAH	CTN Account Handling functions
CBR	CTN Browsing functions
CNO	CTN Notification functions
COH	CTN Object Handling functions

Table 4.1: CTN 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, the outcome of the test is a Fail verdict.

4.2 Generic SDP Integrated Tests

4.2.1 Server Generic SDP Integrated Tests

4.2.1.1 CTN Notification Service on the CCE device

Execute the Generic SDP Integrated Tests defined in Section 6.3, Server test procedures (SGSIT), in [10] using Table 4.2 below as input:

TCID	Reference	Attribute ID name	Attribute ID definition source (Universal, Profile)	Value/secondary value	Attribute presence (Present/Present for [role], Optionally present, TCMT defined)
CTN/CCE/SGSIT/SERR/BV-01-C [Service record GSIT – CTN CCE Notification Service]	[3] 7.3	ServiceClassIDList	Universal	“CTN Notification Service” (UUID)	Present for CCE
CTN/CCE/SGSIT/ATTR/BV-01-C [Attribute GSIT – Protocol Descriptor List]	[3] 7.3	ProtocolDescriptorList	Universal	“L2CAP” (UUID): GOEP L2CAP PSM – skip (Uint16), “OBEX” (UUID)	Present for CCE
CTN/CCE/SGSIT/ATTR/BV-02-C [Attribute GSIT – Bluetooth Profile Descriptor List]	[3] 7.3	BluetoothProfileDescriptorList	Universal	“Calendar Tasks and Notes profile” (UUID): Version “1x0100” (Uint16)	Present for CCE
CTN/CCE/SGSIT/ATTR/BV-03-C [Attribute GSIT – CTN Supported Features]	[3] 7.3	CTN Supported Features	Profile	skip (Uint32)	Present for CCE

Table 4.2: Input for the CTN Notification Service on the CCE device SGSIT SDP test procedure

4.2.1.2 CTN Access Service on the CSE device

Execute the Generic SDP Integrated Tests defined in Section 6.3, Server test procedures (SGSIT), in [10] using Table 4.3 below as input:

TCID	Reference	Attribute ID name	Attribute ID definition source (Universal, Profile)	Value/secondary value	Attribute presence (Present/Present for [role], Optionally present, TCMT defined)
CTN/CSE/SGSIT/SERR/BV-02-C [Service record GSIT – CTN CSE Access Service]	[3] 7.2	ServiceClassIDList	Universal	“CTN Access Service” (UUID)	Present for CSE
CTN/CSE/SGSIT/ATTR/BV-04-C [Attribute GSIT – Protocol Descriptor List]	[3] 7.2	ProtocolDescriptorList	Universal	“L2CAP” (UUID): GOEP L2CAP PSM – skip (Uint16), “OBEX” (UUID)	Present for CSE



TCID	Reference	Attribute ID name	Attribute ID definition source (Universal, Profile)	Value/secondary value	Attribute presence (Present/Present for [role], Optionally present, TCMT defined)
CTN/CSE/SGSIT/ATTR/BV-05-C [Attribute GSIT – Bluetooth Profile Descriptor List]	[3] 7.2	BluetoothProfileDescriptorList	Universal	“Calendar Tasks and Notes profile” (UUID): Version “0x0100” (UInt16)	Present for CSE
CTN/CSE/SGSIT/ATTR/BV-06-C [Attribute GSIT – CTN InstanceID]	[3] 7.2	CTN InstanceID	Profile	skip (UInt8)	Present for CSE
CTN/CSE/SGSIT/ATTR/BV-07-C [Attribute GSIT – CTN Supported Features]	[3] 7.2	CTN Supported Features	Profile	skip (UInt32)	Present for CSE

Table 4.3: Input for the CTN Access Service on the CSE device SGSIT SDP test procedure

4.2.1.3 Calendar Tasks and Notes Profile – Attribute ID Offset String tests

Execute the Generic SDP Integrated Tests defined in Section 6.3, Server test procedures (SGSIT), in [10] using Table 4.4 below as input:

TCID	Reference	ServiceSearchPattern	Attribute ID name	Attribute ID Offset	Attribute presence (Present/Present for [role], Optionally present, TCMT defined)
CTN/CCE/SGSIT/OFFS/BV-01-C [Attribute ID Offset String GSIT – Service Name]	[3] 7.3	CTN Notification Service	ServiceName	0x0000	Present for CCE
CTN/CSE/SGSIT/OFFS/BV-02-C [Attribute ID Offset String GSIT – Service Name]	[3] 7.2	CTN Access Service	ServiceName	0x0000	Present for CSE

Table 4.4: Input for the Calendar Tasks and Notes Profile SGSIT Attribute ID Offset String tests

4.2.2 Client Generic SDP Integrated Tests

Execute the Generic SDP Future Compatibility Tests defined in Section 6.4, Client test procedures (CGSIT), in [10] using Table 4.5 below as input:

TCID	Reference	Service Record Service Class UUID description	Lower Tester SDP record initial conditions
CTN/CCE/CGSIT/SFC/BV-01-C [SDP Future Compatibility – IUT is CTN CCE]	[3] 3.5, 7	CTN Access Service	The Lower Tester exposes CTN CSE SDP record. The version in the Bluetooth Profile Descriptor List is greater than the most recently adopted version. All bits are set in the supported features attribute, including Reserved bits.

Table 4.5: Input for the Client CGSIT SDP future compatibility tests



4.3 Account Handling

Check that the CTN accounts can be handled properly.

4.3.1 IUT – CTN Client Equipment

Check that the CTN Client Equipment (CCE) can properly handle CTN CAS accounts.

CTN/CCE/CAH/BV-01-C [Retrieve Information about a CAS Account]

- Test Purpose

Verify that the CCE can retrieve descriptive information of a CAS-account from the CSE.

- Reference

[3] 4.2

[6] 4.3.1.1

- Initial Condition

- The Initial Conditions of GPP/GIH/BV-01-C apply ([6] 4.3.1.1).

- Test Procedure

Perform the Test Procedure of GPP/GIH/BV-01-C ([6] 4.3.1.1).

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GIH/BV-01-C ([6] 4.3.1.1) apply.

Additionally these pass criteria apply to this test case:

The IUT receives the application parameters 'EmailURI' and 'LastUpdate' in the response from the Lower Tester.

4.3.2 IUT – CTN Server Equipment

Check that the CTN Server Equipment (CSE) can properly provide CTN accounts.

CTN/CSE/CAH/BV-11-C [Return Information about a CAS Account]

- Test Purpose

Verify that the CSE can deliver descriptive information of a CAS-account to the CCE.

- Reference

[3] 4.2

[6] 4.3.2.1

- Initial Condition

- The Initial Conditions of GPP/GIH/BV-11-C apply ([6] 4.3.2.1).

- Test Procedure

Perform the Test Procedure of GPP/GIH/BV-11-C ([6] 4.3.2.1)



- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GIH/BV-11-C ([6] 4.3.2.1) apply.

Additionally, these pass criteria apply to this test case:

The IUT sends the application parameters 'EmailURI' and 'LastUpdate' in the response.

4.4 CTN Browsing Feature

Verify that the Browsing in the CSE's repository is properly implemented.

4.4.1 IUT – CTN Client Equipment

Verify that the functions specific to the Browsing in the object repository are properly implemented by the CCE.

CTN/CCE/CBR/BV-01-C [Retrieve an Object Listing]

- Test Purpose

Verify that the CCE can retrieve object listings from the CSE for each object type supported by the CCE.

- Reference

[3] 4.4

[6] 4.5.1.2

- Initial Condition

- The Initial Conditions of GPP/GBR/BV-02-C apply ([6] 4.5.1.2)
- The IUT (CCE) and the Lower Tester (CSE) have established an active CAS connection.
- The 'GetCTNListing' function is used.

- Test Procedure

Perform the Test Procedure of GPP/GBR/BV-02-C ([6] 4.5.1.2)

Depending on the object types supported by the CCE, the following folders are selected for the listings:

- 1. '..\telecom\CTN\calendar' for event objects
- 2. '..\telecom\CTN\tasks' for task or to-do objects
- 3. '..\telecom\CTN\notes' for note objects

The test is performed for all object types supported by the IUT (CCE).

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GBR/BV-02-C ([6] 4.5.1.2) apply.

4.4.2 IUT – CTN Server Equipment

Verify that the functions specific to the Browsing in the object repository are properly implemented by the CSE.

CTN/CSE/CBR/BV-11-C [Return an Object Listing]

- Test Purpose

Verify that the CSE can deliver object listings to the CCE for each object type supported by the CSE.

- Reference

[3] 4.4

[6] 4.5.2.3

- Initial Condition

- The Initial Conditions of GPP/GBR/BV-12-C apply ([6] 4.5.2.3).
- The IUT (CSE) and the Lower Tester (CCE) have established an active CAS connection.
- The 'GetCTNListing' function is used.

- Test Procedure

Perform the Test Procedure of GPP/GBR/BV-12-C ([6] 4.5.2.3)

Depending on the object types supported by the CSE, the following folders are selected for the listings:

- 1. '..\telecom\CTN\calendar' for event objects
- 2. '..\telecom\CTN\tasks' for task or to-do objects
- 3. '..\telecom\CTN\notes' for note objects

The test is performed for all object types supported by the IUT (CSE).

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GBR/BV-12-C ([6] 4.5.2.3) apply.

CTN/CSE/CBR/BI-12-C [Reject an Object Listing Request for an Invalid Folder]

- Test Purpose

Verify that the CSE can reject a CCE request for an object listing of a non-existing folder.

- Reference

[3] 4.4

- Initial Condition

- The IUT and the Lower Tester have established a CTN session. In that session, the CTN Access Service is active.

- Test Procedure

The Lower Tester requests an object-listing by a 'GetCTNListing' function request with an invalid folder included in the 'Name' header of the request, i.e., something different from

- ..\telecom\CTN\calendar
- ..\telecom\CTN\tasks
- ..\telecom\CTN\notes

The IUT responds with an error code.

- Expected Outcome

Pass verdict

The IUT response of 'GetCTNListing' function is well formatted according to [3].

The IUT responds with a suitable error code. (For details, see Section 6.2.7 OBEX Error Codes in [5].)

4.5 CTN Object Handling Feature

Verify that handling of the CTN bCalendar objects is properly implemented.

4.5.1 IUT – CTN Client Equipment

Verify that the functions specific to the handling of the CTN bCalendar objects in the CSE's repository are properly implemented by the CCE.

CTN/CCE/COH/BV-01-C [Retrieve a bCalendar Object from the CSE]

- Test Purpose

Verify that the CCE can retrieve bCalendar objects from the CSE for each object type supported by the CSE.

- Reference

[3] 4.5

[6] 4.6.1.1

- Initial Condition

- The Initial Conditions of GPP/GOH/BV-01-C apply ([6] 4.6.1.1).
- The IUT (CCE) and the Lower Tester (CSE) have established an active CAS connection.
- The 'GetCTNObject' function is used.

- Test Procedure

Perform the Test Procedure of GPP/GOH/BV-01-C ([6] 4.6.1.1)

Depending on the object types supported by the CCE and CSE, the following folders are selected for the object download:

- 1. '..\telecom\CTN\calendar' for event objects
- 2. '..\telecom\CTN\tasks' for task or to-do objects
- 3. '..\telecom\CTN\notes' for note objects



The test is performed for all object types supported by the IUT (CCE).

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GOH/BV-01-C ([6] 4.6.1.1) apply.

CTN/CCE/COH/BV-02-C [Upload a bCalendar Object to the CSE]

- Test Purpose

Verify that the CCE can upload bCalendar objects on the CSE repository for each object type supported by CCE.

- Reference

[3] 4.6

[6] 4.6.1.2

- Initial Condition

- The Initial Conditions of GPP/GOH/BV-02-C apply ([6] 4.6.1.2).
- The IUT (CCE) and the Lower Tester (CSE) have established an active CAS connection.

- Test Procedure

Perform the Test Procedure of GPP/GOH/BV-02-C ([6] 4.6.1.2)

Depending on the object types supported by the CCE, the following folders are selected for the object upload:

- 1. '..\telecom\CTN\calendar' for event objects
- 2 '..\telecom\CTN\tasks' for task or to-do objects
- 3. '..\telecom\CTN\notes' for note objects

The test is performed for all object types supported by the IUT (CCE).

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GOH/BV-02-C ([6] 4.6.1.2) apply.

CTN/CCE/COH/BV-03-C [Delete a bCalendar Object on the CSE]

- Test Purpose

Verify that the CCE can delete bCalendar objects on the CSE repository for each object type supported by CCE.

- Reference

[3] 4.8

- Initial Condition

- The IUT (CCE) and the Lower Tester (CSE) have established an active CAS connection.
- The 'SetCTNStatus' function is used.



Depending on the object types supported by the CCE, the following folders are selected for the object deletion:

- ..\telecom\CTN\calendar for event objects
- ..\telecom\CTN\tasks for task or to-do objects
- ..\telecom\CTN\notes for note objects

The test is performed for all object types supported by the IUT (CCE) and CSE.

- Test Procedure

The IUT requests the Lower Tester to delete one literal object X from its folder by using the function 'SetCTNStatus' with the StatusIndicator 'deletedStatus' set to the StatusValue 'yes' which means delete.

- Expected Outcome

Pass verdict

The request of the 'SetCTNStatus' function is well formatted according to [3].

The literal CTN object X has been deleted from the Lower Tester's folder.

CTN/CCE/COH/BV-04-C [Forward a bCalendar Object on the CSE]

- Test Purpose

Verify that the CCE can initiate action to forward of bCalendar objects on the CSE repository for each object type supported by CCE.

- Reference

[3] 4.7

- Initial Condition

- The IUT and the Lower Tester have established a CTN session. In that session, the CTN Access Service is active.
- The repository of the Lower Tester (CSE) contains at least one bCalendar object for each object type supported by the IUT (CCE). The Lower Tester has retrieved the handles of these objects.

- Test Procedure

The IUT requests a forward of a bCalendar object by using the 'ForwardCTNObject' function with a valid email URI included in the 'Description' header of the request.

The Lower Tester forwards the bCalendar object to the related address

The test is performed for all object types supported by the IUT (CCE)

- Expected Outcome

Pass verdict

The IUT request of the 'CTNForward' function is well formatted according to [3].

The bCalendar object has been sent to the recipient related to the email URI.

CTN/CCE/COH/BV-05-C [Update Status of a bCalendar Object on the CSE]

- Test Purpose

Verify that the CCE can change the status of bCalendar objects on the CSE repository.
- Reference

[3] 4.5
- Initial Condition
 - The IUT and the Lower Tester have established a CTN session. In that session, the CTN Access Service is active.
 - The repository of the Lower Tester (CSE) contains at least one bCalendar object in the ..\telecom\CTN\calendar folder (event type) with a confirm-status of the participant related to the CSE that is other than 'accepted' and with non-activated alarm.
 - The IUT has retrieved the handle of this object.
- Test Procedure

The IUT requests for the of the bCalendar object on the CSE a confirm-status change of the participant related to the CSE to 'accepted' by using the 'SetCTNStatus' function.

The Lower Tester changes the confirm-status and sends a 'success' response.

The IUT requests for the of the bCalendar object an alarm-status change with value 'yes' (=activate-alarm) by using the 'SetCTNStatus' function.

The Lower Tester changes the confirm-status and sends a 'success' response.
- Expected Outcome

Pass verdict:

The IUT requests of the 'SetCTNStatus' function are well formatted according to [3].

The confirm-status of the bCalendar object has changed to 'accepted'.

The alarm-status of the bCalendar object has changed to 'yes' (=activated)

CTN/CCE/COH/BV-06-C [Receive Listing Filtered by datetime]

- Test Purpose

Verify that the CCE can receive a listing filtered by datetime.
- Reference

[3] 5.3
- Initial Condition
 - The IUT and the Lower Tester have established a CTN session. In that session, the CTN Access Service is active.
 - The current folder of the Lower Tester contains at least one object that has a datetime before X.
 - The current folder of the Lower Tester contains at least one object that has a datetime later than Y.
 - The current folder of the Lower Tester contains at least one object that has a date between X and Y.



- Test Procedure
 1. The IUT (CCE) requests a listing using the function 'GetCTNListing' with the ApplicationParameter FilterPeriodBegin set to datetime X and FilterPeriodEnd set to datetime Y.
 2. The IUT (CCE) requests a listing using the function 'GetCTNListing' with the ApplicationParameter FilterPeriodBegin set to a datetime before X and FilterPeriodEnd set to datetime X.
 3. The IUT (CCE) requests a listing using the function 'GetCTNListing' with the ApplicationParameter FilterPeriodBegin set to datetime Y and FilterPeriodEnd set to after datetime Y.
 4. The IUT (CCE) requests a listing using the function 'GetCTNListing' with the ApplicationParameter FilterPeriodBegin set to a datetime before X and FilterPeriodEnd set to after datetime Y.

- Expected Outcome

Pass verdict

The IUT's request of the 'GetCTNListing' function is well formatted according to [3].

The listing in the response of test procedure step 1 only contains entries with a datetime between X and Y.

The listing in the response of test procedure step 2 only contains entries with a datetime between "before X" and X.

The listing in the response of test procedure step 3 only contains entries with a datetime between Y and "after datetime Y".

The listing in the response of test procedure step 4 only contains entries with a datetime between "before X" and "after datetime Y".

4.5.2 IUT – CTN Server Equipment

Verify that the functions specific to the handling of the bCalendar objects in the CSE's repository are properly implemented by the CSE.

CTN/CSE/COH/BV-11-C [Return a bCalendar Object]

- Test Purpose

Verify that the CSE can deliver bCalendar objects to the CCE for each object type supported by the CSE.
- Reference

[3] 4.5

[6] 4.6.2.1
- Initial Condition
 - The Initial Conditions of GPP/GOH/BV-11-C apply ([6] 4.6.2.1).
 - The IUT (CSE) and the Lower Tester (CCE) have established an active CAS connection.
 - The 'GetCTNObject' function is used.
- Test Procedure

Perform the Test Procedure of GPP/GOH/BV-11-C ([6] 4.6.2.1)



Depending on the object types supported by the CSE, the following folders are selected for the object download:

- 1. '..\telecom\CTN\calendar' for event objects
- 2. '..\telecom\CTN\tasks' for task or to-do objects
- 3. '..\telecom\CTN\notes' for note objects

The test is performed for all object types supported by the IUT (CSE).

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GOH/BV-11-C ([6] 4.6.2.1) apply.

CTN/CSE/COH/BI-16-C [Reject an Invalid Request for a bCalendar Object]

- Test Purpose

Verify that the CSE can reject a request for a non-existing bCalendar object.

- Reference

[3] 4.5

[6] 4.6.2.2

- Initial Condition

- The Initial Conditions of GPP/GOH/BI-11-C apply ([6] 4.6.2.2).
- The IUT (CSE) and the Lower Tester (CCE) have established an active CAS connection.
- The 'GetCTNObject' function is used for the request.

- Test Procedure

Perform the Test Procedure of GPP/GOH/BI-11-C ([6] 4.6.2.2) when applied to the retrieval of bCalendar objects.

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GOH/BI-11-C ([6] 4.6.2.2) apply.

CTN/CSE/COH/BV-12-C [Receive a bCalendar Object from the CCE]

- Test Purpose

Verify that the CSE can receive bCalendar objects from the CCE for each object type supported by CSE and CCE.

- Reference

[3] 4.6

[6] 4.6.2.3

- Initial Condition

- The Initial Conditions of GPP/GOH/BV-12-C apply ([6] 4.6.2.3).

- The IUT (CCE) and the Lower Tester (CSE) have established an active CAS connection.
- The 'PushCTNObject' function is used.
- Test Procedure

Perform the Test Procedure of GPP/GOH/BV-12-C ([6] 4.6.2.3)

Depending on the object types supported by the CSE, the following folders are selected for the object download:

 - 1. '..\telecom\CTN\calendar' for event objects
 - 2. '..\telecom\CTN\tasks' for task or to-do objects
 - 3. '..\telecom\CTN\notes' for note objects

The test is performed for all bCalendar object types supported by the IUT (CSE) and CCE.
- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GOH/BV-12-C ([6] 4.6.2.3) apply.

CTN/CSE/COH/BV-13-C [Delete a bCalendar Object]

- Test Purpose

Verify that the CSE can delete bCalendar objects on request of the CCE for each object type supported by the CSE.
- Reference

[3] 4.8
- Initial Condition
 - The IUT (CSE) and the Lower Tester (CCE) have established an active CAS connection.
 - The 'SetCTNStatus' function is used.
- Test Procedure

The Lower Tester requests the IUT to delete one literal object from its folder by using the function 'SetCTNStatus' with the StatusIndicator 'deletedStatus' set to the StatusValue 'yes' which means delete.

Dependent on the object types supported by the CSE the following folders are selected for the object deletion:

 - ..\telecom\CTN\calendar for event objects
 - ..\telecom\CTN\tasks for task or to-do objects
 - ..\telecom\CTN\notes for note objects

The test is performed for all object types supported by the IUT (CSE).
- Expected Outcome

Pass verdict

The response of the 'SetCTNStatus' function is well formatted according to [3].

The literal CTN object has been deleted from the IUT's folder.



CTN/CSE/COH/BV-14-C [Forward a bCalendar Object]

- Test Purpose

Verify that the CSE can forward a bCalendar object on request of the CCE for each object type supported by CSE.
- Reference

[3] 4.7
- Initial Condition
 - The IUT and the Lower Tester have established a CTN session. In that session, the CTN Access Service is active.
 - The repository of the IUT (CSE) contains at least one bCalendar object for each object type supported by the IUT. The Lower Tester has retrieved the handles of these objects.
- Test Procedure

The Lower Tester requests a forward of a bCalendar object by using the ForwardCTNObject function with a valid email URI included in the 'Description' header of the request.

The IUT forwards the bCalendar object to the related address

The test is performed for all object types supported by the IUT (CSE).
- Expected Outcome

Pass verdict

The IUT response of the 'CTNForward' function is well formatted according to [3].

The bCalendar object has been sent by the IUT device to the recipient related to the email URI.

CTN/CSE/COH/BV-15-C [Update Status of a bCalendar Object]

- Test Purpose

Verify that the CSE can change the status of bCalendar objects on request of the CCE.
- Reference

[3] 4.5
- Initial Condition
 - The IUT and the Lower Tester have established a CTN session. In that session, the CTN Access Service is active.
 - The repository of the IUT (CSE) contains at least one bCalendar object in the ..\telecom\CTN\calendar folder (event type) with a confirm-status of the participant related to the CSE that is other than 'accepted' and with non-activated alarm.
 - The Lower Tester has retrieved the handle of this object.
- Test Procedure

The Lower Tester (CCE) requests for the of the bCalendar object on the IUT (CSE) a confirm-status change of the participant related to the CSE to 'accepted' by using the SetCTNStatus function.

The IUT changes the confirm-status and sends a 'success' response.

The Lower Tester requests for the of the bCalendar object an alarm-status change with value 'yes' (=activate-alarm) by using the 'SetCTNStatus' function.

The IUT changes the confirm-status and sends a 'success' response.

- Expected Outcome

Pass verdict

The IUT responses of the 'SetCTNStatus' function are well formatted according to [3].

The confirm-status of the bCalendar object has changed to 'accepted'.

The alarm-status of the bCalendar object has changed to 'yes' (=activated)

CTN/CSE/COH/BV-16-C [Filtering by datetime]

- Test Purpose

Verify that the CSE can properly respond to a listing request with filtering by datetime.

- Reference

[3] 5.3

- Initial Condition

- The IUT and the Lower Tester have established a CTN session. In that session, the CTN Access Service is active.
- The current folder contains at least one object that has a datetime before X.
- The current folder contains at least one object that has a datetime later than Y.
- The current folder contains at least one object that has a datetime between X and Y.

- Test Procedure

1. The Lower Tester (CCE) requests a listing using the function 'GetCTNListing' with the ApplicationParameter FilterPeriodBegin set to datetime X and FilterPeriodEnd set to datetime Y.
2. The Lower Tester (CCE) requests a listing using the function 'GetCTNListing' with the ApplicationParameter FilterPeriodBegin set to a datetime before X and FilterPeriodEnd set to datetime X.
3. The Lower Tester (CCE) requests a listing using the function 'GetCTNListing' with the ApplicationParameter FilterPeriodBegin set to datetime Y and FilterPeriodEnd set to after datetime Y.
4. The Lower Tester (CCE) requests a listing using the function 'GetCTNListing' with the ApplicationParameter FilterPeriodBegin set to a datetime before X and FilterPeriodEnd set to after datetime Y.

- Expected Outcome

Pass verdict

The IUT response of the "GetCTNListing" function is well formatted according to [3].

The listing in the response of test procedure step 1 only contains entries with a datetime between X and Y.

The listing in the response of test procedure step 2 only contains entries with a datetime between "before X" and X.

The listing in the response of test procedure step 3 only contains entries with a datetime between Y and “after datetime Y”.

The listing in the response of test procedure step 4 only contains entries with a datetime between “before X” and “after datetime Y”.

4.6 CTN Notification Feature

Verify the normal behavior of the components necessary to realize the CTN Notification.

4.6.1 IUT – CTN Client Equipment

Verify that the CTN Client Equipment device can properly take advantage of the CTN Notification.

CTN/CCE/CNO/BV-01-C [Receive a Notification Event]

- Test Purpose

Verify that the CCE can receive notification events from the CSE.

- Reference

[3] 4.3

[6] 4.7.1.1

- Initial Condition

- The Initial Conditions of GPP/GNO/BV-01-C apply ([6] 4.7.1.1).
- The IUT (CCE) and the Lower Tester (CSE) have established an active CNS connection and an active CAS connection.
- The ‘SendCTNEvent’ function is used.

- Test Procedure

Perform the Test Procedure of GPP/GNO/BV-01-C ([6] 4.7.1.1)

The test is performed for several types of events, i.e., the following operations are performed by the Lower Tester with reporting of the related events:

1. Create a new bCalendar object on the Lower Tester
→ Lower Tester sends a ‘NewObject’ event
2. Change the content of a bCalendar object on the Lower Tester
→ Lower Tester sends an ‘ObjectUpdate’ event
3. Delete a bCalendar object on the Lower Tester
→ Lower Tester sends an ‘ObjectDeleted’ event
4. An alarm has been triggered for an event on the Lower Tester
→ Lower Tester sends an ‘Alarm’ event.

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GNO/BV-01-C ([6] 4.7.1.1) apply.

4.6.2 IUT – CTN Server Equipment

Verify that the CTN Server Equipment device has properly implemented the CTN Notification.

CTN/CSE/CNO/BV-11-C [Send a Notification Event]

- Test Purpose

Verify that the CSE can send notification events to the CCE.

- Reference

[3] 4.3

[6] 4.7.2.1

- Initial Condition

- The Initial Conditions of GPP/GNO/BV-11-C apply ([6] 4.7.2.1).
- The IUT (CSE) and the Lower Tester (CCE) have established an active CNS connection and an active CAS connection.
- The 'SendCTNEvent' function is used.

- Test Procedure

Perform the Test Procedure of GPP/GNO/BV-11-C ([6] 4.7.2.1)

The test is performed for several types of events, i.e., the following operations are performed by the IUT with reporting of the related events:

1. Create a new bCalendar object on the IUT
→ IUT sends a 'NewObject' event
2. Change the content of a bCalendar object on the IUT
→ IUT sends an 'ObjectUpdate' event
3. Delete a bCalendar object on the IUT
→ IUT sends an 'ObjectDeleted' event
4. An alarm has been triggered for an event on the IUT
→ IUT sends an 'Alarm' event

- Expected Outcome

Pass verdict

The Pass verdicts of GPP/GNO/BV-11-C ([6] 4.7.2.1) apply.

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 the CTN Profile [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. Further details about the function of the TCMT are elaborated in [2].

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

Item	Feature	Test Case(s)
CTN 2/2	CTN CCE Notification Service Discovery	CTN/CCE/SGSIT/SERR/BV-01-C CTN/CCE/SGSIT/ATTR/BV-01-C CTN/CCE/SGSIT/ATTR/BV-02-C CTN/CCE/SGSIT/ATTR/BV-03-C CTN/CCE/SGSIT/OFFS/BV-01-C
CTN 2/1a	CTN CCE SDP Future Compatibility	CTN/CCE/CGSIT/SFC/BV-01-C
CTN 4/1a	CTN CSE Access Service Discovery	CTN/CSE/SGSIT/SERR/BV-02-C CTN/CSE/SGSIT/ATTR/BV-04-C CTN/CSE/SGSIT/ATTR/BV-05-C CTN/CSE/SGSIT/ATTR/BV-06-C CTN/CSE/SGSIT/ATTR/BV-07-C CTN/CSE/SGSIT/OFFS/BV-02-C
CTN 1/2	CTN Server Equipment	CTN/CSE/GOEP/ROB/BV-01-C CTN/CSE/GOEP/ROB/BV-02-C
CTN 2/1a	Session Management: CAS, single account (CCE)	CTN/CCE/GPP/GSM/BV-01-C CTN/CCE/GPP/GSM/BV-03-C
CTN 2/1a AND CTN 2/2	Session Management: single CAS and CNS (CCE)	CTN/CCE/GPP/GSM/BV-02-C CTN/CCE/GPP/GSM/BV-04-C
CTN 2/1b AND CTN 2/2	Session Management: multiple CAS and CNS (CCE)	CTN/CCE/GPP/GSM/BV-05-C CTN/CCE/GPP/GSM/BV-06-C CTN/CCE/GPP/GSM/BV-07-C
CTN 4/1a	Session Management: CAS, single account (CSE)	CTN/CSE/GPP/GSM/BV-11-C CTN/CSE/GPP/GSM/BV-13-C
CTN 4/1a AND CTN 4/2	Session Management: single CAS and CNS (CSE)	CTN/CSE/GPP/GSM/BV-12-C CTN/CSE/GPP/GSM/BV-14-C
CTN 4/1b AND CTN 4/2	Session Management: multiple CAS and CNS (CSE)	CTN/CSE/GPP/GSM/BV-15-C CTN/CSE/GPP/GSM/BV-16-C CTN/CSE/GPP/GSM/BV-17-C

Item	Feature	Test Case(s)
CTN 3/1a	Account Management: Get Account Information (CCE)	CTN/CCE/CAH/BV-01-C
CTN 3/1c	Account Management: Sync Account (CCE)	CTN/CCE/GPP/GAH/BV-01-C
CTN 5/1a	Account Management: Get Account Information (CSE)	CTN/CSE/CAH/BV-11-C CTN/CSE/GPP/GIH/BI-11-C
CTN 5/1c	Account Management: Sync Account (CSE)	CTN/CSE/GPP/GIH/BV-12-C
CTN 3/2a	Notification: Send Notification (CCE)	CTN/CCE/CNO/BV-01-C
CTN 5/2a	Notification: Send Notification (CSE)	CTN/CSE/CNO/BV-11-C
CTN 3/3a	Browsing: CTN Listing (CCE)	CTN/CCE/CBR/BV-01-C CTN/CCE/COH/BV-06-C
CTN 5/3a	Browsing: CTN Listing (CSE)	CTN/CSE/CBR/BV-11-C CTN/CSE/CBR/BI-12-C CTN/CSE/COH/BV-16-C
CTN 3/4a	Downloading: Get CTN Object (CCE)	CTN/CCE/COH/BV-01-C
CTN 3/4b	Downloading: Set CTN Status (CCE)	CTN/CCE/COH/BV-05-C
CTN 5/4a	Downloading: Get CTN Object (CSE)	CTN/CSE/COH/BV-11-C CTN/CSE/COH/BI-16-C
CTN 5/4b	Downloading: Set CTN Status (CSE)	CTN/CSE/COH/BV-15-C
CTN 3/5a	Uploading: Push CTN Object (CCE)	CTN/CCE/COH/BV-02-C
CTN 5/5a	Uploading: Push CTN Object (CSE)	CTN/CSE/COH/BV-12-C
CTN 3/6a	Forward: Forward CTN Object (CCE)	CTN/CCE/COH/BV-04-C
CTN 5/6a	Forward: Forward CTN Object (CSE)	CTN/CSE/COH/BV-14-C
CTN 3/8a	Delete: Delete CTN Object (CCE)	CTN/CCE/COH/BV-03-C
CTN 5/8a	Delete: Delete CTN Object (CSE)	CTN/CSE/COH/BV-13-C
CTN 10/3	GOEP 2.0 or later: Client sends PUT request with SRM	CTN/CCE/GOEP/SRM/BV-03-C
CTN 16/3 AND CTN 4/2	GOEP 2.0 or later: Client sends PUT request with SRM	CTN/CSE/GOEP/SRM/BV-03-C
CTN 11/3 AND CTN 2/2	GOEP 2.0 or later: Server sends PUT response with SRM	CTN/CCE/GOEP/SRM/BV-04-C
CTN 15/3	GOEP 2.0 or later: Server sends PUT response with SRM	CTN/CSE/GOEP/SRM/BV-04-C
CTN 10/4	GOEP 2.0 or later: Client sends GET request with SRM	CTN/CCE/GOEP/SRM/BV-07-C
CTN 15/4	GOEP 2.0 or later: Server sends GET response with SRM	CTN/CSE/GOEP/SRM/BV-08-C
CTN 10/3	GOEP 2.0 or later: Client keeps issuing PUT on wait	CTN/CCE/GOEP/SRMP/BV-01-C
CTN 16/3 AND CTN 4/2	GOEP 2.0 or later: Client keeps issuing PUT on wait	CTN/CSE/GOEP/SRMP/BV-01-C
CTN 15/4	GOEP 2.0 or later: Server keeps waiting for GET on wait	CTN/CSE/GOEP/SRMP/BV-02-C

Item	Feature	Test Case(s)
CTN 11/3 AND CTN 12/11 AND CTN 2/2	GOEP 2.0 or later: Server does not issue PUT with invalid SRMP	CTN/CCE/GOEP/SRMP/BV-03-C
CTN 15/3 AND CTN 17/11	GOEP 2.0 or later: Server does not issue PUT with invalid SRMP	CTN/CSE/GOEP/SRMP/BV-03-C
CTN 10/4 AND CTN 12/11	GOEP 2.0 or later: Client does not issue GET with invalid SRMP	CTN/CCE/GOEP/SRMP/BV-04-C
CTN 10/4 AND CTN 12/11	GOEP 2.0 or later: Client can GET object with SRMP	CTN/CCE/GOEP/SRMP/BV-05-C
CTN 10/4	GOEP 2.0 or later: Client keeps sending GET requests on wait	CTN/CCE/GOEP/SRMP/BV-06-C
CTN 10/4	GOEP 2.0 or later: Client ignores GET response with invalid SRMP	CTN/CCE/GOEP/SRMP/BI-01-C
CTN 15/4	GOEP 2.0 or later: Server ignores GET request with invalid SRMP	CTN/CSE/GOEP/SRMP/BI-02-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2014-09-18	Approved by BoD
	1.0.1r00	2015-10-06	TSEs 6461 & 6677: Corrected editorial mistake – numbering of steps and duplication of step 1 – in CTN/CCE/COH/BV-06-I and CTN/CSE/COH/BV-16-I (legacy Test Case IDs TP/COH/BV-06-I and TP/COH/BV-16-I).
1	1.0.1	2015-12-22	Prepared for TCRL 2015-2 publication
	1.0.2r00	2016-10-12	Converted to new Test Case ID conventions as defined in TSTO v4.1.
	1.0.2r01	2016-10-13	TSE 6968: Corrected typo – CCE>CSE – in 3.2
	1.0.2r02	2016-11-15	Updated TC ID in test case grouping structure figures
2	1.0.2	2016-12-13	Approved by BTI. Prepared for TCRL 2016-2 publication.
	1.0.1.0r00	2018-11-09	Updated version number to 1.0.1.0 to align with adoption of the specification 1.0.1.
	1.0.1.0r01	2018-11-13	Updated template.
3	1.0.1.0	2018-11-21	Approved by BTI. Prepared for TCRL 2018-2 publication.
	1.0.1.0 ed2r00	2022-07-28	TSE 19247 (rating 1): Per E19243, updated reference in test case CTN/CSE/CBR/BI-12-I. Template-related editorials, including assigning p3 to previous v1.0.1.0 and aligning the copyright page and footer/logo with v2 of the DNMD.
	1.0.1.0 edition 2	2022-08-23	Approved by BTI on 2022-08-22. Prepared for edition 2 publication.
	p4r00–r07	2023-09-05 – 2024-04-26	TSE 22674 (rating 1): Corrected an abbreviation in the test purpose of the “IUT – CTN Server Equipment (CSE)” section. TSE 23962 (rating 1): Converted all -I tests to -C tests; updated the TCMT and TCRL accordingly. Template-related editorials. TSE 24523 (rating 4): Added a new GSIT section with new TCs CTN/CCE/SGSIT/SERR/BV-01-C, CTN/CCE/SGSIT/OFFS/BV-01-C, CTN/CCE/SGSIT/ATTR/BV-01-C – -03-C, CTN/CSE/SGSIT/SERR/BV-02-C, CTN/CSE/SGSIT/ATTR/BV-04-C – -07-C, CTN/CCE/SGSIT/SFC/BV-01-C, and CTN/CSE/SGSIT/OFFS/BV-02-C. Updated the TCMT accordingly, including removing CTN/CSE/GOEP/CON/BV-02-C. Added the SDP TS to the references list and updated the Test Suite Structure, the test groups list, and the TC Conventions section. Performed editorial work to align with the current TS template, including updates to the Test Suite Structure, conformance, and TCMT introduction.

Publication Number	Revision Number	Date	Comments
4	p4	2024-07-01	Approved by BTI on 2024-05-22. Prepared for TCRL 2024-1 publication.

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