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Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 9: Transcoding for Bluetooth Low Energy: Personal Health Devices

Recommendation ITU-T H.849

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Recommendation ITU-T H.849

Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 9: Transcoding for Bluetooth Low Energy: Personal Health Devices

Summary

Recommendation ITU-T H.849 provides a test suite structure (TSS) and the test purposes (TP) for the transcoding by personal health devices in the Personal Health Devices (PHD) interface of application-level data between the Bluetooth Low Energy Bluetooth Generic Attribute Profile format and the IEEE 11073-20601 data format, based on the requirements defined in the Recommendations of the ITU-T H.810 sub-series, of which Recommendation ITU-T H.810 (2017) is the base Recommendation. The objective of this test specification is to provide a high probability of interoperability at this interface.

Recommendation ITU-T H.849 is a transposition of Continua Test Tool DG2016, Test Suite Structure & Test Purposes, Personal Health Devices Interface; Part 9: PHD Transcoding Whitepaper. Personal Health Device BLE (Version 1.6, 2016-09-20), that was developed by the Personal Connected Health Alliance. A number of versions of this specification existed before transposition.

This Recommendation includes an electronic attachment with the protocol implementation conformance statements (PICS) and the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.849	2015-01-13	16	11.1002/1000/12278
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Keywords

Bluetooth Generic Attribute Profile, Bluetooth Low Energy (BLE), Conformance testing, Continua Design Guidelines, data format transcoding, e-health, IEEE 11073-20601, ITU-T H.810, personal area network, personal connected health devices, Personal Health Devices interface, touch area network.

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* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

Table of Contents

Electronic attachment: This Recommendation includes an electronic attachment with the protocol implementation conformance statements (PICS) and the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A.

Introduction

This Recommendation is a transposition of Continua Test Tool DG2016, Test Suite Structure & Test Purposes, Personal Health Devices Interface; Part 9: PHD Transcoding Whitepaper. Personal Health Device BLE (Version 1.6, 2016-09-20), that was developed by the Personal Connected Health Alliance. The table below shows the revision history of this test specification; it may contain versions that existed before transposition.

Version	Date	Revision history
1.0	2012-10-05	Initial release for Test Tool DG2011 based on the requirements in [b-CGD 2011].
1.1	2013-05-24	Initial release for Test Tool DG2012. This uses "TSS&TP_DG2011_ LP-PAN_PART_9_v1.0.doc" as a baseline and adds new features included in [b-CDG 2012]: • BPM and HR profiles
1.2	2014-01-24	Initial release for Test Tool DG2013. This uses "TSS&TP_DG2012_ LP-PAN_PART_9_v1.1.doc" as a baseline and adds new features included in [b-ITU-T H.810]/[b-CDG 2013]: • Adds glucose meter BLE • Adds BLE SSP support • Adds NFC new transport • Adds INR device specialization
1.3	2014-04-24	TM Lite & Doc Enhancements (Test Tool v4.0 Maintenance Release 1). It uses "TSS&TP_DG2013_LP-PAN_PART_9_v1.2.doc" as a baseline and adds new features included in Documentation Enhancements: • "Other PICS" row added
1.4	2015-07-01	Initial release for Test Tool DG2015. It uses "TSS&TP_DG2013_LP-PAN_PART_9_v1.3.doc" as a baseline and adds new features included in [b-ITU-T H.810 (2015)]/[b-CDG 2015]: • Adds WS/BCA BLE Device Specialization • Adds SABTE IEEE Device Specialization
1.5	2016-01-26	First maintenance release for Test Tool DG2015. It uses "TSS&TP_DG2015_LP-PAN_PART_9_v1.4.doc" as a baseline and adds some updates according to the Maintenance 2015 activity.
1.6	2016-09-20	Initial release for Test Tool DG2016. It uses "TSS&TP_DG2016_LP-PAN_PART_9_v1.5.doc" as a baseline and adds new features included in [b-ITU-T H.810 (2016)]/[b-CDG 2016]: • Adds PLX BLE device specialization • Adds CGM BLE device specialization
1.7	2018-02-27	Initial release for Test Tool DG2017. It adds some updates and fixes.

Recommendation ITU-T H.849

Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 9: Transcoding for Bluetooth Low Energy: Personal Health Devices

1 Scope

The scope of this Recommendation[1] is to provide a test suite structure (TSS) and the test purposes (TP) for the Personal Health Devices interface based on the requirements defined in the Continua Design Guidelines (CDG) [ITU-T H.810 (2017)]. The objective of this test specification is to provide a high probability of interoperability at this interface.

The TSS and TP for the Personal Health Devices interface have been divided into the parts specified below. This Recommendation covers Part 9.

– Part 1: Optimized exchange protocol. Personal Health Device
– Part 2: Optimized exchange protocol. Personal Health Gateway
– Part 3: Continua design guidelines. Personal Health Device
– Part 4: Continua design guidelines. Personal Health Gateway
– Part 5: Device specializations. Personal Health Device. This document is divided into the following subparts:
  - Part 5A: Weighing scales
  - Part 5B: Glucose meter
  - Part 5C: Pulse oximeter
  - Part 5D: Blood pressure monitor
  - Part 5E: Thermometer
  - Part 5F: Cardiovascular fitness and activity monitor
  - Part 5G: Strength fitness equipment
  - Part 5H: Independent living activity hub
  - Part 5I: Adherence monitor
  - Part 5J: Insulin pump
  - Part 5K: Peak expiratory flow monitor
  - Part 5L: Body composition analyser
  - Part 5M: Basic electrocardiograph
  - Part 5N: International normalized ratio monitor
  - Part 5O: Sleep apnoea breathing therapy equipment (SABTE)
  - Part 5P: Continuous glucose monitor (CGM)
  - Part 5Q: Power status monitor (PSM)
– Part 6: Device specializations. Personal Health Gateway
– Part 7: Continua Design Guidelines. Personal Health Device BLE

[1] This Recommendation includes an electronic attachment with the protocol implementation conformance statements (PICS) and the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A.

– Part 8: Continua Design Guidelines. Personal Health Gateway BLE

– **Part 9: Personal Health Devices Transcoding Whitepaper. Personal Health Device**

– Part 10: Personal Health Devices Transcoding Whitepaper. Personal Health Gateway

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T H.810 (2017)] Recommendation ITU-T H.810 (2017), *Interoperability design guidelines for personal health systems*.

[Bluetooth PHDT v1.4] Bluetooth SIG (2013), *Personal Health Devices Transcoding White Paper, v1.4*. https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=294539

[Bluetooth PHDT v1.5] Bluetooth SIG (2014), *Personal Health Devices Transcoding White Paper, v1.5*. https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=272346

[Bluetooth PHDT v1.6] Bluetooth SIG (2015), *Personal Health Devices Transcoding White Paper, v1.6*. https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=310657

[ISO/IEEE 11073-104xx] ISO/IEEE 11073-104xx (in force), *Health informatics – Personal health device communication – Device specialization*. NOTE – Shorthand to refer to the collection of device specialization standards that utilize [ISO/IEEE 11073-20601-2015A], where xx can be any number from 01 to 99, inclusive.

[ISO/IEEE 11073-20601-2016C] ISO/IEEE 11073-20601:2016, *Health informatics – Personal health device communication – Part 20601: Application profile – Optimized exchange protocol*, including ISO/IEEE 11073-20601:2016/Cor.1:2016. https://www.iso.org/standard/66717.html with https://www.iso.org/standard/71886.html

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ATS	Abstract Test Suite
BLE	Bluetooth Low Energy
CDG	Continua Design Guidelines
CGM	Continuous Glucose Monitor
DUT	Device Under Test
GATT	Generic Attribute Profile
GUI	Graphical User Interface
INR	International Normalized Ratio
IP	Insulin Pump
IUT	Implementation Under Test
MDS	Medical Device System
NFC	Near Field Communication
PAN	Personal Area Network
PCO	Point of Control and Observation
PCT	Protocol Conformance Testing
PHD	Personal Health Device
PHDC	Personal Healthcare Device Class
PHG	Personal Health Gateway
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation extra Information for Testing
PSM	Power Status Monitor
SABTE	Sleep Apnoea Breathing Therapy Equipment
SCR	Static Conformance Review
SDP	Service Discovery Protocol
SOAP	Simple Object Access Protocol
TCRL	Test Case Reference List
TCWG	Test and Certification Working Group
TP	Test Purpose
TSS	Test Suite Structure
uint8, uint16	8 and 16 bits unsigned integer
USB	Universal Serial Bus
WDM	Windows Driver Model

5 Conventions

The key words "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "MAY", "MAY NOT" in this Recommendation are to be interpreted as in [b-ETSI SR 001 262].

– SHALL is equivalent to 'must' or 'it is required to'.

– SHALL NOT is equivalent to 'must not' or 'it is not allowed'.

– SHOULD is equivalent to 'it is recommended to'.

– SHOULD NOT is equivalent to 'it is not recommended to'.

– MAY is equivalent to 'is permitted'.

– MAY NOT is equivalent to 'it is not required that'.

NOTE – The above-mentioned key words are capitalized for illustrative purposes only and they do not appear capitalized within this Recommendation.

In this document, "0x" denotes a number in hexadecimal format, and "(dec)" after a number indicates it is expressed in decimal format.

Reference is made in the ITU-T H.800-series of Recommendations to different versions of the Continua Design Guidelines (CDG) by a specific designation. The list of terms that may be used in this Recommendation is provided in Table 1.

Table 1 – List of designations associated with the various versions of the CDG

CDG release	Transposed as	Version	Description	Designation
2017	-	7.0	Release 2017 of the CDG including maintenance updates of the CDG 2016 and additional guidelines that cover new functionalities.	-
2016 plus errata	[b-ITU-T H.810 (2016)]	6.1	Release 2016 plus errata noting all ratified bugs [b-CDG 2016].	–
2016	–	6.0	Release 2016 of the CDG including maintenance updates of the CDG 2015 and additional guidelines that cover new functionalities.	Iris
2015 plus errata	[b-ITU-T H.810 (2015)]	5.1	Release 2015 plus errata noting all ratified bugs [b-CDG 2015]. The 2013 edition of H.810 is split into eight parts in the H.810-series.	–
2015	–	5.0	Release 2015 of the CDG including maintenance updates of the CDG 2013 and additional guidelines that cover new functionalities.	Genome
2013 plus errata	[b-ITU-T H.810 (2013)]	4.1	Release 2013 plus errata noting all ratified bugs [b-CDG 2013].	–
2013	–	4.0	Release 2013 of the CDG including maintenance updates of the CDG 2012 and additional guidelines that cover new functionalities.	Endorphin
2012 plus errata	–	3.1	Release 2012 plus errata noting all ratified bugs [b-CDG 2012].	–
2012	–	3.0	Release 2012 of the CDG including maintenance updates of the CDG 2011 and additional guidelines that cover new functionalities.	Catalyst
2011 plus errata	–	2.1	CDG 2011 integrated with identified errata.	–
2011	–	2.0	Release 2011 of the CDG including	Adrenaline

Table 1 – List of designations associated with the various versions of the CDG

CDG release	Transposed as	Version	Description	Designation
			maintenance updates of the CDG 2010 and additional guidelines that cover new functionalities [b-CDG 2011].	
2010 plus errata	–	1.6	CDG 2010 integrated with identified errata	–
2010	–	1.5	Release 2010 of the CDG with maintenance updates of the CDG Version 1 and additional guidelines that cover new functionalities [b-CDG 2010].	1.5
1.0	–	1.0	First released version of the CDG [b-CDG 1.0].	–

6 Test suite structure (TSS)

The test purposes (TPs) for the Personal Health Devices interface have been divided into the main subgroups specified below. Annex A describes the TPs for subgroups 1.4.1 to 1.4.8 (shown in bold).

– Group 1: Personal Health Device (PHD)
  - Group 1.1: Transport (TR)
    - Subgroup 1.1.1: Design guidelines: Common (DGC)
    - Subgroup 1.1.2: USB design guidelines (UDG)
    - Subgroup 1.1.3: Bluetooth design guidelines (BDG)
    - Subgroup 1.1.4: Pulse oximeter design guidelines (PODG)
    - Subgroup 1.1.5: Cardiovascular design guidelines (CVDG)
    - Subgroup 1.1.6: Activity hub design guidelines (HUBDG)
    - Subgroup 1.1.7: ZigBee design guidelines (ZDG)
    - Subgroup 1.1.8: Glucose meter design guidelines (GLDG)
    - Subgroup 1.1.9: Bluetooth low energy design guidelines (BLEDG)
    - Subgroup 1.1.10: Basic electrocardiograph design guidelines (ECGDG)
    - Subgroup 1.1.11: NFC design guidelines (NDG)
  - Group 1.2: IEEE 20601 Optimized exchange protocol (OXP)
    - Subgroup 1.2.1: PHD domain information model (DIM)
    - Subgroup 1.2.2: PHD service model (SER)
    - Subgroup 1.2.3: PHD communication model (COM)
  - Group 1.3: Devices class specializations (CLASS)
    - Subgroup 1.3.1: Weighing scales (WEG)
    - Subgroup 1.3.2: Glucose meter (GL)
    - Subgroup 1.3.3: Pulse oximeter (PO)
    - Subgroup 1.3.4: Blood pressure monitor (BPM)
    - Subgroup 1.3.5: Thermometer (TH)
    - Subgroup 1.3.6: Cardiovascular (CV)

- Subgroup 1.3.7: Strength (ST)
- Subgroup 1.3.8: Activity hub (HUB)
- Subgroup 1.3.9: Adherence monitor (AM)
- Subgroup 1.3.10: Insulin pump (IP)
- Subgroup 1.3.11: Peak flow (PF)
- Subgroup 1.3.12: Body composition analyser (BCA)
- Subgroup 1.3.13: Basic electrocardiograph (ECG)
- Subgroup 1.3.14: International normalized ratio (INR)
- Subgroup 1.3.15: Sleep apnoea breathing therapy equipment (SABTE)
- Subgroup 1.3.16: Continuous glucose monitor (CGM)

• Group 1.4: Personal health device transcoding whitepaper (PHDTW)
- **Subgroup 1.4.1**: **General requirements (GEN)**
- **Subgroup 1.4.2**: **Thermometer requirements (TH)**
- **Subgroup 1.4.3**: **Blood pressure requirements (BPM)**
- **Subgroup 1.4.4**: **Heart rate requirements (HR)**
- **Subgroup 1.4.5**: **Glucose meter requirements (GL)**
- **Subgroup 1.4.6**: **Weight scale requirements (WS)**
- **Subgroup 1.4.7: Whitepaper pulse oximeter requirements (PLX)**
- **Subgroup 1.4.8: Whitepaper continuous glucose monitoring requirements (CGM)**

– Group 2: Personal Health Gateway (PHG)

• Group 2.1: Transport (TR)
- Subgroup 2.1.1: Design guidelines: Common (DGC)
- Subgroup 2.1.2: USB design guidelines (UDG)
- Subgroup 2.1.3: Bluetooth design guidelines (BDG)
- Subgroup 2.1.4: Cardiovascular design guidelines (CVDG)
- Subgroup 2.1.5: Activity hub design guidelines (HUBDG)
- Subgroup 2.1.6: ZigBee design guidelines (ZDG)
- Subgroup 2.1.7: Bluetooth low energy design guidelines (BLEDG)
- Subgroup 2.1.8: NFC design guidelines (NDG)

• Group 2.2: IEEE 20601 Optimized exchange protocol (OXP)
- Subgroup 2.2.1: General (GEN)
- Subgroup 2.2.2: PHD domain information model (DIM)
- Subgroup 2.2.3: PHD service model (SER)
- Subgroup 2.2.4: PHD communication model (COM)

• Group 2.3: Devices class specializations (CLASS)
- Subgroup 2.3.1: Weighing scales (WEG)
- Subgroup 2.3.2: Glucose meter (GL)
- Subgroup 2.3.3: Pulse oximeter (PO)
- Subgroup 2.3.4: Blood pressure monitor (BPM)
- Subgroup 2.3.5: Thermometer (TH)

- Subgroup 2.3.6: Cardiovascular (CV)
- Subgroup 2.3.7: Strength (ST)
- Subgroup 2.3.8: Activity hub (HUB)
- Subgroup 2.3.9: Adherence monitor (AM)
- Subgroup 2.3.10: Insulin pump (IP)
- Subgroup 2.3.11: Peak flow (PF)
- Subgroup 2.3.12: Body composition analyser (BCA)
- Subgroup 2.3.13: Basic electrocardiograph (ECG)
- Subgroup 2.3.14: International normalized ratio (INR)
- Subgroup 2.3.15: Sleep apnoea breathing therapy equipment (SABTE)
- Subgroup 2.3.16: Continuous glucose monitor (CGM)

- Group 2.4: Personal health device transcoding whitepaper (PHDTW)
  - Subgroup 2.4.1: General requirements (GEN)
  - Subgroup 2.4.2: Thermometer requirements (TH)
  - Subgroup 2.4.3: Blood pressure measurement requirements (BPM)
  - Subgroup 2.4.4: Heart rate requirements (HR)
  - Subgroup 2.4.5: Glucose meter requirements (GL)
  - Subgroup 2.4.6: Weight scale requirements (WS)
  - Subgroup 2.4.7: Whitepaper pulse oximeter requirements (PLX)
  - Subgroup 2.4.8: Whitepaper continuous glucose monitoring requirements (CGM)

7 Electronic attachment

The protocol implementation conformance statements (PICS) and the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A can be downloaded from http://handle.itu.int/11.1002/2000/12067. See [b-PHD PICS & PIXIT], [b-PHG PICS & PIXIT] and [b-TI].

In the electronic attachment, letters "C" and "I" in the column labelled "Mandatory" are used to distinguish between "PICS" and "PIXIT" respectively during testing. If the cell is empty, the corresponding PICS is "independent". If the field contains a "C", the corresponding PICS is dependent on other PICS, and the logical expression is detailed in the "SCR_Expression" field. The static conformance review (SCR) is used in the test tool to assert whether the PICS selection is consistent.

Annex A

Test purposes

(This annex forms an integral part of this Recommendation.)

A.1 TP definition conventions

The test purposes (TPs) are defined according to the following rules:

- **TP Id**: This is a unique identifier (TP/<TT>/<DUT>/<GR>/<SGR>/<XX> – <NNN>). It is specified according to the naming convention defined below:
  - Each test purpose identifier is introduced by the prefix "TP".
  - <TT>: This is the test tool that will be used in the test case:
    - PAN: Personal area network (Bluetooth or USB)
    - LAN: Local area network (ZigBee)
    - PAN-LAN: Personal area network (Bluetooth or USB) - Local area network (ZigBee)
    - LP-PAN: Low power personal area network (BLE)
    - TAN: Touch area network (NFC)
    - PLT: Personal area network (Bluetooth or USB) – Local area network (ZigBee) – Touch area network (NFC)
  - <DUT>: This is the device under test.
    - PHD: Personal Health Device
    - PHG: Personal Health Gateway
  - <GR>: This identifies a group of test cases.
  - <SGR>: This identifies a subgroup of test cases.
  - <XX>: This identifies the type of testing.
    - BV: Valid behaviour test.
    - BI: Invalid behaviour test.
  - <NNN>: This is a sequential number that identifies the test purpose.
- **TP label**: This is the title of the TP.
- **Coverage**: This contains the specification reference and clause to be checked by the TP.
  - Spec: This indicates the earliest version of the specification from which the testable items to be checked by the TP are included.
  - Testable item: This contains the testable items to be checked by the TP.
- **Test purpose**: This is a description of the requirements to be tested.
- **Applicability**: This contains the PICS items that define if the test case is applicable or not for a specific device. When a TP contains an "ALL" in this field it means that it applies to the device under test within that scope of the test (specialization, transport used, etc.).
- **Other PICS**: This contains additional PICS items (apart from the PICS specified in the Applicability row) which are used within the test case implementation and can modify the final verdict. When this row is empty, it means that only the PICS specified in the Applicability row are used within the test case implementation.

- **Initial condition**: This indicates the state to which the DUT needs to be moved at the beginning of TC execution.
- **Test procedure**: This describes the steps to be followed in order to execute the test case.
- **Pass/Fail criteria**: This provides criteria to decide whether the DUT passes or fails the test case.

A.2 Subgroup 1.4.1: Whitepaper general requirements (GEN)

TP Id		TP/LP-PAN/PHD/PHDTW/GEN/BV-000		
TP label		Whitepaper. Date Time characteristic		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Common MDS 6; O		
Test purpose		Check that: BLE Personal Health Device (PHD) Date Time characteristic represents the current PHD date and time		
Applicability		C_AG_BLE_000		
Other PICS		C_AG_BLE_002		
Initial condition		The PHD under test and the simulated Personal Health Gateway (PHG) are in a Standby state		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The test tool checks the characteristics implemented by the PHD under test 5. IF the PHD implements the date time characteristic (C_AG_BLE_002) THEN a. The simulated PHG reads the date time characteristic value b. The test tool checks that the date time format is correct: • Year: 1900 ≤ value ≤ 2100 OR value = 0 • Month: 1 ≤ value ≤ 12 OR value = 0 • Day: 1 ≤ value ≤ 31 OR value = 0 • Hours: 0 ≤ value ≤ 23 • Minutes: 0 ≤ value ≤ 59 • Seconds: 0 ≤ value ≤ 59 c. The test operator checks that the date time value is correct		
Pass/Fail criteria		In step 4, IF PICS C_AG_BLE_002 = TRUE THEN the PHD implements the date time characteristic In step 4, IF PICS C_AG_BLE_002 = FALSE THEN the PHD does not implement the date time characteristic In step 5.b, the values of date time characteristic fields are within the ranges specified in the test procedure In step 5.c, the date time characteristic reports a correct date and time		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/GEN/BV-001		
TP label		Whitepaper. Current Time Service		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable Items	Common MDS 6; O		
Test purpose		Check that: Current Time characteristic inside Current Time Service represents the current PHD date and time		
Applicability		C_AG_BLE_000 AND C_AG_BLE_030		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in a Standby state		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state) 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state) 4. Test Tool checks characteristics implemented by the PHD under test 5. IF PHD implements Current Time Service(C_AG_BLE_030) THEN a. The simulated PHG reads Current Time characteristic value b. Test Tool checks that Current Time format is correct: • Year: 1900 ≤ value ≤ 2100 OR value = 0 • Month: 1 ≤ value ≤ 12 OR value = 0 • Day: 1 ≤ value ≤ 31 OR value = 0 • Hours: 0 ≤ value ≤ 23 • Minutes: 0 ≤ value ≤ 59 • Seconds: 0 ≤ value ≤ 59 • Day of Week: 0 ≤ value ≤ 7 • Fractions256: 0 ≤ value ≤ 255 • Adjust Reason: 0000???? c. Test Operator checks that Current Time value is correct		
Pass/Fail criteria		In Step 4, IF PICS C_AG_BLE_030 = TRUE THEN PHD implements Current Time service In Step 4, IF PICS C_AG_BLE_030 = FALSE THEN PHD does not implement Current Time service In Step 5.b, values of Current Time characteristic fields are within the ranges specified in Test Procedure In Step 5.c, the Current Time characteristic reports a correct Current Time		
Notes (to assist manual testing)		To read Current Time characteristic, PHG shall perform a "Read Characteristic Value" Generic attribute profile (GATT) sub-procedure on characteristic with UUID 0x2A2B. The PHG will then receive a Read Response. Check ATT packet value in the received response. (fields will all be present and in the following order): • First 2 octets (Year) are between 1900 (0x076C) and 2100 (0x0834) OR they are equal to 0x0000. Note that bytes will be transmitted using little endian order (i.e., the least		

	significant octet first). • Month (1 octet) will be between 1 (0x01) and 12 (0x0C) OR equal to 0 (0x00). • Day (1 octet) will be between 1 (0x01) and 31 (0x1F) OR equal to 0 (0x00). • Hours (1 octet) will be between 0 (0x00) and 23 (0x17). • Minutes (1 octet) will be between 0 (0x00) and 59 (0x3B). • Seconds (1 octet) will be between 0 (0x00) and 59 (0x3B). • Day of Week (1 octet) will be between 0 (0x00) and 7 (0x07). • Fractions256 (1 octet) will be between 0 (0x00) and 255 (0xFF) • Adjust Reason field (8bit) will have bits 0-3 set to 0 or 1 and bits 4-7 set to 0.

A.3 Subgroup 1.4.2: Whitepaper thermometer requirements (TH)

TP Id		TP/LP-PAN/PHD/PHDTW/TH/BV-000		
TP label		Whitepaper. Temperature measurement value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Float Type 1; C	TH Numeric 7; M	TH Numeric 11; M
Test purpose		Check that: Temperature Measurement Value field in Temperature Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_001		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in a Standby state		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a temperature measurement to the simulated PHG 5. The test tool checks the measurement sent by the PHD under test a. IF the Temperature Units Flag = 0 (Temp in ºC) THEN • Check that the temperature reported in the Temperature Measurement Value (Celsius) field is coherent: 25 < value < 50 • The test operator checks that the temperature reported in the Temperature Measurement Value (Celsius) field is correct (value and units) b. IF the Temperature Units Flag = 1 (Temp in ºF) THEN • Check that the temperature reported in the Temperature Measurement Value (Fahrenheit) field is coherent: 75 < value < 125 • The test operator checks that the temperature reported in the Temperature Measurement Value (Fahrenheit) field is correct (value and units)		
Pass/Fail criteria		In step 5.a, the value in the Temperature Measurement Value (Celsius) field is within the range specified in the test procedure and the value is correct. In step 5.b, the value in the Temperature Measurement Value (Fahrenheit) field is within the range specified in the test procedure and the value is correct.		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/TH/BV-001		
TP label		Whitepaper. Temperature time stamp value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Date-Time Conv 1; M	TH Numeric 10; M	
Test purpose		Check that: Time Stamp field in Temperature Measurement characteristic represents the instant of time when BLE PHD acquired the measurement		
Applicability		C_AG_BLE_000 AND C_AG_BLE_001		
Other PICS		C_AG_BLE_003		
Initial condition		The PHD under test and the simulated PHG are in a Standby state		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a temperature measurement to the simulated PHG 5. The test tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_003 = TRUE (time stamp is reported) THEN • The test tool checks that the Time Stamp Flag = 1 • The test tool checks that the time stamp reported in the Time Stamp field is coherent: - Year: 1900 ≤ value ≤ 2100 OR value = 0 - Month: 1 ≤ value ≤ 12 OR value = 0 - Day: 1 ≤ value ≤ 31 OR value = 0 - Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • The test operator checks that the time stamp reported in the Time Stamp field is correct (value and units) b. IF C_AG_BLE_003 = FALSE (the time stamp is not reported) THEN • the test tool checks that Time Stamp Flag = 0		
Pass/Fail criteria		In step 5.a, the time stamp is reported, the value of the Time Stamp field is within the range specified in the test procedure and the value is correct. In step 5.a, the time stamp is not reported		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/TH/BV-002		
TP label		Whitepaper. Temperature type value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	TH Numeric 3; M		
Test purpose		Check that: The Temperature Type field in the Temperature Measurement characteristic or Temperature Type characteristic represent the location on the human body at which the temperature was measured by the BLE PHD		

Applicability	C_AG_BLE_000 AND C_AG_BLE_001
Other PICS	
Initial condition	The PHD under test and the simulated PHG are in a Standby state
Test procedure	1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a temperature measurement to the simulated PHG 5. The test tool checks the measurement sent by the PHD under test. a. IF Temperature Type Flag = 1 (Temperature Type field present) THEN check that the Temperature Type field value is correct: 1 ≤ value ≤ 9 b. IF the Temperature Type Flag = 0 (Temperature Type field not present) THEN the simulated PHG reads the temperature type characteristic (if it is implemented) and checks that its value is correct: 1 ≤ value ≤ 9
Pass/Fail criteria	In step 5.a, the value of the Temperature Type field is within the range specified in the test procedure. In step 5.b, the value of the temperature type characteristic (if it is implemented) is within the range specified in the test procedure.
Notes	

A.4 Subgroup 1.4.3: Whitepaper blood pressure requirements (BPM)

TP Id		TP/LP-PAN/PHD/PHDTW/BPM/BV-000		
TP label		Whitepaper. Blood Pressure Measurement value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Short Float Type 1; C	BP Numeric 6; M	BP Numeric 10; M
Test purpose		Check that: Blood Pressure Measurement Value fields (systolic, diastolic and MAP) in Blood Pressure Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_004		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in a Standby state		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a blood pressure measurement to the simulated PHG. 5. The test tool checks the measurement sent by the PHD under test a. IF the Blood Pressure Units Flag = 0 (mmHg) THEN • Check that the systolic value reported in the Blood Pressure Measurement Value (mmHg) field is coherent: 20 < value < 200 • Check that the diastolic value reported in the Blood Pressure Measurement Value (mmHg) field is coherent: 20 < value < 200 ▪ Check that the MAP reported in the Blood Pressure Measurement Value (mmHg) field is coherent: 20 < value < 200 ▪ The test operator checks that the systolic value reported in the Blood Pressure		

	Measurement Value (mmHg) field is correct (value and units) ▪ The test operator checks that the diastolic value reported in the Blood Pressure Measurement Value (mmHg) field is correct (value and units) • The test operator checks that the mean arterial pressure (MAP) value reported in the Blood Pressure Measurement Value (mmHg) field is correct (value and units) b. IF Blood Pressure Units Flag = 1 (kPa) THEN • Check that the systolic value reported in the Blood Pressure Measurement Value (kPa) field is coherent: 2.66 < value < 26.66 • Check that the diastolic value reported in the Blood Pressure Measurement Value (kPa) field is coherent: 2.66 < value < 26.66 • Check that the MAP value reported in the Blood Pressure Measurement Value (kPa) field is coherent: 2.66 < value < 26.66 • The test operator checks that the systolic value reported in the Blood Pressure Measurement Value (kPa) field is correct (value and units) • The test operator checks that the diastolic value reported in the Blood Pressure Measurement Value (kPa) field is correct (value and units) • The test operator checks that the MAP value reported in the Blood Pressure Measurement Value (kPa) field is correct (value and units)
Pass/Fail criteria	In step 5.a, the values of the Blood Pressure Measurement Compound Value (mmHg) fields are within the range specified in the test procedure and the values are correct. In step 5.b, the values of the Blood Pressure Measurement Compound Value (kPa) fields are within the range specified in the test procedure and the values are correct.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/BPM/BV-001		
TP label		Whitepaper. Blood Pressure Measurement, Time Stamp value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Date-Time Conv 1; M	BP Numeric 9; M	PR Numeric 6; M
Test purpose		Check that: Time Stamp field in Blood Pressure Measurement characteristic represents the instant of time when BLE PHD acquired the measurement		
Applicability		C_AG_BLE_000 AND C_AG_BLE_004		
Other PICS		C_AG_BLE_005		
Initial condition		The PHD under test and the simulated PHG are in a Standby state		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a blood pressure measurement to the simulated PHG. 5. The test tool checks measurement sent by the PHD under test a. IF C_AG_BLE_005 = TRUE (time stamp is reported) THEN • the test tool checks that Time Stamp Flag = 1 • the test tool checks that the time stamp reported in Time Stamp field is coherent: - Year: 1900 ≤ value ≤ 2100 OR value = 0 - Month: 1 ≤ value ≤ 12 OR value = 0		

	- Day: 1 ≤ value ≤ 31 OR value = 0 - Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • the test operator checks that the time stamp reported in the Time Stamp field is correct (value and units) b. IF C_AG_BLE_005 = FALSE (time stamp is not reported) THEN • the test tool checks that Time Stamp Flag = 0
Pass/Fail criteria	In step 5.a, the time stamp is reported, the value of the Time Stamp field is within the range specified in the test procedure and the value is correct. In step 5.b, the time stamp is not reported.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/BPM/BV-002		
TP label		Whitepaper. Blood Pressure Measurement, Pulse Rate value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Short Float Type 1; C	PR Numeric 7; M	
Test purpose		Check that: Pulse Rate field in Blood Pressure Measurement characteristic may be present if PHD under test supports Pulse Rate measurements, if it is present then its value represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_004		
Other PICS		C_AG_BLE_006		
Initial condition		The PHD under test and the simulated PHG are in a Standby state		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a blood pressure measurement to the simulated PHG. 5. The test tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_006 = TRUE (the PHD reports the pulse rate) THEN • the test tool checks that Pulse Rate Flag = 1 • the test tool checks that the pulse rate reported in the Pulse Rate field is coherent: 20 ≤ value ≤ 250 • the test operator checks that the pulse rate reported in the Pulse Rate field is correct (value and units) b. IF C_AG_BLE_006 = FALSE (the PHD does not report the pulse rate) THEN • the test tool checks that the Pulse Rate Flag = 0 • the test tool checks that the Pulse Rate field is not reported		
Pass/Fail criteria		In step 5.a, the pulse rate is reported, the value of the Pulse Rate field is within the range specified in the test procedure and the value is correct. In step 5.b, the pulse rate is not reported.		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/BPM/BV-003		
TP label		Whitepaper. Blood Pressure Measurement, User ID value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	UserID 2; O		
Test purpose		Check that: User ID field in Blood Pressure Measurement characteristic shall be present if PHD under test supports multiple users		
Applicability		C_AG_BLE_000 AND C_AG_BLE_004		
Other PICS		C_AG_BLE_007		
Initial condition		The PHD under test and the simulated PHG are in a Standby state.		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a blood pressure measurement to the simulated PHG. 5. The test tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_007 = TRUE (PHD supports multiple users) THEN • the test tool checks that the User ID Flag = 1 • the test tool checks that the User ID field is reported • the test operator checks that the User ID reported in the User ID field is correct b. IF C_AG_BLE_007 = FALSE (the PHD does not support multiple users) THEN • the test tool checks that User ID Flag = 0 • the test tool checks that the User ID field value is not reported		
Pass/Fail criteria		In step 5.a, the User ID is reported and the value is correct. In step 5.b, the User ID is not reported.		
Notes				

A.5 Subgroup 1.4.4: Whitepaper heart rate requirements (HR)

TP Id		TP/LP-PAN/PHD/PHDTW/HR/BV-000		
TP label		Whitepaper. Heart Rate Measurement value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	HR Numeric 6; M		
Test purpose		Check that: Heart Rate Measurement Value field in Heart Rate Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_015		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in a Standby state		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection		

	state). 4. The PHD under test sends a heart rate measurement to the simulated PHG. 5. The test tool checks the measurement sent by the PHD under test a. IF Heart Rate Value Format Flag = 0 (Heart Rate Value Format is set to unit8) THEN • Check that the heart rate reported in the Heart Rate Measurement Value (uint8) field is codified in unit8 format and its value is coherent: 20 < value < 250 • The test operator checks that the heart rate reported in the Heart Rate Measurement Value (uint8) field is correct (value and units) b. IF Heart Rate Value Format Flag = 1 (Heart Rate Value Format is set to unit16) THEN • Check that the heart rate reported in the Heart Rate Measurement Value (uint16) field is codified in unit16 format and its value is coherent: 20 < value < 250 • The test operator checks that the heart rate reported in the Heart Rate Measurement Value (uint16) field is correct (value and units)
Pass/Fail criteria	In step 5.a, the value of Heart Rate Measurement (uint8) field is within the range specified in the test procedure and the value is correct. In step 5.b, value of the Heart Rate Measurement Value (uint16) field is within the range specified in the test procedure and the value is correct.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/HR/BV-002		
TP label		Whitepaper. Heart Rate Measurement, RR-Interval values		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	HR Numeric 6; M		
Test purpose		Check that: RR-Interval field in Heart Rate Measurement characteristic may be present if PHD under test supports RR-Interval measurements, if it is present then its value represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_015		
Other PICS		C_AG_BLE_017		
Initial condition		The PHD under test and the simulated PHG are in a Standby state.		
Test procedure		1. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a heart rate measurement to the simulated PHG 5. The test tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_017 = TRUE (PHD reports RR-Interval) THEN • the test tool checks that RR-Interval Flag = 1 • the test tool checks that the RR-Interval values reported in the RR-Interval field are coherent: 250 ≤ value ≤ 3000 [ticks] • the test operator checks that the RR-Interval values reported in the RR-Interval field are correct b. IF C_AG_BLE_017 = FALSE (the PHD does not report the RR-Interval) THEN • the test tool checks that RR-Interval Flag = 0 • the test tool checks that the RR-Interval field is not reported		

Pass/Fail criteria	In step 5.a, the RR-Interval is reported, the values of the RR-Interval field are within the range specified in the test procedure and the values are correct In step 5.b, the RR-Interval is not reported
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/HR/BV-003		
TP label		Whitepaper. Heart Rate Measurement, energy expended values		
Coverage	**Spec**	[Bluetooth PHDT v1.5]		
	Testable items	Energy Numeric 6; M		
Test purpose		Check that: Energy Expended field in Heart Rate Measurement characteristic may be present if PHD under test supports Energy Expended measurements, if it is present then its value represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_015		
Other PICS		C_AG_BLE_031		
Initial condition		The PHD under test and the simulated PHG are in a Standby state		
Test procedure		1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state) 2. The simulated PHG initiates discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with PHD under test (Initiating state) 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Heart Rate measurement to Simulated PHG 5. Test Tool checks measurement sent by PHD under test a. IF C_AG_BLE_031 = TRUE (PHD reports Energy Expended) THEN • Test Tool checks that Energy Expended Flag = 1 • Test Tool checks that Energy Expended values reported in Energy Expended field are coherent: XXX ≤ value ≤ XXX • Test Operator checks that Energy Expended values reported in Energy Expended field are correct b. IF C_AG_BLE_031 = FALSE (PHD does not report Energy Expended) THEN • Test Tool checks that Energy Expended Flag = 0 • Test Tool checks that Energy Expended field is not reported		
Pass/Fail criteria		In Step 5.a, Energy Expended is reported, values of Energy Expended field are within the range specified in Test Procedure and the values are correct In Step 5.b, Energy Expended is not reported		
Notes				

A.6 Subgroup 1.4.5: Whitepaper glucose requirements (GL)

TP Id		TP/LP-PAN/PHD/PHDTW/GL/BV-000
TP label		Whitepaper. Glucosemeter, Glucose Concentration value
Coverage	**Spec**	[Bluetooth PHDT v1.4]

	Testable items	Float Type 1; C	GL Numeric 4; M	GL Numeric 6; M
Test purpose		Check that: Glucose Measurement – Glucose Concentration value field in Glucose Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Other PICS		C_AG_BLE_010		
Initial condition		The PHD under test and the simulated PHG are in a Standby state.		
Test procedure		1. Ask the operator to acquire a glucose concentration measurement. 2. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The simulated PHG requests the PHD under test to report stored records by performing a writing operation in the record access control point (RACP). 6. The PHD under test sends a glucose measurement to the simulated PHG. 7. The test tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_010 = TRUE (the PHD reports the glucose concentration, type and sample location) THEN the test tool checks that the Glucose Concentration, Type and Sample Location Present Flag = 1 i. IF Glucose Concentration Units Flag = 0 THEN • the test tool checks that the glucose concentration reported in the Glucose Measurement field is coherent: 0,0002 ≤ value ≤ 0,003 (kg/L) • the test operator checks that the glucose concentration reported in the glucose measurement (kg/L) is correct (value and units) ii. IF the Glucose Concentration, Type and Sample Location Present Flag = 1 AND the Glucose Concentration Units Flag = 1 THEN • the Test Tool checks that the glucose concentration reported in the glucose measurement is coherent: 0,001 ≤ value ≤ 0,017 (mol/L) • the test operator checks that the glucose concentration reported in the glucose measurement (mol/L) is correct (value and units) b. IF C_AG_BLE_010 = FALSE (the PHD reports the glucose concentration, type and sample location) THEN • the test tool checks that the Glucose Concentration, Type and Sample Location Present Flag = 0 • the test tool checks that the glucose concentration is not reported		
Pass/Fail criteria		In step 7.a.i, the value of the Glucose Concentration field (kg/L) is within the range specified in the test procedure and the value is correct. In step 7.a.ii, the value of the Glucose Concentration field (mol/L) is within the range specified in the test procedure and the value is correct. In step 7.b, the glucose concentration is not reported.		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/GL/BV-001		
TP label		Whitepaper. Glucosemeter, Base Time and Time Offset values		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	GL Numeric 5; M	Date-Time Conv 1; M	

Test purpose	Check that: Base Time field in Glucose Measurement characteristic represents the value of an internal real-time clock or equivalent that keeps time relative to its initial setting in resolution of seconds
Applicability	C_AG_BLE_000 AND C_AG_BLE_008
Other PICS	C_AG_BLE_009
Initial condition	The PHD under test and the simulated PHG are in a Standby state.
Test procedure	1. Ask the operator to acquire a glucose concentration measurement. 2. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The simulated PHG requests the PHD under test to report stored records by performing a writing operation in the record access control point (RACP). 6. The PHD under test sends a glucose measurement to the simulated PHG. 7. The test tool checks the measurement sent by the PHD under test a. the test tool checks that the time stamps reported in the Base Time field and the Time Offset field (if present) are coherent • The Base Time field is present and its value is: - Year: 1900 ≤ value ≤ 2100 - Month: 1 ≤ value ≤ 12 - Day: 1 ≤ value ≤ 31Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • IF C_AG_BLE_009 = TRUE (the PHD reports the time offset) THEN Time Offset Flag may be set to 1, the Time Offset field may be present and its value is: -1440 ≤ value ≤ 1440 (minutes) • IF C_AG_BLE_009 = FALSE (the PHD does not report the time offset) THEN Time Offset Flag = 0 and the Time Offset field is not present b. the test operator checks that the time stamp reported in the Base Time field and the Time Offset field are correct (value and units) • IF the Time Offset field is not present or its value is 0x0000, THEN the time stamp matches with the Base Time field • IF the Time Offset field is present and its value is other than 0x0000 THEN the time stamp equals base time + time offset.
Pass/Fail criteria	In step 7.a, the base time is reported and the time offset may be reported, the values of the Base Time field and the Time Offset field are within the ranges specified in the test procedure. In step 7.b, the time stamp value is correct.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/GL/BV-002		
TP label		Whitepaper. Glucosemeter, Type and Sample Location values		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	GL Numeric 2; M	GL Enumeration 15; M	
Test purpose		Check that:		

	The Type nibble and the Sample Location nibble comprise one octet. Therefore, when one nibble is present, both nibbles shall be present
Applicability	C_AG_BLE_000 AND C_AG_BLE_008
Other PICS	C_AG_BLE_010
Initial condition	The PHD under test and the simulated PHG are in a Standby state.
Test procedure	1. Ask the operator to acquire a glucose concentration measurement and include the type and sample location information. 2. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The simulated PHG requests the PHD under test to report stored records by performing a writing operation in the record access control point (RACP). 6. The PHD under test sends a glucose measurement to the simulated PHG. 7. The test tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_010 = TRUE (the PHD reports the glucose concentration, type and sample location) THEN • the test tool checks that Glucose Concentration, Type and Sample Location Flag = 1 • the test tool checks that the Type field value reported in the glucose measurement is present, and is set to allowed values: 1 ≤ value ≤ 10 (dec) • the test operator checks that the Type field value reported in the glucose measurement is correct • the test tool checks that the Sample Location field reported in glucose measurement is present and is set to allowed values: 1 ≤ value ≤ 4 (dec) OR value = 15 (dec) • the test operator checks that the sample location reported in the glucose measurement is correct b. IF C_AG_BLE_010 = FALSE (the PHD does not report the glucose concentration, type and sample location) THEN • the test tool checks that Glucose Concentration, Type and Sample Location Flag = 0 • the test tool checks that the Glucose Concentration, Type and Sample Location field is not reported
Pass/Fail criteria	In step 7.a, value of Type and Sample Location fields are within the range specified in the test procedure and the values are correct. In step 7.b, Type and Sample Location fields are not present
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/GL/BV-003		
TP label		Whitepaper. Glucosemeter, Sensor Status Annunciation value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	GL Enumeration 15; M		
Test purpose		Check that: If Sensor Status Annunciation field is sent, it is set to a valid value.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Other PICS		C_AG_BLE_011		

Initial condition	The PHD under test and the simulated PHG are in a Standby state
Test procedure	1. Ask the operator to acquire a glucose concentration measurement and include, if it is possible, the Sensor Status Annunciation information. 2. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The simulated PHG requests the PHD under test to report stored records by performing a writing operation in the record access control point (RACP). 6. The PHD under test sends a glucose measurement to the simulated PHG 7. The test tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_011 = TRUE (the PHD reports the sensor status annunciation) THEN • the test tool checks that the Sensor Status Annunciation Flag = 1 • the test tool checks that the Sensor Status Annunciation field reported in the glucose measurement is present, and is set to allowed values: Bits 0 to 11 may be set to 0 o 1, Bits 11 to 15 must be set to 0 • the test operator checks that the Sensor Status Annunciation reported in the glucose measurement is correct b. IF C_AG_BLE_011 = FALSE (the PHD does not report sensor status annunciation) THEN • the test tool checks that the Sensor Status Annunciation flag = 0 • the test tool checks that the Sensor Status Annunciation field is not reported
Pass/Fail criteria	In step 7.a, the value of the Sensor Status Annunciation field is within the range specified in the test procedure and the value is correct. In step 7.b, the Sensor Status Annunciation field is not present
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/GL/BV-004		
TP label		Whitepaper. Glucosemeter, Blood Glucose Concentration below the capabilities of the device sensor		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	GL Numeric 6; M		
Test purpose		Check that: IF a Blood Glucose Concentration is below the capabilities of the device sensor, it shall be indicated with a value of -INFINITY [AND] IF present, bit 6 of Sensor Status Annunciation field is set to 1		
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in a Standby state.		
Test procedure		1. Ask the operator to remove all stored measurements and then to place in a device sensor a blood sample with a blood glucose level below the capabilities of the device sensor. In addition, ask the operator to acquire a glucose concentration measurement and include, if it is possible, the Sensor Status Annunciation information. 2. Turn on the PHD under test and configure it as a discoverable Bluetooth device		

	(Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The simulated PHG requests the PHD under test to report stored records by performing a writing operation in the record access control point (RACP). 6. The PHD under test sends a glucose measurement to the simulated PHG. 7. The test tool checks the measurement sent by the PHD under test a. Glucose Concentration field b. IF the Sensor Status Annunciation field is present THEN Bit 6 = 1
Pass/Fail criteria	In step 7.a, the value of the Glucose Concentration field is set to 0x0802 (-INFINITY) In step 7.b, bit 6 of Sensor Status Annunciation field (the sensor result is lower than the device can process) is set to 1
Notes	The vendor must provide a blood sample (or a simulated blood solution) with a blood glucose level below the capabilities of device sensor.

TP Id		TP/LP-PAN/PHD/PHDTW/GL/BV-005		
TP label		Whitepaper. Glucosemeter, Blood Glucose Concentration above the capabilities of the device sensor		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	GL Numeric 6; M		
Test purpose		Check that: IF a Blood Glucose Concentration is above the capabilities of the device sensor, it shall be indicated with a value of +INFINITY [AND] IF present, bit 5 of Sensor Status Annunciation field is set to 1		
Applicability		C_AG_BLE_000 AND C_AG_BLE_008 AND C_AG_BLE_010		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in a Standby state.		
Test procedure		1. Ask the operator to remove all stored measurements and then to place in a device sensor a blood sample with a blood glucose level above the capabilities of device sensor. In addition, ask the operator to acquire a glucose concentration measurement and include, if it is possible, the Sensor Status Annunciation information. 2. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The simulated PHG requests the PHD under test to report stored records by performing a writing operation in the record access control point (RACP). 6. The PHD under test sends a glucose measurement to the simulated PHG. 7. The test tool checks the measurement sent by the PHD under test a. Glucose Concentration field b. IF the Sensor Status Annunciation field is present then Bit 5 = 1		
Pass/Fail criteria		In step 7.a, the value of the Glucose Concentration field is set to 0x07FE (+INFINITY) In step 7.b, bit 5 of the Sensor Status Annunciation field (the sensor result higher than the device can process) is set to 1		

Notes	The vendor must provide a blood sample (or a simulated blood solution) with a blood glucose level above the capabilities of device sensor.

TP Id		TP/LP-PAN/PHD/PHDTW/GL/BV-006		
TP label		Whitepaper. Glucosemeter Context values		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	GL Numeric 11; M	GL Numeric 17; M	GL Numeric 24; M
		GL Numeric 31; M	GL Enumeration 10; M	GL Enumeration 20; M
		GL Enumeration 25; M		
Test purpose		Check that: If Glucose Measurement Context is sent, it is set to a valid value.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Other PICS		C_AG_BLE_012		
Initial condition		The PHD under test and the simulated PHG are in a Standby state.		
Test procedure		1. Ask the operator to acquire a glucose concentration measurement and include, if it is possible, as much as possible of Glucose measurement context information (Carbohydrate ID, Carbohydrate (kg), Meal, Tester, Health, Exercise duration, Exercise intensity, Medication ID, Medication (kg or l) and/or HbA1c). 2. Turn on the PHD under test and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The simulated PHG requests the PHD under test to report stored records by performing a writing operation in the record access control point (RACP). 6. The PHD under test sends a glucose measurement followed by a Glucose measurement context to the simulated PHG 7. The test tool checks the measurement sent by the PHD under test a. IF Context Information Follows Flag = 1 from Glucose Measurement Flags field THEN i. Check that the Glucose measurement is followed by a Glucose Measurement Context ii. Check that the Glucose Measurement Context includes at least one field in addition to the Flags field and the Sequence Number field iii. Check that the sequence number value from Glucose measurement context is the same as the value of the sequence number of its corresponding glucose measurement characteristic iv. Check that IF Extended Flags Present Flag = 1, THEN Extended Flags field is present, and is set to 00000000 v. Check that IF Carbohydrate ID And Carbohydrate Present Flag = 1, THEN • Carbohydrate ID and Carbohydrate fields are present, and Carbohydrate ID is set to allowed values (Carbohydrate ID: 1 ≤ value ≤ 7) and Carbohydrate is set to a coherent value (0<carbohydrate (kg) < 0.4) • The test operator checks that the Carbohydrate ID and Carbohydrate reported in the Glucose measurement context are correct vi. Check that IF Meal Present Flag = 1, THEN • Meal field is present, and is set to allowed values (1 ≤ value ≤ 5 (dec)) • the test operator checks that Meal reported in the Glucose measurement context is correct		

	vii. Check that IF Tester-Health Present Flag = 1, THEN • Tester and Health fields are present and they are set to allowed values (Tester: 0 ≤ value ≤ 3 (dec) OR value = 15 (dec), Health: 0 ≤ value ≤ 5 (dec) OR value = 15) • the test operator checks that the Tester-Health reported in the Glucose measurement context is correct viii. Check that IF Exercise Duration And Exercise Intensity Present Flag = 1, THEN • Exercise Duration And Exercise Intensity fields are present, and Exercise intensity is set to allowed values (0 ≤ Exercise intensity (%) ≤ 100) • the test operator checks that Exercise duration and Exercise intensity reported in the Glucose measurement context is correct ix. Check that IF Medication ID and Medication Present Flag = 1, THEN • Medication ID and Medication fields are present. If Medication Value Units Flag = 1, Medication is set in kilograms; else, Medication is set in litres. Medication ID is set to allowed values (1 ≤ Medication ID ≤ 5 (dec)) • the test operator checks that the Medication ID and Medication reported in the Glucose measurement context is correct and Medication is set to a coherent value (0< Medication (l) < 0.000002 or 0< Medication (kg) < 0.000002) x. Check that IF HbA1c Present Flag = 1, THEN • HbA1c field is present, and is set to allowed values (0 ≤ HbA1c (%) ≤ 100) • the test operator checks that HbA1c reported in the Glucose measurement context is correct b. IF Context Information Follows Flag = 0 from Glucose Measurement Flags field THEN Check that Glucose measurement is not followed by a Glucose measurement context
Pass/Fail criteria	In step 7.a, the Glucose measurement is followed by Glucose Measurement Context and it fulfils requisites described in the test procedure. In step 7.b, the Glucose Measurement Context is not received
Notes	

A.7 Subgroup 1.4.6: Whitepaper weight scale requirements (WS)

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-000		
TP label		Whitepaper. Weight Measurement, Weight value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Float Type 1; C	Weight Numeric 4; M	Weight Numeric 7; M
Test purpose		Check that: Weight Measurement Value field in Weight Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_018		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in the Standby state		
Test procedure		1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state).		

	3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Weight measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test a. IF Weight Units Flag = 0 (Kg) THEN • Check that Weight reported in Weight Measurement Value (Kg) field is coherent: 200 [1 kg] < value < 200000 [1000 kg] • Test Operator checks that Weight reported in Weight Measurement Value (Kg) field is correct (value and units) b. IF Weight Units Flag = 1 (lb) THEN • Check that Weight reported in Weight Measurement Value (lb) field is coherent: 220 [2.2 lb] < value < 220000 [2200 lb] • Test Operator checks that Weight reported in Weight Measurement Value (lb) field is correct (value and units)
Pass/Fail criteria	In Step 5.a, values of Weight Measurement Weight Value (Kg) fields are within the range specified in Test Procedure and the values are correct. In Step 5.b, values of Weight Measurement Weight Value (lb) fields are within the range specified in Test Procedure and the values are correct.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-001		
TP label		Whitepaper. Weight Measurement, Time Stamp value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Date-Time Conv 1; M	Weight Numeric 6; M	Height Numeric 6; M
		BMI Numeric 6; M		
Test purpose		Check that: Time Stamp field in Weight Measurement characteristic represents the instant of time when BLE PHD acquired the measurement		
Applicability		C_AG_BLE_000 AND C_AG_BLE_018		
Other PICS		C_AG_BLE_020		
Initial condition		The PHD under test and the simulated PHG are in the Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with PHD under test (Connection state). 4. The PHD under test sends a Weight Measurement to the simulated PHG. 5. Test Tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_020 = TRUE (time stamp is reported) THEN • Test Tool checks that Time Stamp Flag = 1 • Test Tool checks that Time Stamp reported in Time Stamp field is coherent: - Year: 1900 ≤ value ≤ 2100 OR value = 0		

	- Month: 1 ≤ value ≤ 12 OR value = 0 - Day: 1 ≤ value ≤ 31 OR value = 0 - Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • Test Operator checks that Time Stamp reported in Time Stamp field is correct (value and units) b. IF C_AG_BLE_020 = FALSE (time stamp is not reported) THEN • Test Tool checks that Time Stamp Flag = 0
Pass/Fail criteria	In Step 5.a, Time Stamp is reported, value of Time Stamp field is within the range specified in Test Procedure and the value is correct. In Step 5.b, Time Stamp is not reported
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-002		
TP label		Whitepaper. Weight Measurement, Height and BMI values		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Float Type 1; C	Height Numeric 4; M	Height Numeric 7; M
Test purpose		Check that: Height field in Weight Measurement characteristic may be present if PHD under test supports Weight measurements, if it is present then its value represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_018		
Other PICS		C_AG_BLE_021		
Initial condition		The PHD under test and the simulated PHG are in the Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Weight measurement to the simulated PHG. 5. Test Tool checks the measurement sent by the PHD under test a. IF C_AG_BLE_021 = TRUE (PHD reports Height and BMI) THEN • Test Tool checks that BMI and Height Flag = 1 a. IF Height Units Flag = 0 (m) THEN - Check that Height reported in Weight Measurement Value (m) field is coherent: 1400 [1.40 m] < value < 2300 [2.30 m] - Test Operator checks that Height reported in Weight Measurement Value (m) field is correct (value and units) b. IF Height Units Flag = 1 (in) THEN - Check that Height reported in Weight Measurement Value (in) field is		

	coherent: 551 [55.1 in] < value < 906 [90.6 in] - Test Operator checks that Height reported in Weight Measurement Value (in) field is correct (value and units) • Test Tool checks that BMI reported in BMI field is coherent: 15 ≤ value ≤ 40 • Test Operator checks that BMI reported in BMI field is correct (value and units) b. IF C_AG_BLE_021 = FALSE (PHD does not report Height and BMI) THEN • Test Tool checks that BMI and Height Flag = 0 • Test Tool checks that Height and BMI fields are not reported
Pass/Fail criteria	In Step 5.a, Height and BMI are reported, values of Height and BMI field are within the range specified in Test Procedure and the values are correct In Step 5.b, Height and BMI are not reported
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-003		
TP label		Whitepaper. Weight Measurement, BMI value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Float Type 1; C	BMI Numeric 4; M	BMI Numeric 7; M
Test purpose		Check that: BMI field in Weight Measurement characteristic may be present if PHD under test supports BMI measurements, if it is present then its value represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_018		
Other PICS		C_AG_BLE_022		
Initial condition		The PHD under test and the simulated PHG are in the Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Weight measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test a. IF C_AG_BLE_022 = TRUE (PHD reports BMI) THEN • Test Tool checks that BMI and Height Flag = 1 • Test Tool checks that BMI reported in BMI field is coherent: 15 ≤ value ≤ 30 • Test Operator checks that BMI reported in BMI field is correct (value and units) b. IF C_AG_BLE_022 = FALSE (PHD does not report BMI) THEN • Test Tool checks that BMI and Height Flag = 0 • Test Tool checks that BMI field is not reported		
Pass/Fail criteria		In Step 5.a, BMI is reported, value of BMI field is within the range specified in Test Procedure and the value is correct. In Step 5.b, BMI is not reported.		

Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-004		
TP label		Whitepaper. Weight Measurement, User ID value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	UserID15 2; O		
Test purpose		Check that: User ID field in Weight Measurement characteristic shall be present if PHD under test supports multiple users		
Applicability		C_AG_BLE_000 AND C_AG_BLE_018		
Other PICS		C_AG_BLE_023		
Initial condition		The PHD under test and the simulated PHG are in the Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The Simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Weight measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test a. IF C_AG_BLE_023 = TRUE (PHD supports multiple users) THEN • Test Tool checks that User ID Flag = 1 • Test Tool checks that User ID field is reported • Test Operator checks that User ID reported in User ID field is correct b. IF C_AG_BLE_023 = FALSE (PHD does not support multiple users) THEN • Test Tool checks that User ID Flag = 0 • Test Tool checks that User ID field is not reported		
Pass/Fail criteria		In Step 5.a, User ID is reported and the value is correct. In Step 5.b, User ID is not reported.		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-005		
TP label		Whitepaper. Body Composition Measurement, Body Fat Percentage value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Float Type 1; C	Body Fat Numeric 4; M	Body Fat Numeric 7; M
Test purpose		Check that: Body Fat Value field in Body Composition Measurement characteristic represents the measurement value acquired by BLE PHD		

Applicability	C_AG_BLE_000 AND C_AG_BLE_019
Other PICS	
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Body Composition measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test • Check that Body Fat reported in Body Composition Measurement Value (%) field is coherent: 5 < value < 30 • Test Operator checks that Body Fat reported in Body Composition Measurement Value (%) field is correct (value and units)
Pass/Fail criteria	In Step 5, value of Body Composition Measurement Body Fat Value (%) field is within the range specified in Test Procedure and the value is correct.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-006		
TP label		Whitepaper. Body Composition Measurement, Time Stamp value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Date-Time Conv 1; M	Body Fat Numeric 6; M	Fat Free Numeric 6; M
		Soft Lean Numeric 6; M	Body Water Numeric 6; M	
Test purpose		Check that: Time Stamp field in Body Composition Measurement characteristic represents the instant of time when BLE PHD acquired the measurement		
Applicability		C_AG_BLE_000 AND C_AG_BLE_019		
Other PICS		C_AG_BLE_025		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Body Composition Measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test a. IF C_AG_BLE_025 = TRUE (time stamp is reported) THEN • Test Tool checks that Time Stamp Flag = 1 • Test Tool checks that Time Stamp reported in Time Stamp field is coherent: - Year: 1900 ≤ value ≤ 2100 OR value = 0		

	- Month: 1 ≤ value ≤ 12 OR value = 0 - Day: 1 ≤ value ≤ 31 OR value = 0 - Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • Test Operator checks that Time Stamp reported in Time Stamp field is correct (value and units) b. IF C_AG_BLE_025 = FALSE (time stamp is not reported) THEN • Test Tool checks that Time Stamp Flag = 0
Pass/Fail criteria	In Step 5.a, Time Stamp is reported, value of Time Stamp field is within the range specified in Test Procedure and the value is correct. In Step 5.b, Time Stamp is not reported.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-007		
TP label		Whitepaper. Body Composition Measurement, Fat Free Mass value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Float Type 1; C	Fat Free Numeric 4; M	Fat Free Numeric 7; M
Test purpose		Check that: Fat Free Mass field in Body Composition Measurement characteristic may be present if PHD under test supports Body Composition measurements, if it is present then its value represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_019		
Other PICS		C_AG_BLE_026		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Body Composition measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test a. IF C_AG_BLE_026 = TRUE (PHD reports Fat Free Mass) THEN • Test Tool checks that Fat Free Mass present Flag = 1 a. If Measurement Units Flag = 0 (kg) THEN - Check that Fat Free Mass reported in Body Composition Measurement (kg) field is coherent: 0 [0 kg] < value < 15000 [75 kg] - Test operator checks that Fat Free Mass reported in Body Composition Measurement (kg) field is correct (value and units) b. If Measurement Units Flag = 1 (lb) THEN - Check that Fat Free Mass reported in Body Composition Measurement		

	(lb) field is coherent: 0 [0 lb] < value < 33069 [165,35 lb] - Test operator checks that Fat Free Mass reported in Body Composition Measurement (kg) field is correct (value and units) b. IF C_AG_BLE_026 = FALSE (PHD does not report Fat Free Mass) THEN • Test Tool checks that Fat Free Mass Flag = 0 • Test Tool checks that Fat Free Mass field is not reported
Pass/Fail criteria	In Step 5.a, Fat Free Mass is reported, value of Fat Free Mass field is within the range specified in Test Procedure and the value is correct. In Step 5.b, Fat Free Mass is not reported.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-008		
TP label		Whitepaper. Body Composition Measurement, Soft Lean Mass value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Float Type 1; C	Soft Lean Numeric 4; M	Soft Lean Numeric 7; M
Test purpose		Check that: Soft Lean Mass field in Body Composition Measurement characteristic may be present if PHD under test supports Soft Lean Mass measurements, if it is present then its value represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_019		
Other PICS		C_AG_BLE_027		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Body Composition measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test a. IF C_AG_BLE_027 = TRUE (PHD reports Soft Lean Mass) THEN • Test Tool checks that Soft Lean Mass present Flag = 1 a. If Measurement Units Flag = 0 (kg) THEN - Check that Soft Lean Mass reported in Body Composition Measurement (kg) field is coherent: 0 [0 kg] < value < 15000 [75 kg] - Test operator checks that Soft Lean Mass reported in Body Composition Measurement (kg) field is correct (value and units) b. If Measurement Units Flag = 1 (lb) THEN - Check that Soft Lean Mass reported in Body Composition Measurement (lb) field is coherent: 0 [0 lb] < value < 33069 [165,35 lb] - Test operator checks that Soft Lean Mass reported in Body Composition Measurement (kg) field is correct (value and units) b. IF C_AG_BLE_027 = FALSE (PHD does not report Soft Lean Mass) THEN		

	• Test Tool checks that Soft Lean Mass Flag = 0 • Test Tool checks that Soft Lean Mass field is not reported
Pass/Fail criteria	In Step 5.a, Soft Lean Mass is reported, value of Soft Lean Mass field is within the range specified in Test Procedure and the value is correct. In Step 5.b, Soft Lean Mass is not reported.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-009		
TP label		Whitepaper. Body Composition Measurement, Body Water Mass value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Float Type 1; C	Body Water Numeric 4; M	Body Water Numeric 7; M
Test purpose		Check that: Body Water Mass field in Body Composition Measurement characteristic may be present if PHD under test supports Body Water Mass measurements, if it is present then its value represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_019		
Other PICS		C_AG_BLE_028		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Body Composition measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test a. IF C_AG_BLE_028 = TRUE (PHD reports Body Water Mass) THEN • Test Tool checks that Body Water Mass present Flag = 1 a. If Measurement Units Flag = 0 (kg) THEN - Check that Body Water Mass reported in Body Composition Measurement (kg) field is coherent: 0 [0 kg] < value < 15000 [75 kg] - Test operator checks that Body Water Mass reported in Body Composition Measurement (kg) field is correct (value and units) b. If Measurement Units Flag = 1 (lb) THEN - Check that Body Water Mass reported in Body Composition Measurement (lb) field is coherent: 0 [0 lb] < value < 33069 [165,35 lb] - Test operator checks that Boyd Water Mass reported in Body Composition Measurement (kg) field is correct (value and units) b. IF C_AG_BLE_028 = FALSE (PHD does not report Body Water Mass) THEN • Test Tool checks that Body Water Mass Flag = 0 • Test Tool checks that Body Water Mass field is not reported		
Pass/Fail criteria		In Step 5.a, Body Water Mass is reported, value of Body Water Mass field is within the range		

	specified in Test Procedure and the value is correct. In Step 5.b, Body Water Mass is not reported.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-010		
TP label		Whitepaper. Body Composition Measurement, User ID value		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	UserID20 2; O		
Test purpose		Check that: User ID field in Body Composition Measurement characteristic shall be present if PHD under test supports multiple users		
Applicability		C_AG_BLE_000 AND C_AG_BLE_019		
Other PICS		C_AG_BLE_029		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Body Composition measurement to the simulated PHG. 5. Test Tool checks measurement sent by PHD under test a. IF C_AG_BLE_029 = TRUE (PHD supports multiple users) THEN • Test Tool checks that User ID Flag = 1 • Test Tool checks that User ID field is reported • Test Operator checks that User ID reported in User ID field is correct b. IF C_AG_BLE_029 = FALSE (PHD does not support multiple users) THEN • Test Tool checks that User ID Flag = 0 • Test Tool checks that User ID field is not reported		
Pass/Fail criteria		In Step 5.a, User ID is reported and the value is correct. In Step 5.b, User ID is not reported.		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-011		
TP label		Whitepaper. Body Composition Measurement, Multiple Packet Measurement		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	Multi Packet Numeric 1; M		
Test purpose		Check that:		

	A Multiple Packet Measurement has a correct structure.
Applicability	C_AG_BLE_000 AND C_AG_BLE_019
Other PICS	
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Body Composition multiple-packet measurement (if it is possible, a Multiple Packet transmission) to the simulated PHG. 5. Test Tool checks measurement sent by the PHD under test, and checks the value of Multiple Packet Measurement flag. 6. IF Multiple Packet Measurement Flag = 1 a. Test Tool receives a new Body Composition measurement b. Test Tool checks Multiple Packet Measurement flag on both measurements c. Test Tool checks the value of Body Fat Percentage field on both measurements d. Test Tool checks the value of Time Stamp field on both measurements e. Test Tool checks the value of User ID field on both measurements f. Test Tool checks the value of Basal Metabolism on both measurements g. Test Tool checks the value of Muscle Percentage on both measurements h. Test Tool checks the value of Muscle Mass on both measurements i. Test Tool checks the value of Fat Free Mass on both measurements j. Test Tool checks the value of Soft Lean Mass on both measurements k. Test Tool checks the value of Body Water Mass on both measurements l. Test Tool checks the value of Impedance on both measurements m. Test Tool checks the value of Weight on both measurements n. Test Tool checks the value of Height on both measurements 7. IF Multiple Packet Measurement Flag = 0, PHD under test does not receive a new Body Composition measurement with Multiple Packet Measurement Flag = 1
Pass/Fail criteria	In Step 6.a, a new Body Composition Measurement is received. In Step 6.b, Multiple Packet Measurement flag on both measurements are set to 1 In Step 6.c, Body Fat Percentage field on both measurements are set to the same value In Step 6.d, if Time Stamp field is present, it is present only in the first measurement In Step 6.e, if User ID field is present, it is present only in the first measurement In Step 6.f, if Basal Metabolism is present, it is present only in one measurement In Step 6.g, if Muscle Percentage is present, it is present only in one measurement In Step 6.h, if Muscle Mass is present, it is present only in one measurement In Step 6.i, if Fat Free is present, it is present only in one measurement In Step 6.j, if Soft Lean Mass is present, it is present only in one measurement In Step 6.k, if Body Water Mass is present, it is present only in one measurement In Step 6.l, if Impedance is present, it is present only in one measurement In Step 6.m, if Weight is present, it is present only in one measurement

	In Step 6.n, if Height is present, it is present only in one measurement In Step 7, a new Body Composition Measurement is not received, or a new Body Composition Measurement is received with Multiple Packet Measurement Flag set to 0.
Notes	

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-012		
TP label		Whitepaper. Body Composition Measurement, Height and Weight not reported		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	BC Feature 4; M		
Test purpose		Check that: Height and Weight fields in Body Composition Measurement characteristic shall not be present.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_019		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Body Composition measurement to the simulated PHG. 5. The simulated PHG reads the Body Composition Feature. 6. Test Tool checks measurement sent by PHD under test a. Test Tool checks that Weight flag = 0. b. Test Tool checks that Weight field is not reported. c. Test Tool checks that Height flag = 0. d. Test Tool checks that Height field is not reported. 7. Test Tool checks Body Composition Feature sent by PHD under test a. Test Tool checks that Height Resolution flags = 000.		
Pass/Fail criteria		In Step 6.a and 6.b, Weight field is not reported. In Step 6.c and 6.d, Height field is not reported. In Step 7, Height Resolution flags are zero.		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-013
TP label		Whitepaper. Weight Scale Feature
Coverage	**Spec**	[Bluetooth PHDT v1.4]

	Testable items	WS Feature 4; M		
Test purpose		Check that: Weight Scale Feature and Weight Scale Measurement are coherent.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_018		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Weight Scale measurement to the simulated PHG. 5. The simulated PHG reads the Weight Scale Feature. 6. Test Tool checks measurement sent by PHD under test a. Test Tool checks if Time Stamp is reported. b. Test Tool checks if User ID is reported. c. Test Tool checks if BMI is reported. 7. Test Tool checks Weight Scale Feature sent by PHD under test a. Test Tool checks Time Stamp Supported bit. b. Test Tool checks Multiple Users Supported bit c. Test Tool checks BMI Supported bit		
Pass/Fail criteria		In Step 6.a and 7.a, if Time Stamp Supported bit =0, Time Stamp field is not reported. In Step 6.b and 7.b, if Multiple Users Supported bit =0, User ID field is not reported. In Step 6.c and 7.c, if BMI Supported bit =0, BMI field is not reported.		
Notes				

TP Id		TP/LP-PAN/PHD/PHDTW/WS/BV-014		
TP label		Whitepaper. Body Composition Feature		
Coverage	**Spec**	[Bluetooth PHDT v1.4]		
	Testable items	BC Feature 5; M		
Test purpose		Check that: Body Composition Feature and Body Composition Measurement are coherent.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_018 AND C_AG_BLE_019		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state).		

	2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a Weight Scale measurement to the simulated PHG. 5. The simulated PHG reads the Body Composition Feature. 6. Test Tool checks measurement sent by PHD under test a. Test Tool checks if Time Stamp is reported. b. Test Tool checks if User ID is reported. c. Test Tool checks if Basal Metabolism is reported d. Test Tool checks if Muscle Percentage is reported e. Test Tool checks if Muscle Mass is reported f. Test Tool checks if Fat Free Mass is reported g. Test Tool checks if Soft Lean Mass is reported h. Test Tool checks if Body Water Mass is reported i. Test Tool checks if Impedance is reported j. Test Tool checks if Weight is reported k. Test Tool checks if Height is reported. 7. Test Tool checks Body Composition Feature sent by the PHD under test a. Test Tool checks Time Stamp Supported bit. b. Test Tool checks Multiple Users Supported bit c. Test Tool checks Basal Metabolism Supported bit d. Test Tool checks Muscle Percentage Supported bit e. Test Tool checks Muscle Mass Supported bit f. Test Tool checks Fat Free Mass Supported bit g. Test Tool checks Soft Lean Mass Supported bit h. Test Tool checks Body Water Mass Supported bit i. Test Tool checks Impedance Supported bit j. Test Tool checks Weight Supported bit k. Test Tool checks Height Supported bit
Pass/Fail criteria	In Step 6.a and 7.a, if Time Stamp Supported bit =0, Time Stamp field is not reported In Step 6.b and 7.b, if Multiple Users Supported bit =0, User ID field is not reported In Step 6.c and 7.c, if Basal Metabolism Supported bit =0, Basal Metabolism field is not reported In Step 6.d and 7.d, if Muscle Percentage Supported bit =0, Muscle Percentage field is not reported In Step 6.e and 7.e, if Muscle Mass Supported bit =0, Muscle Mass field is not reported In Step 6.f and 7.f, if Fat Free Mass Supported bit =0, Fat Free Mass field is not reported In Step 6.g and 7.g, if Soft Lean Mass Supported bit =0, Soft Lean Mass field is not reported In Step 6.h and 7.h, if Body Water Mass Supported bit =0, Body Water Mass field is not reported In Step 6.i and 7.i, if Impedance Supported bit =0, Impedance field is not reported In Step 6.j and 7.j, if Weight Supported bit =0, Weight field is not reported In Step 6.k and 7.k, if Height Supported bit =0, Height field is not reported.
Notes	

A.8 Subgroup 1.4.7: Whitepaper pulse oximeter requirements (PLX)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-000		
TP label		Whitepaper. PLX Spot-Check Measurement, SpO2 and Pulse Rate values		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	SpO2 Numeric 8; M	SpO2 Numeric 10; M
		PR Numeric 8; M	PR Numeric 10; M	
Test purpose		Check that: SpO2 subfield of SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic represents the measurement value acquired by BLE PHD [AND] PR subfield of SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Spot-Check measurement to the simulated PHG. 5. Check measurement sent by the PHD under test • Check that SpO2 value reported in SpO2PR-Spot-Check field is coherent: 70(%) ≤ value ≤ 100(%). • Check that PR value reported in SpO2PR-Spot-Check field is coherent: 20(bpm) ≤ value ≤ 250(bpm). • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Spot-Check field are correct.		
Pass/Fail criteria		In Step 5, value of SpO2 and PR subfields of SpO2PR-Spot-Check field are within the ranges specified in Test Procedure and the values are correct.		
Notes (to assist manual testing)		In order to enable indications on the PLX Spot-Check Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the PLX Spot-Check Measurement characteristic has been enabled for indications, the PHD is expected to send a PLX Spot-Check measurement to the PHG to check the required fields. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **SpO2PR-Spot-Check field** (4 octets) will be present, with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. Check that:		

	1. First subfield contains a value between 70 (0x0046) and 100 (0x0064). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Second subfield contains a value between 20 (0x0014) and 250 (0x00FA). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • Timestamp field (if present, 7 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-001		
TP label		Whitepaper. PLX Spot-Check Measurement, SpO2 and Pulse Rate values unavailable		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	SpO2 Numeric 10; M	PR Numeric 10; M
		SpO2 Numeric 20; M	PR Numeric 20; M	
Test purpose		Check that: When SpO2 value of SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic cannot be determined the special value NaN is used (0x07FF) [AND] When PR value of SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic cannot be determined the special value NaN is used (0x07FF)		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. Simulated PHG initiates discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with PHD under test (Initiating state) 3. Simulated PHG initiates a Bluetooth connection with PHD under test (Connection state) 4. PHD under test sends a PLX Spot-Check measurement with unavailable SpO2 and PR values (e.g. simulating a measurement or device error) to Simulated PHG 5. Check measurement sent by PHD under test • Check that SpO2 value reported in SpO2PR-Spot-Check field is the special value NaN (0x07FF) • Check that PR value reported in SpO2PR-Spot-Check field is the special value NaN (0x07FF) • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Spot-Check field are equal to the special value NaN (unavailable measurements).		
Pass/Fail criteria		In Step 5, value of SpO2 and PR subfields of SpO2PR-Spot-Check field are equal to the special value NaN (0x07FF).		
Notes (to assist manual testing)		In order to enable indications on the PLX Spot-Check Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the PLX Spot-Check Measurement characteristic has been enabled for indications, the		

	PHD is expected to send a PLX Spot-Check measurement to the PHG to check the required fields. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **SpO2PR-Spot-Check field** (4 octets) will be present, with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. Check that: 1. First subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 2. Second subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 3. Check that received values match those actually transmitted. • Timestamp field (if present, 7 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-002		
TP label		Whitepaper. PLX Spot-Check Measurement, Time Stamp value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Date-Time Conv 1; M	SpO2 Numeric 9; M	PR Numeric 9; M
Test purpose		Check that: Time Stamp field in PLX Spot-Check Measurement characteristic represents the instant of time when BLE PHD acquired the measurement		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033		
Other PICS		C_AG_BLE_035		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Spot-Check Measurement to the simulated PHG. 5. Check measurement sent by the PHD under test a. IF C_AG_BLE_035 = TRUE (time stamp is reported) THEN • Check that "Timestamp field is present" Flag = 1 • Check that the Time Stamp reported in the Timestamp field is coherent: - Year: 1900 ≤ value ≤ 2100 OR value = 0 - Month: 1 ≤ value ≤ 12 OR value = 0 - Day: 1 ≤ value ≤ 31 OR value = 0		

	- Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • Test Operator checks that the Time Stamp reported in Timestamp field is correct. b. IF C_AG_BLE_035 = FALSE (time stamp is not reported) THEN • Check that "Timestamp field is present" Flag = 0.
Pass/Fail criteria	In Step 5.a, Time Stamp is reported, value of Timestamp field is within the range specified in Test Procedure and the value is correct. In Step 5.b, Time Stamp is not reported.
Notes (to assist manual testing)	In order to enable indications on the PLX Spot-Check Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the PLX Spot-Check Measurement characteristic has been enabled for indications, the PHD is expected to send a PLX Spot-Check measurement to the PHG to check the required fields. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 0 (Timestamp field is present) is set to 1 IF C_AG_BLE_035 = TRUE 2. Bit 0 (Timestamp field is present) is set to 0 IF C_AG_BLE_035 = FALSE • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • **Timestamp** field (**7 octets**) will be present IF C_AG_BLE_035 = TRUE. In that case, check in that field that: 1. First 2 octets (Year) are between 1900 (0x076C) and 2100 (0x0834) OR they are equal to 0x0000. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Month (1 octet) will be between 1 (0x01) and 12 (0x0C) OR equal to 0 (0x00). 3. Day (1 octet) will be between 1 (0x01) and 31 (0x1F) OR equal to 0 (0x00). 4. Hour (1 octet) will be between 0 (0x00) and 23 (0x17). 5. Minute (1 octet) will be between 0 (0x00) and 59 (0x3B). 6. Second (1 octet) will be between 0 (0x00) and 59 (0x3B). 7. Check that received values match those actually transmitted. • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-003		
TP label		Whitepaper. PLX Spot-Check Measurement, Measurement Status value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	SpO2 Numeric 7; M	PR Numeric 7; M	
Test purpose		Check that: If Measurement Status field is sent in PLX Spot-Check Measurement, it is set to a valid value.		

Applicability	C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033
Other PICS	C_AG_BLE_036
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Spot-Check Measurement to the simulated PHG. 5. Check measurement sent by PHD under test a. IF C_AG_BLE_036 = TRUE (PHD reports Measurement Status) THEN • Check that "Measurement Status field is present" Flag = 1 • Check that Measurement Status field reported in PLX Spot-Check Measurement is present, and is set to allowed values: bits 5 to 15 may be set to 0 o 1, Bits 0 to 4 are reserved for future use and must be set to 0 • Test Operator checks that the Measurement Status value reported in the PLX Spot-Check Measurement is correct b. IF C_AG_BLE_036 = FALSE (PHD does not report Measurement Status) THEN • Check that "Measurement Status field is present" Flag = 0 • Check that Measurement Status field is not reported
Pass/Fail criteria	In Step 5.a, value of Measurement Status field is correct. In Step 5.b, Measurement Status field is not present
Notes (to assist manual testing)	In order to enable indications on the PLX Spot-Check Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the PLX Spot-Check Measurement characteristic has been enabled for indications, the PHD is expected to send a PLX Spot-Check measurement to the PHG to check the required fields. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 1 (Measurement Status field is present) is set to 1 IF C_AG_BLE_036 = TRUE 2. Bit 1 (Measurement Status field is present) is set to 0 IF C_AG_BLE_036 = FALSE • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • Timestamp field (if present, 7 octets) • **Measurement Status** field (**2 octets**) will be present IF C_AG_BLE_036 = TRUE. In that case, check in that field that: 1. Bits 0 to 4 are reserved for future use and are equal to 0. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Bits 5 to 15 may be 0 or 1. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-004		
TP label		Whitepaper. PLX Spot-Check Measurement, Device and Sensor Status value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	DSS Enumeration 4; M		
Test purpose		Check that: If Device and Sensor Status field is sent in PLX Spot-Check Measurement, it is set to a valid value.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033		
Other PICS		C_AG_BLE_037		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Spot-Check Measurement to the simulated PHG. 5. Check measurement sent by PHD under test a. IF C_AG_BLE_037 = TRUE (PHD reports Device and Sensor Status) THEN • Check that "Device and Sensor Status field is present" Flag = 1 • Check that Device Sensor Status field reported in PLX Spot-Check Measurement is present, and is set to allowed values: bits 0 to 15 may be set to 0 o 1, Bits 16 to 23 are reserved for future use and must be set to 0 • Test Operator checks that the Device and Sensor Status value reported in the PLX Spot-Check Measurement is correct b. IF C_AG_BLE_037 = FALSE (PHD does not report Device and Sensor Status) THEN • Check that "Device and Sensor Status field is present" Flag = 0 • Check that Device and Sensor Status field is not reported		
Pass/Fail criteria		In Step 5.a, value of Device and Sensor Status field is correct. In Step 5.b, Device and Sensor Status field is not present.		
Notes (to assist manual testing)		In order to enable indications on the PLX Spot-Check Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the PLX Spot-Check Measurement characteristic has been enabled for indications, the PHD is expected to send a PLX Spot-Check measurement to the PHG to check the required fields. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 2 (Device and Sensor Status field is present) is set to 1 IF C_AG_BLE_037 = TRUE 2. Bit 2 (Device and Sensor Status field is present) is set to 0 IF C_AG_BLE_037 =		

	FALSE • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • Timestamp field (if present, 7 octets) • Measurement Status field (if present, 2 octets) • **Device and Sensor Status** field (**3 octets**) will be present IF C_AG_BLE_037 = TRUE. In that case, check in that field that: 1. Bits 16 to 23 are reserved for future use and are equal to 0. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Bits 0 to 15 may be 0 or 1. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-005		
TP label		Whitepaper. PLX Spot-Check Measurement, Pulse Amplitude Index value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	PQ Numeric 8; M	
Test purpose		Check that: Pulse Amplitude Index field in PLX Spot-Check Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033		
Other PICS		C_AG_BLE_038		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Spot-Check measurement. 5. Check measurement sent by PHD under test a. IF C_AG_BLE_038 = TRUE (PHD reports Pulse Amplitude Index) THEN • Check that "Pulse Amplitude Index field is present" Flag = 1 • Check that Pulse Amplitude Index value reported in Pulse Amplitude Index field is coherent: 1(%) ≤ value ≤ 100(%) • Test Operator checks that the Pulse Amplitude Index value reported in the PLX Spot-Check Measurement is correct b. IF C_AG_BLE_038 = FALSE (PHD does not report Pulse Amplitude Index) THEN • Check that "Pulse Amplitude Index field is present" Flag = 0		
Pass/Fail criteria		In Step 5.a, value of Pulse Amplitude Index field is correct. In Step 5.b, Pulse Amplitude Index field is not present.		
Notes		In order to enable indications on the PLX Spot-Check Measurement characteristic, PHG will		

(to assist manual testing)	use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the PLX Spot-Check Measurement characteristic has been enabled for indications, the PHD is expected to send a PLX Spot-Check measurement to the PHG to check the required fields. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 3 (Pulse Amplitude Index field is present) is set to 1 IF C_AG_BLE_038 = TRUE 2. Bit 3 (Pulse Amplitude Index field is present) is set to 0 IF C_AG_BLE_038 = FALSE • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • Timestamp field (if present, 7 octets) • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • **Pulse Amplitude Index** field (**2 octets**) will be present IF C_AG_BLE_038 = TRUE. In that case, check in that field that: 1. It contains a value between 1 (0x0001) and 100 (0x0064). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received values match those actually transmitted.

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-006		
TP label		Whitepaper. PLX Spot-Check Measurement, Pulse Amplitude Index value unavailable		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	PQ Numeric 8; M	PQ Numeric 14; M
Test purpose		Check that: Pulse Amplitude Index field in PLX Spot-Check Measurement characteristic represents an unavailable value (e.g. due to a measurement or device error) using the special value NaN.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033 AND C_AG_BLE_038		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Spot-Check measurement with an unavailable value in the Pulse Amplitude Index field (e.g. simulating a measurement or device error). 5. Check measurement sent by PHD under test • Check that "Pulse Amplitude Index field is present" Flag = 1 • Check that Pulse Amplitude Index value reported in Pulse Amplitude Index field is equal to special value NaN (0x07FF) • Test Operator checks that the Pulse Amplitude Index value reported in the PLX		

	Spot-Check Measurement is equal to special value NaN (0x07FF)
Pass/Fail criteria	In Step 5, value of Pulse Amplitude Index field is special value NaN (0x07FF).
Notes (to assist manual testing)	In order to enable indications on the PLX Spot-Check Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the PLX Spot-Check Measurement characteristic has been enabled for indications, the PHD is expected to send a PLX Spot-Check measurement to the PHG to check the required fields. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 3 (Pulse Amplitude Index field is present) is set to 1 2. Bit 3 (Pulse Amplitude Index field is present) is set to 0 • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • Timestamp field (if present, 7 octets) • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • **Pulse Amplitude Index** field (**2 octets**) will be present, check in that field that: 1. It contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 2. Check that received values match those actually transmitted.

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-007		
TP label		Whitepaper. PLX Continuous Measurement, SpO2 and Pulse Rate Normal values		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	SpO2 Numeric 18; M	SpO2 Numeric 19; M
		PR Numeric 18; M	PR Numeric 19; M	
Test purpose		Check that: SpO2 subfield of SpO2PR-Normal field in PLX Continuous Measurement characteristic represents the measurement value acquired by BLE PHD [AND] PR subfield of SpO2PR-Normal field in PLX Continuous Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state).		

	4. The PHD under test sends a PLX Continuous measurement to the simulated PHG. 5. Check measurement sent by PHD under test • Check that SpO2 value reported in SpO2PR-Normal field is coherent: 70(%) ≤ value ≤ 100(%). • Check that PR value reported in SpO2PR-Normal field is coherent: 20(bpm) ≤ value ≤ 250(bpm). • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Normal field are correct.
Pass/Fail criteria	In Step 5, value of SpO2 and PR subfields of SpO2PR-Normal field are within the ranges specified in Test Procedure and the values are correct.
Notes (to assist manual testing)	In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **SpO2PR-Normal field** (4 octets) will be present, with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. Check that: 1. First subfield contains a value between 70 (0x0046) and 100 (0x0064). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Second subfield contains a value between 20 (0x0014) and 250 (0x00FA). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • The SpO2PR-Fast field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • The SpO2PR-Slow field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-008		
TP label		Whitepaper. PLX Continuous Measurement, SpO2 and Pulse Rate Normal values unavailable		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	SpO2 Numeric 19; M	PR Numeric 19; M
		SpO2 Numeric 20; M	PR Numeric 20; M	
Test purpose		Check that: When SpO2 value of SpO2PR-Normal field in PLX Continuous Measurement characteristic cannot be determined the special value NaN is used (0x07FF) [AND] When PR value of SpO2PR-Normal field in PLX Continuous Measurement characteristic cannot be determined the special value NaN is used (0x07FF)		

Applicability	C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034
Other PICS	
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous measurement with unavailable SpO2 and PR values in SpO2PR-Normal field (e.g. simulating a measurement or device error) to the simulated PHG. 5. Check measurement sent by PHD under test • Check that SpO2 value reported in SpO2PR-Normal field is the special value NaN (0x07FF) • Check that PR value reported in SpO2PR-Normal field is the special value NaN (0x07FF) • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Normal field are equal to the special value NaN (unavailable measurements).
Pass/Fail criteria	In Step 5, value of SpO2 and PR subfields of SpO2PR-Normal field are equal to the special value NaN (0x07FF).
Notes (to assist manual testing)	In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **SpO2PR-Spot-Check field** (4 octets) will be present, with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. Check that: 1. First subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 2. Second subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 3. Check that received values match those actually transmitted. • The SpO2PR-Fast field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • The SpO2PR-Slow field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-009		
TP label		Whitepaper. PLX Continuous Measurement, SpO2 and Pulse Rate Fast values		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	SpO2 Numeric 14; M	SpO2 Numeric 18; M
		SpO2 Numeric 19; M	PR Numeric 14; M	PR Numeric 18; M
		PR Numeric 19; M		
Test purpose		Check that: If present, SpO2 subfield of SpO2PR-Fast field in PLX Continuous Measurement characteristic represents the measurement value acquired by BLE PHD [AND] If present, PR subfield of SpO2PR-Fast field in PLX Continuous Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034		
Other PICS		C_AG_BLE_039		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous measurement to the Simulated PHG. 5. Check measurement sent by PHD under test a. IF C_AG_BLE_039 = TRUE (fast response mode is reported) THEN • Check that "SpO2PR-Fast field is present" Flag = 1 • Check that SpO2 value reported in SpO2PR-Fast field is coherent: 70(%) ≤ value ≤ 100(%). • Check that PR value reported in SpO2PR-Fast field is coherent: 20(bpm) ≤ value ≤ 250(bpm). • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Fast field are correct. b. IF C_AG_BLE_039 = FALSE (fast response mode is not reported) THEN • Check that "SpO2PR-Fast field is present" Flag = 0		
Pass/Fail criteria		In Step 5.a, value of SpO2 and PR subfields of SpO2PR-Fast field are within the ranges specified in Test Procedure and the values are correct. In Step 5.b, Fast Response mode is not reported		
Notes (to assist manual testing)		In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order:		

	• A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 0 (SpO2PR-Fast field is present) is set to 1 IF C_AG_BLE_039 = TRUE 2. Bit 0 (SpO2PR-Fast field is present) is set to 0 IF C_AG_BLE_039 = FALSE • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The **SpO2PR-Fast field** (4 octets) will be present IF C_AG_BLE_039 = TRUE with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. In that case, check that: 1. First subfield contains a value between 70 (0x0046) and 100 (0x0064). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Second subfield contains a value between 20 (0x0014) and 250 (0x00FA). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • The SpO2PR-Slow field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-010		
TP label		Whitepaper. PLX Continuous Measurement, SpO2 and Pulse Rate Fast values unavailable		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	SpO2 Numeric 14; M	SpO2 Numeric 19; M
		SpO2 Numeric 20; M	PR Numeric 14; M	PR Numeric 19; M
		PR Numeric 20; M		
Test purpose		Check that: When SpO2 value of SpO2PR-Fast field in PLX Continuous Measurement characteristic cannot be determined the special value NaN is used (0x07FF) [AND] When PR value of SpO2PR-Fast field in PLX Continuous Measurement characteristic cannot be determined the special value NaN is used (0x07FF)		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034 AND C_AG_BLE_039		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous measurement with unavailable SpO2 and PR values in SpO2PR-Fast field (e.g. simulating a measurement or device error) to the simulated PHG.		

	5. Check measurement sent by PHD under test • Check that SpO2 value reported in SpO2PR-Fast field is the special value NaN (0x07FF) • Check that PR value reported in SpO2PR-Fast field is the special value NaN (0x07FF) • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Fast field are equal to the special value NaN (unavailable measurements).
Pass/Fail criteria	In Step 5, value of SpO2 and PR subfields of SpO2PR-Fast field are equal to the special value NaN (0x07FF).
Notes (to assist manual testing)	In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 0 (SpO2PR-Fast field is present) is set to 1 2. Bit 0 (SpO2PR-Fast field is present) is set to 0 • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The **SpO2PR-Fast field** (4 octets) will be present with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. Check that: 1. First subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 2. Second subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 3. Check that received values match those actually transmitted. • The SpO2PR-Slow field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-011		
TP label		Whitepaper. PLX Continuous Measurement, SpO2 and Pulse Rate Slow values		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	SpO2 Numeric 15; M	SpO2 Numeric 18; M
		SpO2 Numeric 19; M	PR Numeric 15; M	PR Numeric 18; M
		PR Numeric 19; M		
Test purpose		Check that: If present, SpO2 subfield of SpO2PR-Slow field in PLX Continuous Measurement characteristic represents the measurement value acquired by BLE PHD		

	[AND] If present, PR subfield of SpO2PR-Slow field in PLX Continuous Measurement characteristic represents the measurement value acquired by BLE PHD
Applicability	C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034
Other PICS	C_AG_BLE_040
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous measurement to the simulated PHG. 5. Check measurement sent by PHD under test a. IF C_AG_BLE_040 = TRUE (slow response mode is reported) THEN • Check that "SpO2PR-Slow field is present" Flag = 1 • Check that SpO2 value reported in SpO2PR-Slow field is coherent: 70(%) ≤ value ≤ 100(%). • Check that PR value reported in SpO2PR-Slow field is coherent: 20(bpm) ≤ value ≤ 250(bpm). • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Slow field are correct. b. IF C_AG_BLE_040 = FALSE (slow response mode is not reported) THEN • Check that "SpO2PR-Slow field is present" Flag = 0
Pass/Fail criteria	In Step 5.a, value of SpO2 and PR subfields of SpO2PR-Slow field are within the ranges specified in Test Procedure and the values are correct. In Step 5.b, Slow Response mode is not reported.
Notes **(to assist manual testing)**	In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 1 (SpO2PR-Slow field is present) is set to 1 IF C_AG_BLE_040 = TRUE 2. Bit 1 (SpO2PR-Slow field is present) is set to 0 IF C_AG_BLE_040 = FALSE • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The SpO2PR-Fast field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • The **SpO2PR-Slow field** (4 octets) will be present IF C_AG_BLE_039 = TRUE with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. In that case, check that: 1. First subfield contains a value between 70 (0x0046) and 100 (0x0064). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first).

	2. Second subfield contains a value between 20 (0x0014) and 250 (0x00FA). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-012		
TP label		Whitepaper. PLX Continuous Measurement, SpO2 and Pulse Rate Slow values unavailable		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	SpO2 Numeric 15; M	SpO2 Numeric 19; M
		SpO2 Numeric 20; M	PR Numeric 15; M	PR Numeric 19; M
		PR Numeric 20; M		
Test purpose		Check that: When SpO2 value of SpO2PR-Slow field in PLX Continuous Measurement characteristic cannot be determined the special value NaN is used (0x07FF) [AND] When PR value of SpO2PR-Slow field in PLX Continuous Measurement characteristic cannot be determined the special value NaN is used (0x07FF)		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034 AND C_AG_BLE_040		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous measurement with unavailable SpO2 and PR values in SpO2PR-Slow field (e.g. simulating a measurement or device error) to the simulated PHG. 5. Check measurement sent by PHD under test • Check that SpO2 value reported in SpO2PR-Slow field is the special value NaN (0x07FF) • Check that PR value reported in SpO2PR-Slow field is the special value NaN (0x07FF) • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Slow field are equal to the special value NaN (unavailable measurements).		
Pass/Fail criteria		In Step 5, value of SpO2 and PR subfields of SpO2PR-Slow field are equal to the special value NaN (0x07FF).		
Notes (to assist manual testing)		In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications.		

	Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 1 (SpO2PR-Slow field is present) is set to 1 2. Bit 1 (SpO2PR-Slow field is present) is set to 0 • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The SpO2PR-Fast field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • The **SpO2PR-Slow field** (4 octets) will be present with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. Check that: 1. First subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 2. Second subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 3. Check that received values match those actually transmitted. • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-013		
TP label		Whitepaper. PLX Continuous Measurement, Measurement Status value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	SpO2 Numeric 17; M	PR Numeric 17; M	
Test purpose		Check that: If Measurement Status field is sent in PLX Continuous Measurement, it is set to a valid value.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034		
Other PICS		C_AG_BLE_036		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous Measurement to the simulated PHG. 5. Check measurement sent by PHD under test a. IF C_AG_BLE_036 = TRUE (PHD reports Measurement Status) THEN		

	• Check that "Measurement Status field is present" Flag = 1 • Check that Measurement Status field reported in PLX Continuous Measurement is present, and is set to allowed values: bits 5 to 15 may be set to 0 o 1, Bits 0 to 4 are reserved for future use and must be set to 0 • Test Operator checks that the Measurement Status value reported in the PLX Continuous Measurement is correct b. IF C_AG_BLE_036 = FALSE (PHD does not report Measurement Status) THEN • Check that "Measurement Status field is present" Flag = 0 • Check that Measurement Status field is not reported
Pass/Fail criteria	In Step 5.a, value of Measurement Status field is correct. In Step 5.b, Measurement Status field is not present
Notes (to assist manual testing)	In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 2 (Measurement Status field is present) is set to 1 IF C_AG_BLE_036 = TRUE 2. Bit 2 (Measurement Status field is present) is set to 0 IF C_AG_BLE_036 = FALSE • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The SpO2PR-Fast field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • The SpO2PR-Slow field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • **Measurement Status** field (**2 octets**) will be present IF C_AG_BLE_036 = TRUE. In that case, check in that field that: 1. Bits 0 to 4 are reserved for future use and are equal to 0. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Bits 5 to 15 may be 0 or 1. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-014		
TP label		Whitepaper. PLX Continuous Measurement, Device and Sensor Status value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	DSS Enumeration 8; M		
Test purpose		Check that: If Device and Sensor Status field is sent in PLX Continuous Measurement, it is set to a valid value.		

Applicability	C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034
Other PICS	C_AG_BLE_037
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous Measurement to the simulated PHG. 5. Check measurement sent by PHD under test a. IF C_AG_BLE_037 = TRUE (PHD reports Device and Sensor Status) THEN • Check that "Device and Sensor Status field is present" Flag = 1 • Check that Device Sensor Status field reported in PLX Continuous Measurement is present, and is set to allowed values: bits 0 to 15 may be set to 0 o 1, Bits 16 to 23 are reserved for future use and must be set to 0 • Test Operator checks that the Device and Sensor Status value reported in the PLX Continuous Measurement is correct b. IF C_AG_BLE_037 = FALSE (PHD does not report Device and Sensor Status) THEN • Check that "Device and Sensor Status field is present" Flag = 0 • Check that Device and Sensor Status field is not reported
Pass/Fail criteria	In Step 5.a, value of Device and Sensor Status field is correct. In Step 5.b, Device and Sensor Status field is not present
Notes (to assist manual testing)	In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 3 (Device and Sensor Status field is present) is set to 1 IF C_AG_BLE_037 = TRUE 2. Bit 3 (Device and Sensor Status field is present) is set to 0 IF C_AG_BLE_037 = FALSE • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The SpO2PR-Fast field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • The SpO2PR-Slow field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • Measurement Status field (if present, 2 octets) • **Device and Sensor Status** field (**3 octets**) will be present IF C_AG_BLE_037 = TRUE. In that case, check in that field that: 1. Bits 16 to 23 are reserved for future use and are equal to 0. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first).

	2. Bits 0 to 15 may be 0 or 1. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-015		
TP label		Whitepaper. PLX Continuous Measurement, Pulse Amplitude Index value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	PQ Numeric 13; M	
Test purpose		Check that: Pulse Amplitude Index field in PLX Continuous Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034		
Other PICS		C_AG_BLE_038		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous measurement. 5. Check measurement sent by PHD under test a. IF C_AG_BLE_038 = TRUE (PHD reports Pulse Amplitude Index) THEN • Check that "Pulse Amplitude Index field is present" Flag = 1 • Check that Pulse Amplitude Index value reported in Pulse Amplitude Index field is coherent: 1(%) ≤ value ≤ 100(%) • Test Operator checks that the Pulse Amplitude Index value reported in the PLX Continuous Measurement is correct b. IF C_AG_BLE_038 = FALSE (PHD does not report Pulse Amplitude Index) THEN • Check that "Pulse Amplitude Index field is present" Flag = 0		
Pass/Fail criteria		In Step 5.a, value of Pulse Amplitude Index field is correct. In Step 5.b, Pulse Amplitude Index field is not present		
Notes (to assist manual testing)		In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 4 (Pulse Amplitude Index field is present) is set to 1 IF C_AG_BLE_038 = TRUE		

	2. Bit 4 (Pulse Amplitude Index field is present) is set to 0 IF C_AG_BLE_038 = FALSE • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The SpO2PR-Fast field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • The SpO2PR-Slow field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • **Pulse Amplitude Index** field (**2 octets**) will be present IF C_AG_BLE_038 = TRUE. In that case, check in that field that: 1. It contains a value between 1 (0x0001) and 100 (0x0064). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received values match those actually transmitted.

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-016		
TP label		Whitepaper. PLX Continuous Measurement, Pulse Amplitude Index value unavailable		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	PQ Numeric 13; M	PQ Numeric 14; M
Test purpose		Check that: Pulse Amplitude Index field in PLX Continuous Measurement characteristic represents an unavailable value (e.g. due to a measurement or device error) using the special value NaN.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034 AND C_AG_BLE_038		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous measurement with an unavailable value in the Pulse Amplitude Index field (e.g. simulating a measurement or device error). 5. Check measurement sent by PHD under test • Check that "Pulse Amplitude Index field is present" Flag = 1 • Check that Pulse Amplitude Index value reported in Pulse Amplitude Index field is equal to special value NaN (0x07FF) • Test Operator checks that the Pulse Amplitude Index value reported in the PLX Continuous Measurement is equal to special value NaN (0x07FF)		
Pass/Fail criteria		In Step 5, the value of Pulsatile Amplitude Index field is special value NaN (0x07FF)		
Notes (to assist manual testing)		In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications.		

	Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 4 (Pulse Amplitude Index field is present) is set to 1 2. Bit 4 (Pulse Amplitude Index field is present) is set to 0 • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The SpO2PR-Fast field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • The SpO2PR-Slow field (if present, 4 octets), with two subfields, SpO2 (2 octets) and PR (2 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • **Pulse Amplitude Index** field (**2 octets**) will be present, check in that field that: 1. It contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 2. Check that received values match those actually transmitted.

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-017		
TP label		Whitepaper. PLX Features, PLX Spot-Check Measurement		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	PLX Features 1; M	PLX Features 2; C	PLX Features 3; C
		SpO2 Numeric 7; M	SpO2 Numeric 9; M	PR Numeric 7; M
		PQ Numeric 9; M		
Test purpose		Check that: PLX Features and PLX Spot-Check Measurement are coherent.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG reads the PLX Features characteristic. 5. The PHD under test sends a PLX Spot-Check Measurement to the simulated PHG. 6. Check value of Supported Features field of PLX Features characteristic a. Check Measurement Status support bit		

	b. Check Device and Sensor Status support bit. c. Check Timestamp for Spot-Check measurements support bit. d. Check Pulse Amplitude Index support bit. e. Check that bits 8-15 are 0 (Reserved for future use) 7. IF Measurement Status support bit = 1, check value of Measurement Status Support field of PLX Features characteristic a. Check that bits 0-4 are 0 (Reserved for future use) b. Check bits 5-15. These bits may be 0 or 1. 8. IF Device and Sensor Status support bit = 1, check value of Device and Sensor Status Support field of PLX Features characteristic a. Check bits 0-15. These bits may be 0 or 1. b. Check that bits 16-23 are 0 (Reserved for future use) 9. Check measurement sent by PHD under test a. Check if Measurement Status is reported. b. If Measurement Status is reported, check its value. c. Check if Device and Sensor Status is reported. d. If Device and Sensor Status is reported, check its value. e. Check if Time Stamp is reported. f. Check if Pulse Amplitude Index is reported.
Pass/Fail criteria	In Step 7: • Measurement Status Support field is present and values match those on Test Procedure. In Step 8: • Device and Sensor Status Support field is present and values match those on Test Procedure. In Step 9: • If Measurement Status support bit =0, Measurement Status field is not reported. If it is 1, it is reported. • If Measurement Status is supported and reported, check that only bits that are supported according to Measurement Status Support field (7.b) can be equal to 1. • If Device and Sensor Status support bit =0, Device and Sensor Status field is not reported. If it is 1, it is reported. • If Device and Status is supported and reported, check that only bits that are supported according to Device and Sensor Status Support field (8.b) can be equal to 1. • If Time Stamp support bit =0, Time Stamp field is not reported. If it is 1, it is reported. • If Pulse Amplitude Index support bit=0, Pulse Amplitude Index is not reported. If it is 1, it is reported.
Notes **(to assist manual testing)**	To read PLX Features characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2A60. PHG will then receive a Read Response. Check ATT packet value in the received response: • Supported Features field will be present (2 octets), and it indicates features support and optional fields present. Note that bytes will be transmitted using little endian order (i.e. the least significant octet first). 1. Check Measurement Status support bit (bit 0) 2. Check Device and Sensor Status support bit (bit 1) 3. Check Timestamp for Spot-Check measurements support bit (bit 3) 4. Check Pulse Amplitude Index support bit (bit 6)

	5. Check that bits 8-15 are 0 (reserved for future use). • Measurement Status Support field (2 octets) will be present if Measurement Status Support bit = 2. In that case, check that (Note that bytes will be transmitted using little endian order, i.e. the least significant octet first): 1. Check bits 5-15 values. 2. Check that bits 0-4 are 0 (Reserved for future use) • Device and Sensor Status Support field (3 octets) will be present if Device and Sensor Status Support bit = 1. In that case, check that (Note that bytes will be transmitted using little endian order, i.e. the least significant octet first): 1. Check bits 0-15 values. 2. Check that bits 16-23 are 0 (Reserved for future use) In order to enable indications on the PLX Spot-Check Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the PLX Spot-Check Measurement characteristic has been enabled for indications, the PHD is expected to send a PLX Spot-Check measurement to the PHG to check the required fields. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • **Timestamp** field (**if present, 7 octets**). Check that: 1. If Timestamp support bit = 0, Timestamp field is not present. 2. If Timestamp support bit = 1, Timestamp field is present. • **Measurement Status** field (**if present, 2 octets**) Check that: 1. If Measurement Status support bit = 1, this field is present. 2. If Measurement Status support bit = 0, this field is not present. 3. Only bits that are supported according to Measurement Status Support field can be equal to 1 that (Note that bytes will be transmitted using little endian order, i.e. the least significant octet first). • **Device and Sensor Status** field (**if present, 3 octets**). Check that: 1. If Device and Sensor Status support bit = 1, this field is present. 2. If Device and Sensor Status support bit = 0, this field is not present. 3. Only bits that are supported according to Device and Sensor Status Support field can be equal to 1 that (Note that bytes will be transmitted using little endian order, i.e. the least significant octet first). • **Pulse Amplitude Index** field (**if present, 2 octets**). Check that: 1. If Pulse Amplitude Index support bit = 0, this field is not present. 2. If Pulse Amplitude Index support bit = 1, this field is present.

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-018		
TP label		Whitepaper. PLX Features, PLX Continuous Measurement		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	PLX Features 1; M	PLX Features 2; C	PLX Features 3; C
		SpO2 Numeric 17; M	PR Numeric 17; M	PQ Numeric 13; M

Test purpose	Check that: PLX Features and PLX Continuous Measurement are coherent.
Applicability	C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_034
Other PICS	
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a PLX Continuous Measurement to the simulated PHG. 5. The simulated PHG reads the PLX Features characteristic. 6. Check the value of Supported Features field of PLX Features characteristic a. Check Measurement Status support bit b. Check Device and Sensor Status support bit. c. Check SpO2PR-Fast metric support bit. d. Check SpO2PR-Slow metric support bit. e. Check Pulse Amplitude Index support bit. 7. IF Measurement Status support bit = 1, check value of Measurement Status Support field of PLX Features characteristic a. Check that bits 0-4 are 0 (Reserved for future use) b. Check bits 5-15. These bits may be 0 or 1. 8. IF Device and Sensor Status support bit = 1, check value of Device and Sensor Status Support field of PLX Features characteristic a. Check bits 0-15. These bits may be 0 or 1. b. Check that bits 16-23 are 0 (Reserved for future use) 9. Check measurement sent by PHD under test a. Check if Measurement Status is reported. b. If Measurement Status is reported, check its value. c. Check if Device and Sensor Status is reported. d. If Device and Sensor Status is reported, check its value. e. Check if SpO2PR-Fast is reported. f. Check if SpO2PR-Slow is reported. g. Check if Pulse Amplitude Index is reported.
Pass/Fail criteria	In Step 7: • Measurement Status Support field is present and values match those on Test Procedure. In Step 8: • Device and Sensor Status Support field is present and values match those on Test Procedure. In Step 9: • If Measurement Status support bit =0, Measurement Status field is not reported. If it is 1, it is reported. • If Measurement Status is supported and reported, check that only bits that are

	supported according to Measurement Status Support field (7.b) can be equal to 1. • If Device and Sensor Status support bit =0, Device and Sensor Status field is not reported. If it is 1, it is reported. • If Device and Status is supported and reported, check that only bits that are supported according to Device and Sensor Status Support field (8.b) can be equal to 1. • If SpO2PR-Fast support bit =0, SpO2PR-Fast field is not reported. If it is 1, it is reported. • If SpO2PR-Slow support bit =0, SpO2PR-Slow field is not reported. If it is 1, it is reported. • If Pulse Amplitude Index support bit=0, Pulse Amplitude Index is not reported. If it is 1, it is reported.
Notes **(to assist manual testing)**	To read PLX Features characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2A60. PHG will then receive a Read Response. Check ATT packet value in the received response: • Supported Features field will be present (2 octets), and it indicates features support and optional fields present. Note that bytes will be transmitted using little endian order (i.e. the least significant octet first). 1. Check Measurement Status support bit (bit 0) 2. Check Device and Sensor Status support bit (bit 1) 3. Check SpO2PR-Fast metric support bit (bit 4) 4. Check SpO2PR-Slow metric support bit (bit 5) 5. Check Pulse Amplitude Index support bit (bit 6) 6. Check that bits 8-15 are 0 (reserved for future use). • Measurement Status Support field (2 octets) will be present if Measurement Status Support bit = 2. In that case, check that (Note that bytes will be transmitted using little endian order, i.e. the least significant octet first): 1. Check bits 5-15 values. 2. Check that bits 0-4 are 0 (Reserved for future use) • Device and Sensor Status Support field (3 octets) will be present if Device and Sensor Status Support bit = 1. In that case, check that (Note that bytes will be transmitted using little endian order, i.e. the least significant octet first): 1. Check bits 0-15 values. 2. Check that bits 16-23 are 0 (Reserved for future use) In order to enable notifications on the PLX Continuous Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. Once the PLX Continuous Measurement characteristic has been enabled for notifications, the PHD is expected to send a PLX Continuous measurement to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. • Then, the SpO2PR-Normal field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • The **SpO2PR-Fast** field (**if present, 4 octets**), with two subfields, SpO2 (2 octets) and PR (2 octets). Check that: 1. If SpO2PR-Fast metric support bit = 0, this field is not present. 2. If SpO2PR-Fast metric support bit = 1, this field is present. • The **SpO2PR-Slow** field (**if present, 4 octets**), with two subfields, SpO2 (2 octets) and PR (2 octets). Check that:

	1. If SpO2PR-Slow metric support bit = 0, this field is not present. 2. If SpO2PR-Slow metric support bit = 1, this field is present. • **Measurement Status** field (**if present, 2 octets**) Check that: 1. If Measurement Status support bit = 1, this field is present. 2. If Measurement Status support bit = 0, this field is not present. 3. Only bits that are supported according to Measurement Status Support field can be equal to 1 that (Note that bytes will be transmitted using little endian order, i.e. the least significant octet first). • **Device and Sensor Status** field (**if present, 3 octets**). Check that: 1. If Device and Sensor Status support bit = 1, this field is present. 2. If Device and Sensor Status support bit = 0, this field is not present. 3. Only bits that are supported according to Device and Sensor Status Support field can be equal to 1 that (Note that bytes will be transmitted using little endian order, i.e. the least significant octet first). • **Pulse Amplitude Index** field (**if present, 2 octets**). Check that: 1. If Pulse Amplitude Index support bit = 0, this field is not present. 2. If Pulse Amplitude Index support bit = 1, this field is present.

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-019		
TP label		Whitepaper. PLX Features, RACP Measurement Storage support		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	PLX Features 1; M	SpO2 Numeric 6; M	SpO2 Numeric 9; M
Test purpose		Check that: Spot-Check measurements storage is supported when support bit is set in PLX Features		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033		
Other PICS		C_AG_BLE_041		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Ask the operator to acquire at least a PLX Spot-Check measurement (if RACP characteristic is present, the measurements shall be temporarily stored for later transmission). 2. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The simulated PHG reads the PLX Features characteristic. 6. IF C_AG_BLE_041 = FALSE (PHD does not support Spot-Check measurements storage) THEN • Check that Measurement Storage for Spot-Check support bit=0. 7. IF C_AG_BLE_041 = TRUE (PHD does support Spot-Check measurements storage) THEN • Check that Measurement Storage for Spot-Check support bit=1.		

	• Check that Timestamp for Spot-Check measurements support bit = 1; • Check that Record Access Control Point (0x2A52) characteristic is present. • If RACP characteristic is present: ▪ PHG requests the PHD under test to report stored records by performing a writing operation in the Record Access Control Point (RACP) ▪ PHD under test sends a Spot-Check measurement to the PHG. ▪ Check that Timestamp field is reported in measurement sent by PHD under test
Pass/Fail criteria	In Step 6, Measurement Storage for Spot-Check support bit = 0. In Step 7: • Measurement Storage for Spot-Check support bit = 1 • Timestamp for Spot-Check measurements support bit = 1 • Record Access Control Point characteristic is present • Stored measurements report Timestamp field
Notes **(to assist manual testing)**	To read PLX Features characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2A60. PHG will then receive a Read Response. Check ATT packet value in the received response: • Supported Features field will be present (2 octets), and it indicates features support and optional fields present. Note that bytes will be transmitted using little endian order (i.e. the least significant octet first). 1. Check Measurement Storage for Spot-Check support bit (bit 2). IF C_AG_BLE_041 = FALSE, this bit will be 0, ELSE will be 1. 2. Check Timestamp for Spot-Check measurements support bit (bit 3). IF C_AG_BLE_041 = TRUE this bit will be 1. • Measurement Status Support field (if present, 2 octets). • Device and Sensor Status Support field (if present, 3 octets) Once checked that RACP characteristic exists in the service, to receive PLX Spot-Check measurements from RACP characteristic, PHG enables indications on both PLX Spot-Check Measurement and Record Access Control Point characteristics. In order to enable indications, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications. Once both characteristics have been enabled for indications, PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value on the RACP characteristic. Once the PHG has performed such operation, an indication will arrive for each stored PLX Spot-Check measurement. Finally, an indication from the RACP characteristic will also arrive. When the measurement indications arrive, check the value of received ATT packets (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). • **Timestamp** field (**if present, 7 octets**). Check that: 1. This field is present. • Measurement Status field (if present, 2 octets)

	• Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-020		
TP label		Whitepaper. RACP - PLX Spot-Check Measurement, SpO2 and Pulse Rate values		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	SpO2 Numeric 8; M	SpO2 Numeric 10; M
		PR Numeric 8; M	PR Numeric 10; M	
Test purpose		Check that: SpO2 subfield of SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic represents the measurement value acquired by BLE PHD and temporarily stored using RACP characteristic. [AND] PR subfield of SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic represents the measurement value acquired by BLE PHD and temporarily stored using RACP characteristic.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033 AND C_AG_BLE_041		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Ask the operator to acquire at least a PLX Spot-Check measurement (the measurements shall be temporarily stored for later transmission). All measurements stored shall have available SpO2 and PR values. 2. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report stored records by performing a writing operation in the Record Access Control Point (RACP). 6. The PHD under test sends at least a PLX Spot-Check measurement to the simulated PHG. 7. Check measurement(s) sent by PHD under test: • Check that SpO2 value reported in SpO2PR-Spot-Check field is coherent: 70(%) ≤ value ≤ 100(%). • Check that PR value reported in SpO2PR-Spot-Check field is coherent: 20(bpm) ≤ value ≤ 250(bpm). • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Spot-Check field are correct.		
Pass/Fail criteria		In Step 7, values of SpO2 and PR subfields of SpO2PR-Spot-Check field are within the ranges specified in Test Procedure and the values are correct.		
Notes (to assist manual testing)		To receive PLX Spot-Check measurements from RACP characteristic, PHG enables indications on both PLX Spot-Check Measurement and Record Access Control Point characteristics. In order to enable indications, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications.		

	Once both characteristics have been enabled for indications, PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value on the RACP characteristic. Once the PHG has performed such operation, an indication will arrive for each stored PLX Spot-Check measurement. Finally, an indication from the RACP characteristic will also arrive. When the measurement indications arrive, check the value of received ATT packets (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **SpO2PR-Spot-Check field** (4 octets) will be present, with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. Check that: 1. First subfield contains a value between 70 (0x0046) and 100 (0x0064). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Second subfield contains a value between 20 (0x0014) and 250 (0x00FA). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • Timestamp field (if present, 7 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-021		
TP label		Whitepaper. RACP - PLX Spot-Check Measurement, SpO2 and Pulse Rate values unavailable		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	SpO2 Numeric 20; M	PR Numeric 20; M
Test purpose		Check that: When SpO2 value of SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic cannot be determined in temporarily stored measurements the special value NaN is used (0x07FF) [AND] When PR value of SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic cannot be determined in temporarily stored measurements the special value NaN is used (0x07FF)		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033 AND C_AG_BLE_041		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Ask the operator to acquire at least a PLX Spot-Check measurement with unavailable SpO2 and PR values (e.g. simulating a measurement or device error). The measurements shall be temporarily stored for later transmission. All measurements stored shall have unavailable SpO2 and PR values. 2. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state).		

	3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report stored records by performing a writing operation in the Record Access Control Point (RACP). 6. The PHD under test sends at least a PLX Spot-Check measurement with unavailable SpO2 and PR values to the simulated PHG. 7. Check measurement(s) sent by PHD under test: • Check that SpO2 value reported in SpO2PR-Spot-Check field is the special value NaN (0x07FF) • Check that PR value reported in SpO2PR-Spot-Check field is the special value NaN (0x07FF) • Test Operator checks that SpO2 and Pulse Rate values reported in SpO2PR-Spot-Check field are equal to the special value NaN (unavailable measurements).
Pass/Fail criteria	In Step 7, values of SpO2 and PR subfields of SpO2PR-Spot-Check field are equal to the special value NaN (0x07FF).
Notes **(to assist manual testing)**	To receive PLX Spot-Check measurements from RACP characteristic, PHG enables indications on both PLX Spot-Check Measurement and Record Access Control Point characteristics. In order to enable indications, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications. Once both characteristics have been enabled for indications, PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value on the RACP characteristic. Once the PHG has performed such operation, an indication will arrive for each stored PLX Spot-Check measurement. Finally, an indication from the RACP characteristic will also arrive. When the measurement indications arrive, check the value of received ATT packets (besides header and metadata). Fields and subfields will appear in the following order: • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **SpO2PR-Spot-Check field** (4 octets) will be present, with two subfields, **SpO2 (2 octets)** and **PR (2 octets)**. Check that: 1. First subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 2. Second subfield contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 3. Check that received values match those actually transmitted. • Timestamp field (if present, 7 octets). • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-022
TP label		Whitepaper. RACP - PLX Spot-Check Measurement, Time Stamp value
Coverage	**Spec**	[Bluetooth PHDT v1.6]

	Testable items	Date-Time Conv 1; M	SpO2 Numeric 9; M	PR Numeric 9; M
Test purpose		Check that: Time Stamp field in PLX Spot-Check Measurement characteristic represents the instant of time when BLE PHD acquired and temporarily stored the measurement using RACP characteristic		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033 AND C_AG_BLE_041		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Ask the operator to acquire at least a PLX Spot-Check measurement (the measurements shall be temporarily stored for later transmission). 2. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report stored records by performing a writing operation in the Record Access Control Point (RACP). 6. The PHD under test sends at least a PLX Spot-Check Measurement to the simulated PHG. 7. Check measurement(s) sent by PHD under test • Check that "Timestamp field is present" Flag = 1 • Check that the Time Stamp reported in the Timestamp field is coherent: - Year: 1900 ≤ value ≤ 2100 OR value = 0 - Month: 1 ≤ value ≤ 12 OR value = 0 - Day: 1 ≤ value ≤ 31 OR value = 0 - Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • Test Operator checks that the Time Stamp reported in Timestamp field is correct.		
Pass/Fail criteria		In Step 7, Time Stamp is always reported, value of the Timestamp field is within the range specified in Test Procedure and the value is correct.		
Notes (to assist manual testing)		To receive PLX Spot-Check measurements from RACP characteristic, PHG enables indications on both PLX Spot-Check Measurement and Record Access Control Point characteristics. In order to enable indications, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications. Once both characteristics have been enabled for indications, PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value on the RACP characteristic. Once the PHG has performed such operation, an indication will arrive for each stored PLX Spot-Check measurement. Finally, an indication from the RACP characteristic will also arrive. When the measurement indications arrive, check the value of received ATT packets (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present.		

	Check that: 1. Bit 0 (Timestamp field is present) is set to 1. 2. Bit 0 (Timestamp field is present) is set to 0. • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • **Timestamp** field (**7 octets**) will be present, check in that field that: 1. First 2 octets (Year) are between 1900 (0x076C) and 2100 (0x0834) OR they are equal to 0x0000. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Month (1 octet) will be between 1 (0x01) and 12 (0x0C) OR equal to 0 (0x00). 3. Day (1 octet) will be between 1 (0x01) and 31 (0x1F) OR equal to 0 (0x00). 4. Hour (1 octet) will be between 0 (0x00) and 23 (0x17). 5. Minute (1 octet) will be between 0 (0x00) and 59 (0x3B). 6. Second (1 octet) will be between 0 (0x00) and 59 (0x3B). 7. Check that received values match those actually transmitted. • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-023		
TP label		Whitepaper. RACP - PLX Spot-Check Measurement, Measurement Status value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	SpO2 Numeric 7; M	PR Numeric 7; M	
Test purpose		Check that: If Measurement Status field is sent in temporarily stored PLX Spot-Check Measurements, it is set to a valid value.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033 AND C_AG_BLE_041		
Other PICS		C_AG_BLE_036		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Ask the operator to acquire at least a PLX Spot-Check measurement (the measurements shall be temporarily stored for later transmission). 2. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report stored records by performing a writing operation in the Record Access Control Point (RACP). 6. The PHD under test sends at least a PLX Spot-Check Measurement to the simulated PHG. 7. Check measurement(s) sent by PHD under test a. IF C_AG_BLE_036 = TRUE (PHD reports Measurement Status) THEN		

	• Check that "Measurement Status field is present" Flag = 1 • Check that Measurement Status field reported in PLX Spot-Check Measurement is present, and is set to allowed values: bits 5 to 15 may be set to 0 o 1, Bits 0 to 4 are reserved for future use and must be set to 0 • Test Operator checks that the Measurement Status value reported in the PLX Spot-Check Measurement is correct b. IF C_AG_BLE_036 = FALSE (PHD does not report Measurement Status) THEN • Check that "Measurement Status field is present" Flag = 0 • Check that Measurement Status field is not reported
Pass/Fail criteria	In Step 7.a, values of Measurement Status field are correct. In Step 7.b, Measurement Status field is not present in any measurement
Notes (to assist manual testing)	To receive PLX Spot-Check measurements from RACP characteristic, PHG enables indications on both PLX Spot-Check Measurement and Record Access Control Point characteristics. In order to enable indications, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications. Once both characteristics have been enabled for indications, PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value on the RACP characteristic. Once the PHG has performed such operation, an indication will arrive for each stored PLX Spot-Check measurement. Finally, an indication from the RACP characteristic will also arrive. When the measurement indications arrive, check the value of received ATT packets (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 1 (Measurement Status field is present) is set to 1 IF C_AG_BLE_036 = TRUE 2. Bit 1 (Measurement Status field is present) is set to 0 IF C_AG_BLE_036 = FALSE • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • Timestamp field (if present, 7 octets) • **Measurement Status** field (**2 octets**) will be present IF C_AG_BLE_036 = TRUE. In that case, check in that field that: 1. Bits 0 to 4 are reserved for future use and are equal to 0. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Bits 5 to 15 may be 0 or 1. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. • Device and Sensor Status field (if present, 3 octets) • Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-024		
TP label		Whitepaper. RACP - PLX Spot-Check Measurement, Device and Sensor Status value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	DSS Enumeration 4; M		

Test purpose	Check that: If Device and Sensor Status field is sent in temporarily stored PLX Spot-Check Measurements, it is set to a valid value.
Applicability	C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033 AND C_AG_BLE_041
Other PICS	C_AG_BLE_037
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Ask the operator to acquire at least a PLX Spot-Check measurement (the measurements shall be temporarily stored for later transmission). 2. Turn on the PHD under test, and configure it as discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report stored records by performing a writing operation in the Record Access Control Point (RACP). 6. The PHD under test sends at least a PLX Spot-Check Measurement to the simulated PHG. 7. Check measurement(s) sent by PHD under test a. IF C_AG_BLE_037 = TRUE (PHD reports Device and Sensor Status) THEN • Check that "Device and Sensor Status field is present" Flag = 1 • Check that Device Sensor Status field reported in PLX Spot-Check Measurement is present, and is set to allowed values: bits 0 to 15 may be set to 0 o 1, Bits 16 to 23 are reserved for future use and must be set to 0 • Test Operator checks that the Device and Sensor Status value reported in the PLX Spot-Check Measurement is correct b. IF C_AG_BLE_037 = FALSE (PHD does not report Device and Sensor Status) THEN • Check that "Device and Sensor Status field is present" Flag = 0 • Check that Device and Sensor Status field is not reported
Pass/Fail criteria	In Step 7.a, values of Device and Sensor Status field are correct. In Step 7.b, Device and Sensor Status field is not present in any measurement.
Notes (to assist manual testing)	To receive PLX Spot-Check measurements from RACP characteristic, PHG enables indications on both PLX Spot-Check Measurement and Record Access Control Point characteristics. In order to enable indications, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications. Once both characteristics have been enabled for indications, PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value on the RACP characteristic. Once the PHG has performed such operation, an indication will arrive for each stored PLX Spot-Check measurement. Finally, an indication from the RACP characteristic will also arrive. When the measurement indications arrive, check the value of received ATT packets (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 2 (Device and Sensor Status field is present) is set to 1 IF C_AG_BLE_037 =

	TRUE 2. Bit 2 (Device and Sensor Status field is present) is set to 0 IF C_AG_BLE_037 = FALSE • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • Timestamp field (if present, 7 octets) • Measurement Status field (if present, 2 octets) • **Device and Sensor Status** field (**3 octets**) will be present IF C_AG_BLE_037 = TRUE. In that case, check in that field that: 1. Bits 16 to 23 are reserved for future use and are equal to 0. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Bits 0 to 15 may be 0 or 1. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 3. Check that received values match those actually transmitted. 4. Pulse Amplitude Index field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-025		
TP label		Whitepaper. RACP - PLX Spot-Check Measurement, Pulse Amplitude Index value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	PQ Numeric 8; M	
Test purpose		Check that: Pulse Amplitude Index field in PLX Spot-Check Measurement characteristic represents the measurement value acquired and temporarily stored by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033 AND C_AG_BLE_041		
Other PICS		C_AG_BLE_038		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Ask the operator to acquire at least a PLX Spot-Check measurement (the measurements shall be temporarily stored for later transmission). 2. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report stored records by performing a writing operation in the Record Access Control Point (RACP). 6. The PHD under test sends at least a PLX Spot-Check measurement. 7. Check measurement(s) sent by PHD under test a. IF C_AG_BLE_038 = TRUE (PHD reports Pulse Amplitude Index) THEN • Check that "Pulse Amplitude Index field is present" Flag = 1 • Check that Pulse Amplitude Index value reported in Pulse Amplitude Index field is coherent: 1(%) ≤ value ≤ 100(%) • Test Operator checks that the Pulse Amplitude Index value reported in the PLX Spot-Check Measurement is correct b. IF C_AG_BLE_038 = FALSE (PHD does not report Pulse Amplitude Index) THEN		

	• Check that "Pulse Amplitude Index field is present" Flag = 0
Pass/Fail criteria	In Step 7.a, values of Pulse Amplitude Index field are correct. In Step 7.b, Pulse Amplitude Index field is not present in any measurement.
Notes (to assist manual testing)	To receive PLX Spot-Check measurements from RACP characteristic, PHG enables indications on both PLX Spot-Check Measurement and Record Access Control Point characteristics. In order to enable indications, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications. Once both characteristics have been enabled for indications, PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value on the RACP characteristic. Once the PHG has performed such operation, an indication will arrive for each stored PLX Spot-Check measurement. Finally, an indication from the RACP characteristic will also arrive. When the measurement indications arrive, check the value of received ATT packets (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 3 (Pulse Amplitude Index field is present) is set to 1 IF C_AG_BLE_038 = TRUE 2. Bit 3 (Pulse Amplitude Index field is present) is set to 0 IF C_AG_BLE_038 = FALSE • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • Timestamp field (if present, 7 octets) • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • **Pulse Amplitude Index** field (**2 octets**) will be present IF C_AG_BLE_038 = TRUE. In that case, check in that field that: 1. It contains a value between 1 (0x0001) and 100 (0x0064). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received values match those actually transmitted.

TP Id		TP/LP-PAN/PHD/PHDTW/PLX/BV-026		
TP label		Whitepaper. RACP - PLX Spot-Check Measurement, Pulse Amplitude Index value unavailable		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	PQ Numeric 8; M	PQ Numeric 14; M
Test purpose		Check that: Pulse Amplitude Index field in PLX Spot-Check Measurement characteristic represents an unavailable value (e.g. due to a measurement or device error) using the special value NaN in temporarily stored measurements.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_032 AND C_AG_BLE_033 AND C_AG_BLE_038 AND C_AG_BLE_041		
Other PICS				

Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Ask the operator to acquire at least a PLX Spot-Check measurement including an unavailable value in the Pulse Amplitude Index field (e.g. simulating a measurement or device error). The measurement shall be temporarily stored for later transmission. All measurements stored shall have unavailable Pulse Amplitude Index values. 2. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report stored records by performing a writing operation in the Record Access Control Point (RACP). 6. The PHD under test sends at least PLX Spot-Check measurement with an unavailable value in the Pulse Amplitude Index field. 7. Check measurement(s) sent by PHD under test • Check that "Pulse Amplitude Index field is present" Flag = 1 • Check that Pulse Amplitude Index value reported in Pulse Amplitude Index field is equal to special value NaN (0x07FF) • Test Operator checks that the Pulse Amplitude Index value reported in the PLX Spot-Check Measurement is equal to special value NaN (0x07FF)
Pass/Fail criteria	In Step 7, values of Pulsatile Amplitude Index field are equal to special value NaN (0x07FF)
Notes (to assist manual testing)	To receive PLX Spot-Check measurements from RACP characteristic, PHG enables indications on both PLX Spot-Check Measurement and Record Access Control Point characteristics. In order to enable indications, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications. Once both characteristics have been enabled for indications, PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value on the RACP characteristic. Once the PHG has performed such operation, an indication will arrive for each stored PLX Spot-Check measurement. Finally, an indication from the RACP characteristic will also arrive. When the measurement indications arrive, check the value of received ATT packets (besides header and metadata). Fields and subfields will appear in the following order: • A **Flags** field (**1 octet**) will be present to indicate which optional fields are present. Check that: 1. Bit 3 (Pulse Amplitude Index field is present) is set to 1. 2. Bit 3 (Pulse Amplitude Index field is present) is set to 0. • Then, the SpO2PR-Spot-Check field (4 octets) will be present, with two subfields, SpO2 (2 octets) and PR (2 octets). Values are not relevant for this test case. • Timestamp field (if present, 7 octets) • Measurement Status field (if present, 2 octets) • Device and Sensor Status field (if present, 3 octets) • **Pulse Amplitude Index** field (**2 octets**) will be present. Check in that field that: 1. It contains the value 0x07FF. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first), so value will be received as (FF 07). 2. Check that received values match those actually transmitted.

A.9 Subgroup 1.4.8: Whitepaper continuous glucose monitoring requirements (CGM)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-000		
TP label		Whitepaper. CGM Measurement, CGM Glucose Concentration value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	Glucose Numeric 6; M	Glucose Numeric 8; M
Test purpose		Check that: CGM Glucose Concentration field in CGM Measurement characteristic represents the measurement value acquired by BLE PHD		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the Simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a CGM measurement to the simulated PHG. 5. Check the measurement sent by the PHD under test • Check that blood glucose concentration value reported in CGM Glucose Concentration field is coherent: 0(mg/dL) ≤ value ≤ 2700(mg/dL). • Test Operator checks that blood glucose concentration value reported in CGM Glucose Concentration field is correct.		
Pass/Fail criteria		In Step 5, the value of the CGM Glucose Concentration field is within the ranges specified in Test Procedure and the values are correct.		
Notes (to assist manual testing)		In order to enable notifications on the CGM Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. For this particular Test Case, the PHD is expected to send at least a CGM Measurement notification containing one CGM Measurement record to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **CGM Glucose Concentration** field (2 octets) will be present. Check that: 1. Value contained is between 0 (0x0000) and 100 (0x0A8C). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received value match that actually transmitted. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet)		

	3. Status-Octet (if present, 1 octet) • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-001		
TP label		Whitepaper. CGM Measurement, CGM Glucose Concentration value below device capabilities		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	Glucose Numeric 9; M	
Test purpose		Check that: If the CGM Measurement is below device capabilities, value of the CGM Glucose Concentration field shall be -INFINITY.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a CGM measurement below device capabilities to the simulated PHG. 5. Check the measurement sent by the PHD under test • Check that blood glucose concentration value reported in CGM Glucose Concentration field is -INFINITY (0x0802) • Test Operator checks that blood glucose concentration value is -INFINITY (0x0802)		
Pass/Fail criteria		In Step 5, value of CGM Glucose Concentration field is below device capabilities and it is represented as –INIFINITY (0x0802).		
Notes (to assist manual testing)		In order to enable notifications on the CGM Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. For this particular Test Case, the PHD is expected to send at least a CGM Measurement notification containing one CGM Measurement record to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **CGM Glucose Concentration** field (2 octets) will be present. Check that: 1. Value contained is (0x0802). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first).		

	2. Check that received value match that actually transmitted. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet). If present, bit 6 of this octet (22 of total) shall be set to 1. • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-002		
TP label		Whitepaper. CGM Measurement, CGM Glucose Concentration value above device capabilities		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	Glucose Numeric 9; M	
Test purpose		Check that: If the CGM Measurement is above device capabilities, value of the CGM Glucose Concentration field shall be +INFINITY.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a CGM measurement above device capabilities to the simulated PHG. 5. Check the measurement sent by the PHD under test • Check that blood glucose concentration value reported in CGM Glucose Concentration field is +INFINITY (0x07FE) • Test Operator checks that blood glucose concentration value is +INFINITY (0x07FE)		
Pass/Fail criteria		In Step 5, value of CGM Glucose Concentration field is above device capabilities and it is represented as +INFINITY (0x07FE).		
Notes (to assist manual testing)		In order to enable notifications on the CGM Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. For this particular Test Case, the PHD is expected to send at least a CGM Measurement notification containing one CGM Measurement record to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and		

	metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **CGM Glucose Concentration** field (2 octets) will be present. Check that: 1. Value contained is (0x07FE). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received value match that actually transmitted. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet). If present, bit 7 of this octet (23 of total) shall be set to 1. • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-003		
TP label		Whitepaper. CGM Measurement, CGM Glucose Concentration special values		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	Glucose Numeric 10; M	
Test purpose		Check that: Device reports a NaN or NRes value in the CGM Glucose Concentration field of the CGM Measurement characteristic to signal some problem during measurement.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test shall simulate some problem during measurement and send the CGM measurement using a special value to the simulated PHG. 5. Check the measurement sent by the PHD under test • Check that blood glucose concentration value reported in CGM Glucose Concentration field is set to NaN (0x0FF) or NRes (0x0800). • Test Operator checks that blood glucose concentration value reported in CGM Glucose Concentration field is one of the mentioned above due to a measurement problem.		
Pass/Fail criteria		In Step 5, value of CGM Glucose Concentration field is set to NaN (0x0FF) or NRes		

	(0x0800) due to a measurement error.
Notes **(to assist manual testing)**	In order to enable notifications on the CGM Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. For this particular Test Case, the PHD is expected to send at least a CGM Measurement notification containing one CGM Measurement record with a measurement error to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **CGM Glucose Concentration** field (2 octets) will be present. Check that: 1. Value contained is (0x0FF) or (0x0800). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received value match that actually transmitted. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet) • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-004		
TP label		Whitepaper. CGM Measurement, Time Offset value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	BaseOffset 3; M	Glucose Numeric 7; M	
Test purpose		Check that: Time offset field of the CGM Measurement characteristic specifies the relative time difference of the single CGM value to the session start time in minutes.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The PHD under test sends a CGM measurement to the simulated PHG. 5. Check the measurement sent by the PHD under test		

	• Check value reported in Time Offset field (0x0000-0xFFFF) (uint16). • Test Operator checks that time offset value in minutes specifies the relative time difference of the single CGM value to the session start time in minutes.
Pass/Fail criteria	In Step 5, value of Time Offset field specifies the relative time difference of the single CGM value to the session start time as an uint16 (0x0000-0xFFFF) in minutes.
Notes **(to assist manual testing)**	In order to enable notifications on the CGM Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. For this particular Test Case, the PHD is expected to send at least a CGM Measurement notification containing one CGM Measurement record to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the CGM Glucose Concentration field (2 octets) will be present. • **Time Offset field** (2 octets). Check that: 1. The received value match that actually transmitted. • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet) • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-005		
TP label		Whitepaper. CGM Measurement, Sensor Status Annunciation value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Glucose Numeric 5; M		
Test purpose		Check that: If Sensor Status Annunciation field is sent in CGM Measurement, its length and value are correct.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS		C_AG_BLE_043		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test		

	(Connection state). 4. The PHD under test sends a CGM Measurement to the simulated PHG. 5. Check the measurement sent by the PHD under test a. IF C_AG_BLE_043 = TRUE (CGM PHD reports Sensor Status Annunciation) THEN • One of more of flags 5 (Sensor Status Annunciation field, Warning-Octet present), 6 (Sensor Status Annunciation field, Cal/Temp-Octet present) or 7 (Sensor Status Annunciation field, Status-Octet present) are set to 1. • Check that: ▪ If flag 5 is set to 1, then Sensor Status Annunciation Warning-Octet field is present (bits 0 to 7) and at least one bit is set to 1. Bits 6 and 7 shall be set to 0 (reserved for future use). Rest of bits may be set to 0 or 1. ▪ If flag 6 is set to 1, then Sensor Status Annunciation Cal/Temp-Octet field is present (bits 8 to 15) and at least one bit is set to 1. Bits 14 and 15 shall be set to 0 (reserved for future use). Rest of bits may be set to 0 or 1. ▪ If flag 7 is set to 1, then Sensor Status Annunciation Status-Octet field is present (bits 16 to 23) and at least one bit is set to 1. Bits may be set to 0 or 1. • Test Operator checks that the Sensor Status Annunciation field value and size reported in the CGM Measurement are correct b. IF C_AG_BLE_043 = FALSE (CGM PHD does not report Sensor Status Annunciation) THEN • Check that flags 5, 6 and 7 are set to 0. • Check that Sensor Status Annunciation octets are not reported
Pass/Fail criteria	• In Step 5.a, value and size of the Sensor Status Annunciation field are as specified according to value of Flags field. • In Step 5.b, flags 5, 6 and 7 are set to 0 and Sensor Status Annunciation field is not present.
Notes **(to assist manual testing)**	In order to enable notifications on the CGM Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. For this particular Test Case, the PHD is expected to send at least a CGM Measurement notification containing one CGM Measurement record to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A **Flags** field (1 octet) will be present to indicate which optional fields are present. Check value of flags 5, 6 and 7. • Then, the CGM Glucose Concentration field (2 octets) will be present. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets). Check that (note that bytes will be transmitted using little endian order (i.e., the least significant octet first): 1. If flag 5 is set to 1, then Warning-Octet is present. If present, bits 0-5 may be set to 0 or 1 and bits 6-7 shall be set to 0. If present, at least one bit shall be set to 1. 2. If flag 6 is set to 1, then Cal/Temp-Octet is present. If present, bits 8-13 may be set to 0 or 1 and bits 14-15 shall be set to 0. If present, at least one bit shall be set to 1. 3. If flag 7 is set to 1, then Status-Octet is present. If present, bits 16-23 may be set to 0 or 1. If present, at least one bit shall be set to 1. • CGM Trend Information field (if present, 2 octets)

	• CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-006		
TP label		Whitepaper. CGM Measurement, CGM Trend Information value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	GT Numeric 7; M		
Test purpose		Check that: If CGM Trend Information field is sent in CGM Measurement, its value is correct.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS		C_AG_BLE_044		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. PHD under test sends a CGM Measurement to the simulated PHG. 5. Check the measurement sent by the PHD under test a. IF C_AG_BLE_044 = TRUE (CGM PHD reports Glucose Trend Information) THEN • Flag 0 (CGM Trend Information present) is set to 1. • CGM Trend Information field is present as an SFLOAT value in (mg/dL)/min units. • Test Operator checks that the CGM Trend Information field value reported in the CGM Measurement is correct b. IF C_AG_BLE_044 = FALSE (CGM PHD does not report Glucose Trend Information) THEN • Check that flag 0 is set to 0. • Check that CGM Trend Information field is not reported		
Pass/Fail criteria		• In Step 5.a, flag 0 is set to 1, CGM Trend Information field is reported and its value is correct. • In Step 5.b, flags 0 is set to 0 and the CGM Trend Information field is not reported.		
Notes (to assist manual testing)		In order to enable notifications on the CGM Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. For this particular Test Case, the PHD is expected to send at least a CGM Measurement notification containing one CGM Measurement record to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field).		

	• A **Flags** field (1 octet) will be present to indicate which optional fields are present. Check value of flag 0. • Then, the CGM Glucose Concentration field (2 octets) will be present. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet) • CGM Trend Information field (if present, 2 octets). Check that: 1. If flag 0 is set to 1, this field is present and it is set to the reported value (SFLOAT, (mg/dL)/min). • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-007		
TP label		Whitepaper. CGM Status. Time Offset value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	CGM Enumeration 4; M	PHDM Enumeration 5; M	
Test purpose		Check that: Time offset field of the CGM Status characteristic specifies the actual relative time difference to the session start time.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG reads the CGM Status characteristic. 5. Check the CGM Status characteristic: • Check value of the Time Offset field (0x0000-0xFFFF) (uint16). • Test Operator checks that time offset value in minutes specifies the actual relative time to the session start time		
Pass/Fail criteria		Value of Time Offset field matches the actual relative time difference in minutes to the session start time.		
Notes (to assist manual testing)		To read the CGM Status characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2AA9. PHG will then receive a Read Response. Check ATT packet value in the received response. Fields will appear in the following order: • **Time Offset field** (2 octets) will be present. Check that: 1. Its value (uint16) matches the actual relative time difference in minutes to the		

	session start time. • CGM Status field (3 octets) will be present. • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-008		
TP label		Whitepaper. CGM Status. CGM Status value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	CGM Enumeration 4; M	PHDM Enumeration 5; M	
Test purpose		Check that: CGM Status field of the CGM Status characteristic allows the collector to request the current status from the CGM Sensor and its value and format are correct.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The Simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG reads the CGM Status characteristic. 5. Check the CGM Status characteristic: • Check value of the CGM Status field (24 bits). Bits 6-7 and 14-15 shall be set to 0 (reserved for future use). Rest of bits may be set to 0 or 1. • Test Operator checks that CGM Status field matches the current status of the CGM Sensor.		
Pass/Fail criteria		Value of CGM Status field matches the current status of the CGM Sensor and its format is correct.		
Notes (to assist manual testing)		To read the CGM Status characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2AA9. PHG will then receive a Read Response. Check ATT packet value in the received response. Fields will appear in the following order: • Time Offset field (2 octets) will be present. • **CGM Status field** (3 octets) will be present. Check that: 1. Bits 6-7 and 14-15 shall be set to 0 (reserved for future use). Rest of bits may be set to 0 or 1. 2. Value matches the current status of the CGM Sensor. • E2E-CRC field (if present, 2 octets)		

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-009
TP label		Whitepaper. CGM Session Start Time. Session Start Time value
Coverage	**Spec**	[Bluetooth PHDT v1.6]

<table>
<tr><td></td><td rowspan="5">Testable items</td><td>Glucose Numeric 7; M</td><td>SensCal Numeric 11; M</td><td>SRT Numeric 5; M</td></tr>
<tr><td>GT Numeric 6; M</td><td>PLH Numeric 9; M</td><td>DHH Numeric 9; M</td></tr>
<tr><td>GRC Numeric 9; M</td><td>PHDM Enumeration 5; M</td><td>CGM Enumeration 4; M</td></tr>
<tr><td>Date-Time Conv 1; M</td><td></td><td></td></tr>
<tr><td colspan="2">Test purpose</td><td colspan="3">Check that:
Session Start Time field in CGM Session Start Time characteristic represents the time of the initial CGM measurement.</td></tr>
<tr><td colspan="2">Applicability</td><td colspan="3">C_AG_BLE_000 AND C_AG_BLE_042</td></tr>
<tr><td colspan="2">Other PICS</td><td colspan="3"></td></tr>
<tr><td colspan="2">Initial condition</td><td colspan="3">The PHD under test and the simulated PHG are in Standby state.</td></tr>
<tr><td colspan="2">Test procedure</td><td colspan="3">1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state).
2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state).
3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state).
4. The simulated PHG reads the CGM Session Start Time characteristic.
5. Check the CGM Session Start Time characteristic:
• Check that the values of the subfields of the the Session Start Time field are coherent:
- Year: 1900 ≤ value ≤ 2100 OR value = 0
- Month: 1 ≤ value ≤ 12 OR value = 0
- Day: 1 ≤ value ≤ 31 OR value = 0
- Hours: 0 ≤ value ≤ 23
- Minutes: 0 ≤ value ≤ 59
- Seconds: 0 ≤ value ≤ 59
• Test Operator checks that the value of the Session Start Time field is correct.</td></tr>
<tr><td colspan="2">Pass/Fail criteria</td><td colspan="3">Value of the Session Start Time field is within the range specified in the Test Procedure and the value is correct.</td></tr>
<tr><td colspan="2">Notes
(to assist manual testing)</td><td colspan="3">To read the CGM Session Start Time characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2AAA. PHG will then receive a Read Response. Check ATT packet value in the received response. Fields will appear in the following order:
• Session Start Time field (7 octets) will be present. Check that:
1. First 2 octets (Year) are between 1900 (0x076C) and 2100 (0x0834) OR they are equal to 0x0000. Note that bytes will be transmitted using little endian order (i.e., the least significant octet first).
2. Month (1 octet) will be between 1 (0x01) and 12 (0x0C) OR equal to 0 (0x00).
3. Day (1 octet) will be between 1 (0x01) and 31 (0x1F) OR equal to 0 (0x00).
4. Hour (1 octet) will be between 0 (0x00) and 23 (0x17).
5. Minute (1 octet) will be between 0 (0x00) and 59 (0x3B).
6. Second (1 octet) will be between 0 (0x00) and 59 (0x3B).
7. Check that values match those actually written to the characteristic.
• Time Zone field (1 octet) will be present.</td></tr>
</table>

	• DST-Offset field (1 octet) will be present. • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-010		
TP label		Whitepaper. CGM Session Run Time. CGM Session Run Time value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	SRT Numeric 6; M		
Test purpose		Check that: CGM Session Run Time field in CGM Session Run Time characteristic represents the expected run time of the CGM session in a correct format.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG reads the CGM Session Run Time characteristic. 5. Check the CGM Session Run Time characteristic: • Check the value (hours) of the CGM Session Run Time field (uint16) • Test Operator checks that the value of the Session Run Time field is correct.		
Pass/Fail criteria		Value of the CGM Session Run Time field represents the number of hours expected for a CGM session.		
Notes (to assist manual testing)		To read the CGM Session Run Time characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2AAB. PHG will then receive a Read Response. Check ATT packet value in the received response. Fields will appear in the following order: • **CGM Session Run Time field** (2 octets) will be present. Check: 1. Field value as an uint16 (hours) 2. Check that read value matches correct field value. • E2E-CRC field (if present, 2 octets)		

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-011		
TP label		Whitepaper. CGM Feature. CGM Measurement		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	CGM Feature 1; M	CGM Feature 2; C	
Test purpose		Check that:		

	CGM Feature characteristic and CGM Measurement fields are coherent.
Applicability	C_AG_BLE_000 AND C_AG_BLE_042
Other PICS	
Initial condition	The PHD under test and the simulated PHG are in Standby state.
Test procedure	1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG reads the CGM Feature characteristic. 5. The PHD under test sends a CGM Measurement to the simulated PHG. 6. In the CGM Feature field of CGM Feature characteristic: a. Check Calibration support bit b. Check Patient High/Low Alerts support bit. c. Check Hypo Alerts support bit. d. Check Hyper Alerts support bit. e. Check Rate of Increase/Decrease Alerts support bit. f. Check Device Specific Alert support bit. g. Check Sensor Malfunction Detection support bit. h. Check Sensor Temperature High-Low Detection support bit. i. Check Sensor Result High-Low Detection support bit. j. Check Low Battery Detection support bit. k. Check Sensor Type Error Detection support bit. l. Check General Device Fault support bit. m. Check CGM Trend Information support bit. n. Check that bits 17-23 are 0 (Reserved for future use) 7. In CGM Measurement, if Sensor Status Annunciation field Status Octet is present: a. Check bit 1 (Device Battery Low) b. Check bit 2 (Sensor Type Incorrect for Device) c. Check bit 3 (Sensor Malfunction) d. Check bit 4 (Device Specific Alert) e. Check bit 5 (General Device Fault has occurred in the sensor) 8. In CGM Measurement, if Sensor Status Annunciation field Cal/Temp Octet is present: a. Check bit s 9-11 (Calibration not allowed, calibration recommended and calibration required) b. Check bits 12-13 (Sensor Temperature too high for valid test/result at time of measurement, Sensor Temperature too low for valid test/result at time of measurement) 9. In CGM Measurement, if Sensor Status Annunciation field Warning Octet is present: a. Check bits 16-17 (Sensor result lower than the Patient Low level and Sensor result higher than the Patient High Level). b. Check bit 18 (Sensor result lower than the Hypo Level) c. Check bit 19 (Sensor result higher than the Hyper Level) d. Check bits 20-21 (Sensor Rate of Decrease exceeded and Sensor Rate of

	Increase exceeded). e. Check bits 22-23 (Sensor result lower than the device can process and Sensor result higher than the device can process). 10. In CGM Measurement a. Check if CGM Trend Information field is reported
Pass/Fail criteria	In Step 7: • If Low Battery Detection support bit is set to 1 (6.j), Device Battery Low bit (1) may be set to 1, else it is set to 0. • If Sensor Type Error Detection support bit is set to 1 (6.k), Sensor Type Incorrect for Device bit (2) may be set to 1, else it is set to 0. • If Sensor Malfunction Detection support bit is set to 1 (6.g), Sensor Malfunction bit (3) may be set to 1, else it is set to 0. • If Device Specific Alert support bit is set to 1 (6.f), Device Specific Alert bit (4) may be set to 1, else it is set to 0. • If General Device Fault support bit is set to 1 (6.l), General Device Fault has occurred in the sensor bit (5) may be set to 1, else it is set to 0. In Step 8: • If Calibration support bit is set to 1 (6.a), one of bits 9-11 (Calibration not allowed, calibration recommended and calibration required) may be set to 1, else they are set to 0. • If Sensor Temperature High-Low Detection support bit is set to 1 (6.h), one of bits 12-13 (Sensor Temperature too high for valid test/result at time of measurement, Sensor Temperature too low for valid test/result at time of measurement) may be set to 1, else they are set to 0. In Step 9: • If Patient High/Low Alerts support bit is set to 1 (6.b), one of bits 16-17 (Sensor result lower than the Patient Low level and Sensor result higher than the Patient High Level) may be set to 1, else they are set to 0. • If Hypo Alerts support bit is set to 1 (6.c), Sensor result lower than the Hypo Level bit (18) may be set to 1, else it is set to 0. • If Hyper Alerts support bit is set to 1 (6.d), Sensor result higher than the Hyper Level bit (20) may be set to 1, else it is set to 0. • If Rate of Increase/Decrease Alerts support bit is set to 1 (6.e), one of bits 20-21 (Sensor Rate of Decrease exceeded and Sensor Rate of Increase exceeded) may be set to 1, else they are set to 0. • If Sensor Result High-Low Detection support bit is set to 1 (6.i), one of bits 22-23 (Sensor result lower than the device can process and Sensor result higher than the device can process) may be set to 1, else they are set to 0. In Step 10: • If CGM Trend Information support bit is set to 1 (6.m), CGM Trend Information field may be present, else it is not present.
Notes **(to assist manual testing)**	To read CGM Feature characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2AA8. PHG will then receive a Read Response. Check ATT packet value in the received response: • **CGM Feature** field will be present (3 octets), and it indicates features support and optional fields present. Note that bytes will be transmitted using little endian order (i.e. the least significant octet first). 1. Check support bits as stated above. 2. Check that bits 17-23 are 0 (reserved for future use). • CGM Type field (4 bits) will be present. • CGM Sample Location field (4 bits) will be present. • E2E-CRC field (2 octets) will be present.

	In order to enable notifications on the CGM Measurement characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for notifications. For this particular Test Case, the PHD is expected to send at least a CGM Measurement notification containing one CGM Measurement record to the PHG to check the required fields. When the notification arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. • Then, the CGM Glucose Concentration field (2 octets) will be present. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet). Check bits as stated in step 7. 2. Cal/Temp-Octet (if present, 1 octet). Check bits as stated in step 8. 3. Status-Octet (if present, 1 octet). Check bits as stated in step 9. • CGM Trend Information field (if present, 2 octets). Check that: 1. If CGM Trend Information support bit 1 in CGM Feature characteristic, this field may be present and if so, it is set to the reported value (SFLOAT, (mg/dL)/min). If CGM Trend Information support bit is set to 0 this field shall not be present. • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-012		
TP label		Whitepaper. CGM Feature. CGM Status		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	CGM Feature 1; M	CGM Feature 3; C	
Test purpose		Check that: CGM Feature and CGM Status characteristics are coherent.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG reads the CGM Feature characteristic. 5. The simulated PHG reads the CGM Status characteristic. 6. In the CGM Feature field of CGM Feature characteristic: a. Check Calibration support bit		

	b. Check Patient High/Low Alerts support bit. c. Check Hypo Alerts support bit. d. Check Hyper Alerts support bit. e. Check Rate of Increase/Decrease Alerts support bit. f. Check Device Specific Alert support bit. g. Check Sensor Malfunction Detection support bit. h. Check Sensor Temperature High-Low Detection support bit. i. Check Sensor Result High-Low Detection support bit. j. Check Low Battery Detection support bit. k. Check Sensor Type Error Detection support bit. l. Check General Device Fault support bit. m. Check that bits 17-23 are 0 (Reserved for future use) 7. In CGM Status characteristic: a. Check bit 1 (Device Battery Low) b. Check bit 2 (Sensor Type Incorrect for Device) c. Check bit 3 (Sensor Malfunction) d. Check bit 4 (Device Specific Alert) e. Check bit 5 (General Device Fault has occurred in the sensor) f. Check bit s 9-11 (Calibration not allowed, calibration recommended and calibration required) g. Check bits 12-13 (Sensor Temperature too high for valid test/result at time of measurement, Sensor Temperature too low for valid test/result at time of measurement) h. Check bits 16-17 (Sensor result lower than the Patient Low level and Sensor result higher than the Patient High Level). i. Check bit 18 (Sensor result lower than the Hypo Level) j. Check bit 19 (Sensor result higher than the Hyper Level) k. Check bits 20-21 (Sensor Rate of Decrease exceeded and Sensor Rate of Increase exceeded). l. Check bits 22-23 (Sensor result lower than the device can process and Sensor result higher than the device can process).
Pass/Fail criteria	In Step 7: • If Low Battery Detection support bit is set to 1 (6.j), Device Battery Low bit (1) may be set to 1, else it is set to 0. • If Sensor Type Error Detection support bit is set to 1 (6.k), Sensor Type Incorrect for Device bit (2) may be set to 1, else it is set to 0. • If Sensor Malfunction Detection support bit is set to 1 (6.g), Sensor Malfunction bit (3) may be set to 1, else it is set to 0. • If Device Specific Alert support bit is set to 1 (6.f), Device Specific Alert bit (4) may be set to 1, else it is set to 0. • If General Device Fault support bit is set to 1 (6.l), General Device Fault has occurred in the sensor bit (5) may be set to 1, else it is set to 0. • If Calibration support bit is set to 1 (6.a), one of bits 9-11 (Calibration not allowed, calibration recommended and calibration required) may be set to 1, else they are set to 0. • If Sensor Temperature High-Low Detection support bit is set to 1 (6.h), one of bits 12-13 (Sensor Temperature too high for valid test/result at time of measurement, Sensor Temperature too low for valid test/result at time of measurement) may be set to 1, else they are set to 0.

	• If Patient High/Low Alerts support bit is set to 1 (6.b), one of bits 16-17 (Sensor result lower than the Patient Low level and Sensor result higher than the Patient High Level) may be set to 1, else they are set to 0. • If Hypo Alerts support bit is set to 1 (6.c), Sensor result lower than the Hypo Level bit (18) may be set to 1, else it is set to 0. • If Hyper Alerts support bit is set to 1 (6.d), Sensor result higher than the Hyper Level bit (20) may be set to 1, else it is set to 0. • If Rate of Increase/Decrease Alerts support bit is set to 1 (6.e), one of bits 20-21 (Sensor Rate of Decrease exceeded and Sensor Rate of Increase exceeded) may be set to 1, else they are set to 0. • If Sensor Result High-Low Detection support bit is set to 1 (6.i), one of bits 22-23 (Sensor result lower than the device can process and Sensor result higher than the device can process) may be set to 1, else they are set to 0.
Notes (to assist manual testing)	To read CGM Feature characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2AA8. PHG will then receive a Read Response. Check ATT packet value in the received response: • **CGM Feature** field will be present (3 octets), and it indicates features support and optional fields present. Note that bytes will be transmitted using little endian order (i.e. the least significant octet first). 1. Check support bits as stated above. 2. Check that bits 17-23 are 0 (reserved for future use). • CGM Type field (4 bits) will be present. • CGM Sample Location field (4 bits) will be present. • E2E-CRC field (2 octets) will be present. To read the CGM Status characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2AA9. PHG will then receive a Read Response. Check ATT packet value in the received response. Fields will appear in the following order: • Time Offset field (2 octets) will be present. • **CGM Status field** (3 octets) will be present. Check that: 1. Check bits as stated in step 7. • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-013		
TP label		Whitepaper. CGM Feature. Type and Sample Location		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Glucose Numeric 2; M	Glucose Numeric 3; M	
Test purpose		Check that: CGM Type and CGM Sample Location fields of the CGM Feature characteristic are present in CGM Feature characteristic and set to a correct value.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state).		

	2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG reads the CGM Feature characteristic. 5. In the CGM Feature characteristic: • Check value of CGM Type field (4bit). • Check value of CGM Sample Location field (4bit). • Test Operator checks that read values are correct.
Pass/Fail criteria	In Step 5: • CGM Type field value is one of {0x1, 0x2, 0x3, 0x4, 0x5, 0x6, 0x7, 0x8, 0x9, 0xA}. • CGM Sample Location field value is one of {0x1, 0x2, 0x3, 0x4, 0x5, 0xF}. • Values are correct
Notes (to assist manual testing)	To read CGM Feature characteristic, PHG shall perform a "Read Characteristic Value" GATT sub-procedure on characteristic with UUID 0x2AA8. PHG will then receive a Read Response. Check ATT packet value in the received response: • **CGM Feature** field will be present (3 octets), and it indicates features support and optional fields present. • **CGM Type** field (4 bits) will be present. Check that: 1. Value is one of the values stated above 2. Value is correct. • **CGM Sample Location** field (4 bits) will be present. Check that: 1. Value is one of the values stated above 2. Value is correct. • E2E-CRC field (2 octets) will be present.

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-014		
TP label		Whitepaper. RACP. CGM Measurement, CGM Glucose Concentration value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 1; C	Glucose Numeric 6; M	Glucose Numeric 8; M
Test purpose		Check that: CGM Glucose Concentration field in CGM Measurement characteristic represents the measurement value acquired by BLE PHD and temporarily stored using RACP characteristic.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test and acquire at least a CGM Measurement. The measurements shall be temporarily stored for later transmission. 2. Configure the PHD under test as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state).		

	4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report all stored records by performing a writing operation in the Record Access Control Point (RACP) characteristic. 6. The PHD under test sends at least a CGM Measurement notification to the simulated PHG. 7. Check measurement(s) sent by the PHD under test: • Check that blood glucose concentration value reported in CGM Glucose Concentration field is coherent: 0 (mg/dL) ≤ value ≤ 2700 (mg/dL). • Test Operator checks that blood glucose concentration value reported in CGM Glucose Concentration field is correct.
Pass/Fail criteria	In Step 7, value of CGM Glucose Concentration field is within the ranges specified in Test Procedure and the values are correct.
Notes **(to assist manual testing)**	To receive temporarily stored CGM Measurements from the PHD under test, simulated PHG shall enable notifications on the CGM Measurement characteristic and indications on the Record Access Control Point (RACP) characteristic. In order to enable indications/notifications, simulated PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications/notifications. Once CGM Measurement characteristic has been enabled for notifications and Record Access Control Point characteristic has been enabled for indications, simulated PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value to the RACP characteristic. Once the PHG has performed such operation, a notification will arrive for each stored CGM Measurement. Finally, an indication from the RACP characteristic will also arrive. When the CGM Measurement notifications arrive, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **CGM Glucose Concentration** field (2 octets) will be present. Check that: 1. Value contained is between 0 (0x0000) and 100 (0x0A8C). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received value match that actually transmitted. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet) • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id	TP/LP-PAN/PHD/PHDTW/CGM/BV-015
TP label	Whitepaper. RACP. CGM Measurement, CGM Glucose Concentration value below device capabilities

Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	Glucose Numeric 9; M	
Test purpose		Check that: If a temporarily stored CGM Measurement is below device capabilities, value of the CGM Glucose Concentration field shall be -INFINITY.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test and acquire at least a CGM Measurement with a value below device capabilities. The measurements shall be temporarily stored for later transmission. 2. Configure the PHD under test as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report all stored records by performing a writing operation in the Record Access Control Point (RACP) characteristic. 6. The PHD under test sends at least a CGM Measurement notification to the simulated PHG. 7. Check the measurements sent by the PHD under test • Check that blood glucose concentration value reported in CGM Glucose Concentration field is -INFINITY (0x0802) • Test Operator checks that blood glucose concentration value in CGM Glucose Concentration field is -INFINITY (0x0802)		
Pass/Fail criteria		In Step 7, value of CGM Glucose Concentration field is below device capabilities and it is represented as –INIFINITY (0x0802).		
Notes (to assist manual testing)		To receive temporarily stored CGM Measurements from the PHD under test, simulated PHG shall enable notifications on the CGM Measurement characteristic and indications on the Record Access Control Point (RACP) characteristic. In order to enable indications/notifications, simulated PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications/notifications. Once CGM Measurement characteristic has been enabled for notifications and Record Access Control Point characteristic has been enabled for indications, simulated PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value to the RACP characteristic. Once the PHG has performed such operation, a notification will arrive for each stored CGM Measurement. Finally, an indication from the RACP characteristic will also arrive. When the CGM Measurement notifications arrive, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **CGM Glucose Concentration** field (2 octets) will be present. Check that:		

	1. Value contained is (0x0802). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received value match that actually transmitted. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet). If present, bit 6 of this octet (22 of total) shall be set to 1. • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-016		
TP label		Whitepaper. RACP. CGM Measurement, CGM Glucose Concentration value above device capabilities		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	Glucose Numeric 9; M	
Test purpose		Check that: If a temporarily stored CGM Measurement is above device capabilities, value of the CGM Glucose Concentration field shall be +INFINITY.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test and acquire at least a CGM Measurement with a value above device capabilities. The measurements shall be temporarily stored for later transmission. 2. Configure the PHD under test as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report all stored records by performing a writing operation in the Record Access Control Point (RACP) characteristic. 6. The PHD under test sends at least a CGM Measurement notification to the simulated PHG. 7. Check the measurements sent by the PHD under test • Check that blood glucose concentration value reported in CGM Glucose Concentration field is +INFINITY (0x07FE) • Test Operator checks that blood glucose concentration value in CGM Glucose Concentration field is +INFINITY (0x07FE)		
Pass/Fail criteria		In Step 7, value of CGM Glucose Concentration field is above device capabilities and it is represented as +INFINITY (0x07FE).		

Notes (to assist manual testing)	To receive temporarily stored CGM Measurements from the PHD under test, simulated PHG shall enable notifications on the CGM Measurement characteristic and indications on the Record Access Control Point (RACP) characteristic. In order to enable indications/notifications, simulated PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications/notifications. Once CGM Measurement characteristic has been enabled for notifications and Record Access Control Point characteristic has been enabled for indications, simulated PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value to the RACP characteristic. Once the PHG has performed such operation, a notification will arrive for each stored CGM Measurement. Finally, an indication from the RACP characteristic will also arrive. When the CGM Measurement notifications arrive, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **CGM Glucose Concentration** field (2 octets) will be present. Check that: 1. Value contained is (0x07FE). Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received value match that actually transmitted. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet). If present, bit 7 of this octet (23 of total) shall be set to 1. • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-017		
TP label		Whitepaper. RACP. CGM Measurement, CGM Glucose Concentration special values		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Short Float Type 2; M	Glucose Numeric 10; M	
Test purpose		Check that: Device reports a NaN or NRes value in the CGM Glucose Concentration field of the CGM Measurement characteristic to signal some problem during measurement in temporarily stored measurements.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test and acquire at least a CGM Measurement with a special		

	value simulating a problem during measurement. The measurements shall be temporarily stored for later transmission. 2. Configure the PHD under test as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report all stored records by performing a writing operation in the Record Access Control Point (RACP) characteristic. 6. The PHD under test sends at least a CGM Measurement notification to the simulated PHG. 7. Check measurements sent by the PHD under test • Check that blood glucose concentration value reported in CGM Glucose Concentration field is set to NaN (0x0FF) or NRes (0x0800). • Test Operator checks that blood glucose concentration value reported in CGM Glucose Concentration field is one of the mentioned above due to a measurement problem.
Pass/Fail criteria	In Step 7, value of CGM Glucose Concentration field is set to NaN (0x0FF) or NRes (0x0800) due to a measurement error.
Notes (to assist manual testing)	To receive temporarily stored CGM Measurements from the PHD under test, simulated PHG shall enable notifications on the CGM Measurement characteristic and indications on the Record Access Control Point (RACP) characteristic. In order to enable indications/notifications, simulated PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications/notifications. Once CGM Measurement characteristic has been enabled for notifications and Record Access Control Point characteristic has been enabled for indications, simulated PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value to the RACP characteristic. Once the PHG has performed such operation, a notification will arrive for each stored CGM Measurement. Finally, an indication from the RACP characteristic will also arrive. When the CGM Measurement notifications arrive, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its content is not relevant in this test case. • Then, the **CGM Glucose Concentration** field (2 octets) will be present. Check that: 1. Value contained is (0x0FF) or (0x0800).Note that bytes will be transmitted using little endian order (i.e., the least significant octet first). 2. Check that received value match that actually transmitted. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet) • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-018		
TP label		Whitepaper. RACP. CGM Measurement, Time Offset value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	BaseOffset 3; M	Glucose Numeric 7; M	
Test purpose		Check that: Time offset field of the temporarily stored CGM Measurements specifies the relative time difference of the single CGM value to the session start time in minutes.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test and acquire at least a CGM Measurement. The measurements shall be temporarily stored for later transmission. 2. Configure the PHD under test as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report all stored records by performing a writing operation in the Record Access Control Point (RACP) characteristic. 6. The PHD under test sends at least a CGM Measurement notification to the simulated PHG. 7. Check the measurements sent by the PHD under test • Check value reported in Time Offset field (0x0000-0xFFFF) (uint16). • Test Operator checks that time offset value in minutes specifies the relative time difference of the single CGM value to the session start time in minutes.		
Pass/Fail criteria		In Step 7, value of Time Offset field specifies the relative time difference of the single CGM value to the session start time as an uint16 (0x0000-0xFFFF) in minutes.		
Notes (to assist manual testing)		To receive temporarily stored CGM Measurements from the PHD under test, simulated PHG shall enable notifications on the CGM Measurement characteristic and indications on the Record Access Control Point (RACP) characteristic. In order to enable indications/notifications, simulated PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications/notifications. Once CGM Measurement characteristic has been enabled for notifications and Record Access Control Point characteristic has been enabled for indications, simulated PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value to the RACP characteristic. Once the PHG has performed such operation, a notification will arrive for each stored CGM Measurement. Finally, an indication from the RACP characteristic will also arrive. When the CGM Measurement notifications arrive, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A Flags field (1 octet) will be present to indicate which optional fields are present. Its		

	content is not relevant in this test case. • Then, the CGM Glucose Concentration field (2 octets) will be present. • **Time Offset** field (2 octets). Check that: 1. The received value match that actually transmitted. • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet) • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-019		
TP label		Whitepaper. RACP. CGM Measurement, Sensor Status Annunciation value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	Glucose Numeric 5; M		
Test purpose		Check that: If Sensor Status Annunciation field is included in temporarily stored CGM Measurements, its length and value are correct.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS		C_AG_BLE_043		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test and acquire at least a CGM Measurement. The measurements shall be temporarily stored for later transmission. 2. Configure the PHD under test as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report all stored records by performing a writing operation in the Record Access Control Point (RACP) characteristic. 6. The PHD under test sends at least a CGM Measurement notification to the simulated PHG. 7. Check measurements sent by the PHD under test a. IF C_AG_BLE_043 = TRUE (CGM PHD reports Sensor Status Annunciation) THEN • One of more of flags 5 (Sensor Status Annunciation field, Warning-Octet present), 6 (Sensor Status Annunciation field, Cal/Temp-Octet present) or 7 (Sensor Status Annunciation field, Status-Octet present) are set to 1. • Check that: ▪ If flag 5 is set to 1, then Sensor Status Annunciation Warning-Octet field is present (bits 0 to 7) and at least one bit is set to 1. Bits 6 and 7 shall be set to 0 (reserved for future use). Rest of bits may be set to 0 or 1. ▪ If flag 6 is set to 1, then Sensor Status Annunciation Cal/Temp-Octet field is present (bits 8 to 15) and at least one bit is set to 1. Bits 14 and 15 shall be		

	set to 0 (reserved for future use). Rest of bits may be set to 0 or 1. ▪ If flag 7 is set to 1, then Sensor Status Annunciation Status-Octet field is present (bits 16 to 23) and at least one bit is set to 1. Bits may be set to 0 or 1. • Test Operator checks that the Sensor Status Annunciation field value and size reported in the CGM Measurement are correct b. IF C_AG_BLE_043 = FALSE (CGM PHD does not report Sensor Status Annunciation) THEN • Check that flags 5, 6 and 7 are set to 0. • Check that Sensor Status Annunciation octets are not reported
Pass/Fail criteria	• In Step 5.a, value and size of the Sensor Status Annunciation field are as specified according to value of Flags field. • In Step 5.b, flags 5, 6 and 7 are set to 0 and Sensor Status Annunciation field is not present.
Notes (to assist manual testing)	To receive temporarily stored CGM Measurements from the PHD under test, simulated PHG shall enable notifications on the CGM Measurement characteristic and indications on the Record Access Control Point (RACP) characteristic. In order to enable indications/notifications, simulated PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications/notifications. Once CGM Measurement characteristic has been enabled for notifications and Record Access Control Point characteristic has been enabled for indications, simulated PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value to the RACP characteristic. Once the PHG has performed such operation, a notification will arrive for each stored CGM Measurement. Finally, an indication from the RACP characteristic will also arrive. When the CGM Measurement notifications arrive, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A **Flags** field (1 octet) will be present to indicate which optional fields are present. Check value of flags 5, 6 and 7. • Then, the CGM Glucose Concentration field (2 octets) will be present. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets). Check that (note that bytes will be transmitted using little endian order (i.e., the least significant octet first): 1. If flag 5 is set to 1, then Warning-Octet is present. If present, bits 0-5 may be set to 0 or 1 and bits 6-7 shall be set to 0. If present, at least one bit shall be set to 1. 2. If flag 6 is set to 1, then Cal/Temp-Octet is present. If present, bits 8-13 may be set to 0 or 1 and bits 14-15 shall be set to 0. If present, at least one bit shall be set to 1. 3. If flag 7 is set to 1, then Status-Octet is present. If present, bits 16-23 may be set to 0 or 1. If present, at least one bit shall be set to 1. • CGM Trend Information field (if present, 2 octets) • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id	TP/LP-PAN/PHD/PHDTW/CGM/BV-020
TP label	Whitepaper. RACP. CGM Measurement, CGM Trend Information

Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	GT Numeric 7; M		
Test purpose		Check that: If CGM Trend Information field is included in temporarily stored CGM Measurements, its value is correct.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS		C_AG_BLE_044		
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test and acquire at least a CGM Measurement. The measurements shall be temporarily stored for later transmission. 2. Configure the PHD under test as a discoverable Bluetooth device (Advertising state). 3. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 4. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 5. The PHG requests the PHD under test to report all stored records by performing a writing operation in the Record Access Control Point (RACP) characteristic. 6. The PHD under test sends at least a CGM Measurement notification to the simulated PHG. 7. Check the measurements sent by the PHD under test a. IF C_AG_BLE_044 = TRUE (CGM PHD reports Glucose Trend Information) THEN • Flag 0 (CGM Trend Information present) is set to 1. • CGM Trend Information field is present as an SFLOAT value in (mg/dL)/min units. • Test Operator checks that the CGM Trend Information field value reported in the CGM Measurement is correct b. IF C_AG_BLE_044 = FALSE (CGM PHD does not report Glucose Trend Information) THEN • Check that flag 0 is set to 0. • Check that CGM Trend Information field is not reported		
Pass/Fail criteria		• In Step 7.a, flag 0 is set to 1, CGM Trend Information field is reported and its value is correct. • In Step 7.b, flags 0 is set to 0 and the CGM Trend Information field is not reported.		
Notes (to assist manual testing)		To receive temporarily stored CGM Measurements from the PHD under test, simulated PHG shall enable notifications on the CGM Measurement characteristic and indications on the Record Access Control Point (RACP) characteristic. In order to enable indications/notifications, simulated PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on the Client Characteristic Configuration Descriptor of both characteristics to write the proper value for indications/notifications. Once CGM Measurement characteristic has been enabled for notifications and Record Access Control Point characteristic has been enabled for indications, simulated PHG shall perform a "Report Stored Records" operation with an "All Records" operator on the RACP characteristic to receive all stored measurements. To perform this operation, PHG shall perform a "Write Characteristic Value" GATT sub-procedure to write the appropriate value to the RACP characteristic. Once the PHG has performed such operation, a notification will arrive for each stored CGM Measurement. Finally, an indication from the RACP characteristic will also arrive.		

	When the CGM Measurement notifications arrive, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • A Size field (1 octet) will be present, representing the size of the CGM Measurement record that follows (including the Size field). • A **Flags** field (1 octet) will be present to indicate which optional fields are present. Check value of flag 0. • Then, the CGM Glucose Concentration field (2 octets) will be present. • Time Offset field (2 octets). • Sensor Status Annunciation field (if present, up to 3 octets) 1. Warning-Octet (if present, 1 octet) 2. Cal/Temp-Octet (if present, 1 octet) 3. Status-Octet (if present, 1 octet) • CGM Trend Information field (if present, 2 octets). Check that: 1. If flag 0 is set to 1, this field is present and it is set to the reported value (SFLOAT, (mg/dL)/min). • CGM Quality field (if present, 2 octets) • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-021		
TP label		Whitepaper. CGM Specific Ops Control Point. Communication Interval Response value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	GSI Numeric 8; M		
Test purpose		Check that: Communication Interval Response Operand represents the time interval (in minutes) after which the CGM Measurement characteristic is sent to the client.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). The PHD has a valid Communication Interval value already set. 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG makes a request to the CGM Specific Ops control Point to get the CGM Sensor Communication Interval. To do so, it performs a CGM Communication Interval procedure using Op Code "Get CGM Communication Interval" (0x02) (performing a write operation to the CGM Specific Ops Control Point characteristic's Op Code field). 5. The PHD is expected to respond with an indication including a "Communication Interval Response" Op Code (0x03) and a uint8 containing the communication interval in minutes. 6. Check indication sent by PHD under test: a. Op Code is 0x03 ("Communication Interval Response")		

	b. Operand format is uint8 c. Test Operator checks that the value of the operand matches the Communication Interval of the CGM Sensor in minutes.
Pass/Fail criteria	Op Code and Operand in the response match the requirements in Step 6.
Notes (to assist manual testing)	In order to enable indications on the CGM Specific Ops Control Point characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the CGM Specific Ops Control Point has been enabled for indications, in order to obtain the Communication Interval Response value, PHG will use the "Write Characteristic Value" GATT sub-procedure on the CGM Specific Ops Control Point characteristic to write the Op Code "0x02" (Get CGM Communication Interval).The PHD is then expected to send an indication to the PHG as a response. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • **Op Code** field (1 octet) will be present. Check that: 1. Field value is 0x03 (CGM Communication Interval response) • **Operand** field (1 octet) will be present: 1. Check field value (uint8 containing the Communication Interval in minutes). 2. Check that the Communication Interval value is correct. • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-022		
TP label		Whitepaper. CGM Specific Ops Control Point. Calibration Value Response value.		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	SensCal Numeric 3; M	SensCal Numeric 11; M	SensCal Numeric 12; M
Test purpose		Check that: The Glucose Concentration of Calibration field of a Calibration Data Record represents the CGM Sensor blood glucose concentration calibration value in mg/dL. [AND] The Calibration Sample Location field of the Calibration Data Record represents the correct sample location. [AND] The Calibration Time field of the Calibration Data Record represents the time the calibration value was measured as a relative offset to the Session Start Time in minutes.		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042 AND C_AG_BLE_047		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). The PHD has a single Calibration Data Record stored with valid data. 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG makes a request to the CGM Specific Ops control Point to get the		

	latest stored Calibration Data Record. To do so, it performs a Glucose Calibration procedure using Op Code "Get Glucose Calibration value" (0x05) with Operand "0xFFFF" (by performing a write operation to the CGM Specific Ops Control Point characteristic's Op Code and Calibration Data Record Number fields respectively). 5. The PHD is expected to respond with an indication including a "Calibration Value Response" Op Code (0x06) and a Calibration Data Record structure containing the requested calibration information. 6. Check the indication sent by the PHD under test: a. Op Code is 0x06 ("Calibration Value Response") b. Operand format matches the Calibration Data Record structure. c. Check Glucose Concentration of Calibration field value (SFLOAT, mg/dL). d. Test Operator checks that the value of the Glucose Concentration of Calibration field of the Calibration Data Record represents the actual blood glucose concentration calibration value in mg/dL. e. Check that the Calibration Sample Location field has a valid value (4bits). Valid values are {0x1, 0x2, 0x3, 0x4, 0x5, 0xA}. f. Test Operator checks that the value of the Calibration Sample Location represents the correct sample location. g. Check Calibration Time field value (uint16, min). h. Test Operator checks that the value of the Calibration Time field of the Calibration Data Record matches the actual time when the calibration value was measured as a relative offset to the Session Start Time in minutes.
Pass/Fail criteria	Op Code and Operand in the response match the requirements in Step 6.
Notes (to assist manual testing)	In order to enable indications on the CGM Specific Ops Control Point characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the CGM Specific Ops Control Point has been enabled for indications, in order to obtain the latest Calibration Data Record, PHG will use the "Write Characteristic Value" GATT sub-procedure on the CGM Specific Ops Control Point characteristic to write the Op Code "0x05" (Get Glucose Calibration value) and the Operand "0xFFFF". The PHD is then expected to send an indication to the PHG as a response. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • **Op Code** field (1 octet) will be present. Check that: 1. Field value is 0x06 (Calibration Value Response) • **Calibration Value-Glucose concentration of Calibration** field (2 octets) will be present: 1. Check field value (SFLOAT with a valid blood glucose concentration value in mg/dL) 2. Check that he value is correct • **Calibration Value – Calibration Time** field (2 octets) will be present: 1. Check field value (uint16, min) 2. Check that he value is correct • Calibration Value – Calibration Type field (4 bits) will be present. • **Calibration Value – Calibration Sample Location** (4 bits) will be present 1. Check that the field has a correct value according to 6.e. 2. Check that the value is correct • Calibration Value - Next Calibration Time field (2 octets) will be present. • Calibration Value – Calibration Data Record Number field (2 octets) will be present. • Calibration Value – Calibration Status field (1 octet) will be present. • E2E-CRC field (if present, 2 octets)

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-023		
TP label		Whitepaper. CGM Specific Ops Control Point. Patient High Alert Level Response value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	PLH Numeric 10; M		
Test purpose		Check that: Patient High Alert Level Response Operand represents the correct alert level in mg/dL		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042 AND C_AG_BLE_048		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). PHD has a valid Patient High Alert Level value already set. 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG makes a request to the CGM Specific Ops control Point to get the Patient High Alert Level value. To do so, it performs a Patient High Alert Level procedure using Op Code "Get Patient High Alert Level" (0x08) (performing a write operation to the CGM Specific Ops Control Point characteristic's Op Code). 5. The PHD is expected to respond with an indication including a "Patient High Alert Level Response" (0x09) Op Code and an SFLOAT containing the requested value in mg/dL. 6. Check the indication sent by the PHD under test: a. Op Code is 0x09 ("Patient High Alert Level Response") b. Operand format is SFLOAT c. Test Operator checks that the value of the operand matches the Patient High Alert Level value of the CGM Sensor in mg/dL.		
Pass/Fail criteria		Op Code and Operand in the response match the requirements in Step 6.		
Notes (to assist manual testing)		In order to enable indications on the CGM Specific Ops Control Point characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the CGM Specific Ops Control Point has been enabled for indications, in order to obtain the Patient High Alert Level value, PHG will use the "Write Characteristic Value" GATT sub-procedure on the CGM Specific Ops Control Point characteristic to write the Op Code "0x08" (Get Patient High Alert Level).The PHD is then expected to send an indication to the PHG as a response. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • **Op Code** field (1 octet) will be present. Check that: 1. Field value is 0x09 (Patient High Alert Level Response) • **Operand** field (1 octet) will be present: 1. Check field value (SFLOAT containing the Patient High Alert Level in mg/dL). 2. Check that the Patient High Alert Level value is correct. • E2E-CRC field (if present, 2 octets)		

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-024		
TP label		Whitepaper. CGM Specific Ops Control Point. Patient Low Alert Level Response value.		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	PLH Numeric 10; M		
Test purpose		Check that: Patient Low Alert Level Response Operand represents the correct alert level in mg/dL		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042 AND C_AG_BLE_048		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). The PHD has a valid Patient High Alert Level value already set. 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG makes a request to the CGM Specific Ops control Point to get the Patient Low Alert Level value. To do so, it performs a Patient Low Alert Level procedure using Op Code "Get Patient Low Alert Level" (0x0B) (performing a write operation to the CGM Specific Ops Control Point characteristic's Op Code). 5. The PHD is expected to respond with an indication including a "Patient Low Alert Level Response" (0x0C) Op Code and an SFLOAT containing the requested value in mg/dL. 6. Check the indication sent by the PHD under test: a. Op Code is 0x0C ("Patient Low Alert Level Response") b. Operand format is SFLOAT c. Test Operator checks that the value of the operand matches the Patient Low Alert Level value of the CGM Sensor in mg/dL.		
Pass/Fail criteria		Op Code and Operand in the response match the requirements in Step 6.		
Notes (to assist manual testing)		In order to enable indications on the CGM Specific Ops Control Point characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the CGM Specific Ops Control Point has been enabled for indications, in order to obtain the Patient Low Alert Level Response value, PHG will use the "Write Characteristic Value" GATT sub-procedure on the CGM Specific Ops Control Point characteristic to write the Op Code "0x0B" (Get Patient Low Alert Level).The PHD is then expected to send an indication to the PHG as a response. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • **Op Code** field (1 octet) will be present. Check that: 1. Field value is 0x0C (Patient Low Alert Level Response) • **Operand** field (1 octet) will be present: 1. Check field value (SFLOAT containing the Patient Low Alert Level in mg/dL). 2. Check that the Patient Low Alert Level value is correct. • E2E-CRC field (if present, 2 octets)		

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-025		
TP label		Whitepaper. CGM Specific Ops Control Point. Hypo Alert Level Response value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	DHH Numeric 10; M		
Test purpose		Check that: Hypo Alert Level Response Operand represents the correct alert level in mg/dL		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042 AND C_AG_BLE_049		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). The PHD has a valid Hypo Alert Level value already set. 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG makes a request to the CGM Specific Ops control Point to get the Hypo Alert Level value. To do so, it performs a Hypo Alert procedure using Op Code "Get Hypo Alert Level" (0x0E) (performing a write operation to the CGM Specific Ops Control Point characteristic's Op Code). 5. The PHD is expected to respond with an indication including a "Hypo Alert Level Response" (0x0F) Op Code and an SFLOAT containing the requested alert level in mg/dL. 6. Check the indication sent by the PHD under test: a. Op Code is 0x0F ("Hypo Alert Level Response") b. Operand format is SFLOAT c. Test Operator checks that the value of the operand matches the Hypo Alert Level value of the CGM Sensor in mg/dL.		
Pass/Fail criteria		Op Code and Operand in the response match the requirements in Step 6.		
Notes (to assist manual testing)		In order to enable indications on the CGM Specific Ops Control Point characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the CGM Specific Ops Control Point has been enabled for indications, in order to obtain the Hypo Alert Level Response value, PHG will use the "Write Characteristic Value" GATT sub-procedure on the CGM Specific Ops Control Point characteristic to write the Op Code "0x0E" (Get Hypo Alert Level).The PHD is then expected to send an indication to the PHG as a response. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • **Op Code** field (1 octet) will be present. Check that: 1. Field value is 0x0F (Hypo Alert Level Response) • **Operand** field (1 octet) will be present: 1. Check field value (SFLOAT containing the Hypo Alert Level in mg/dL). 2. Check that the Hypo Alert Level value is correct. • E2E-CRC field (if present, 2 octets)		

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-026		
TP label		Whitepaper. CGM Specific Ops Control Point. Hyper Alert Level Response value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	DHH Numeric 10; M		
Test purpose		Check that: Hyper Alert Level Response Operand represents the correct alert level in mg/dL		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042 AND C_AG_BLE_050		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). The PHD has a valid Hyper Alert Level value already set. 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG makes a request to the CGM Specific Ops control Point to get the Hyper Alert Level value. To do so, it performs a Hyper Alert procedure using Op Code "Get Hyper Alert Level" (0x11) (performing a write operation to the CGM Specific Ops Control Point characteristic's Op Code). 5. The PHD is expected to respond with an indication including a "Hyper Alert Level Response" (0x12) Op Code and an SFLOAT containing the requested alert level in mg/dL. 6. Check the indication sent by the PHD under test: a. Op Code is 0x12 ("Hyper Alert Level Response") b. Operand format is SFLOAT c. Test Operator checks that the value of the operand matches the Hyper Alert Level value of the CGM Sensor in mg/dL.		
Pass/Fail criteria		Op Code and Operand in the response match the requirements in Step 6.		
Notes (to assist manual testing)		In order to enable indications on the CGM Specific Ops Control Point characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the CGM Specific Ops Control Point has been enabled for indications, in order to obtain the Hyper Alert Level Response value, PHG will use the "Write Characteristic Value" GATT sub-procedure on the CGM Specific Ops Control Point characteristic to write the Op Code "0x11" (Get Hyper Alert Level).The PHD is then expected to send an indication to the PHG as a response. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • **Op Code** field (1 octet) will be present. Check that: 1. Field value is 0x12 (Hyper Alert Level Response) • **Operand** field (1 octet) will be present: 1. Check field value (SFLOAT containing the Hyper Alert Level in mg/dL). 2. Check that the Hyper Alert Level value is correct. • E2E-CRC field (if present, 2 octets)		

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-027		
TP label		Whitepaper. CGM Specific Ops Control Point. Rate of Decrease Alert Level Response value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	GRC Numeric 10; M		
Test purpose		Check that: Rate of Decrease Alert Level Response Operand represents the correct alert level in mg/dL		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042 AND C_AG_BLE_051		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). The PHD has a valid Rate of Decrease Alert Level value already set. 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG makes a request to the CGM Specific Ops control Point to get the Rate of Decrease Alert Level value. To do so, it performs a Rate of Decrease Alert Level procedure using Op Code "Get Rate of Decrease Alert Level" (0x14) (performing a write operation to the CGM Specific Ops Control Point characteristic's Op Code). 5. The PHD is expected to respond with an indication including a "Rate of Decrease Alert Level Response" (0x15) Op Code and an SFLOAT containing the requested alert level in mg/dL/min. 6. Check the indication sent by the PHD under test: a. Op Code is 0x15 ("Rate of Decrease Alert Level Response") b. Operand format is SFLOAT c. Test Operator checks that the value of the operand matches the Rate of Decrease Alert Level value of the CGM Sensor in mg/dL/min.		
Pass/Fail criteria		Op Code and Operand in the response match the requirements in Step 6.		
Notes (to assist manual testing)		In order to enable indications on the CGM Specific Ops Control Point characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the CGM Specific Ops Control Point has been enabled for indications, in order to obtain the Decrease Alert Level Response value, PHG will use the "Write Characteristic Value" GATT sub-procedure on the CGM Specific Ops Control Point characteristic to write the Op Code "0x14" (Get Rate of Decrease Alert Level).The PHD is then expected to send an indication to the PHG as a response. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • **Op Code** field (1 octet) will be present. Check that: 1. Field value is 0x15 (Rate of Decrease Alert Level Response) • **Operand** field (1 octet) will be present: 1. Check field value (SFLOAT containing the Rate of Decrease Alert Level in mg/dL). 2. Check that the Rate of Decrease Alert Level value is correct. • E2E-CRC field (if present, 2 octets)		

TP Id		TP/LP-PAN/PHD/PHDTW/CGM/BV-028		
TP label		Whitepaper. CGM Specific Ops Control Point. Rate of Increase Alert Level Response value		
Coverage	**Spec**	[Bluetooth PHDT v1.6]		
	Testable items	GRC Numeric 10; M		
Test purpose		Check that: Rate of Increase Alert Level Response Operand represents the correct alert level in mg/dL		
Applicability		C_AG_BLE_000 AND C_AG_BLE_042 AND C_AG_BLE_052		
Other PICS				
Initial condition		The PHD under test and the simulated PHG are in Standby state.		
Test procedure		1. Turn on the PHD under test, and configure it as a discoverable Bluetooth device (Advertising state). The PHD has a valid Rate of Increase Alert Level value already set. 2. The simulated PHG initiates a discovery process (Scanning state), it discovers the PHD under test and it starts a pairing process with the PHD under test (Initiating state). 3. The simulated PHG initiates a Bluetooth connection with the PHD under test (Connection state). 4. The simulated PHG makes a request to the CGM Specific Ops control Point to get the Rate of Increase Alert Level value. To do so, it performs a Rate of Increase Alert Level procedure using Op Code "Get Rate of Increase Alert Level" (0x17) (performing a write operation to the CGM Specific Ops Control Point characteristic's Op Code). 5. The PHD is expected to respond with an indication including a "Rate of Increase Alert Level Response" (0x18) Op Code and an SFLOAT containing the requested alert level in mg/dL/min. 6. Check the indication sent by the PHD under test: a. Op Code is 0x18 ("Rate of Increase Alert Level Response") b. Operand format is SFLOAT c. Test Operator checks that the value of the operand matches the Rate of Increase Alert Level value of the CGM Sensor in mg/dL/min.		
Pass/Fail criteria		Op Code and Operand in the response match the requirements in Step 6.		
Notes (to assist manual testing)		In order to enable indications on the CGM Specific Ops Control Point characteristic, PHG will use the "Write Characteristic Descriptor" GATT sub-procedure on its Client Characteristic Configuration Descriptor to write the proper value for indications. Once the CGM Specific Ops Control Point has been enabled for indications, in order to obtain the Increase Alert Level Response value, PHG will use the "Write Characteristic Value" GATT sub-procedure on the CGM Specific Ops Control Point characteristic to write the Op Code "0x17" (Get Rate of Increase Alert Level).The PHD is then expected to send an indication to the PHG as a response. When the indication arrives, check the value of received ATT packet (besides header and metadata). Fields and subfields will appear in the following order: • **Op Code** field (1 octet) will be present. Check that: 1. Field value is 0x18 (Rate of Increase Alert Level Response) • **Operand** field (1 octet) will be present: 1. Check field value (SFLOAT containing the Rate of Increase Alert Level in mg/dL). 2. Check that the Rate of Increase Alert Level value is correct. • E2E-CRC field (if present, 2 octets)		

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