ITU-T

H.850.6

TELECOMMUNICATION STANDARDIZATION SECTOR OF ITU (08/2020)

# SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

E-health multimedia systems, services and applications – Interoperability compliance testing of personal health systems (HRN, PAN, LAN, TAN and WAN)

Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10F: Transcoding for Bluetooth Low Energy: Personal Health Gateway – Pulse oximeter

Recommendation ITU-T H.850.6



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#### **Recommendation ITU-T H.850.6**

# Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10F: Transcoding for Bluetooth Low Energy: Personal Health Gateway – Pulse oximeter

### **Summary**

Recommendation ITU-T H.850.6 provides a test suite structure (TSS) and the test purposes (TP) for the transcoding of pulse oximeter data by personal health gateways in the Personal Health Devices (PHD) interface of application-level data between the Bluetooth Low Energy Bluetooth Generic Attribute Profile (GATT) format and the IEEE 11073-20601 data format, of which Recommendation ITU-T H.810 (2016) 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.850.6 is a transposition of clause 3.8 of Continua Test Tool DG2016, Test Suite Structure & Test Purposes, Personal Health Devices Interface; Part 10: PHD Transcoding Whitepaper. Personal Health Gateway (Version 1.7, 2017-07-18), 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**

E	dition	Recommendation	Approval	Study Group	Unique ID*
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# **Keywords**

Bluetooth generic attribute profile, Bluetooth low energy (BLE), continua design guidelines, conformance testing, data format transcoding, e-health, IEEE 11073-20601, ITU-T H.810, personal area network, personal connected health devices, personal health devices interface, personal health gateway, pulse oximeter, touch area network.

<sup>\*</sup> 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, <a href="http://handle.itu.int/11.1002/1000/11830-en">http://handle.itu.int/11.1002/1000/11830-en</a>.

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**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 clause 3.8 of Continua Test Tool DG2016, Test Suite Structure & Test Purposes, Personal Health Devices Interface; Part 10: PHD Transcoding Whitepaper. Personal Health Gateway (Version 1.7, 2017-07-18), 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-CDG 2011].
1.1	2013-05-24	Initial release for Test Tool DG2012. It uses "TSS&TP_DG2011_LP-PAN_PART_10_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. It uses "TSS&TP_DG2012_LP-PAN_PART_10_v1.1.doc" as a baseline and adds new features included in [b-ITU-T H.810 (2013)]/[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_10_v1.2.doc" as a baseline and adds new features included in Documentation Enhancements:  • "Other PICS" row has been added
1.4	2015-07-01	Initial release for Test Tool DG2015. It uses "TSS&TP_DG2013_LP-PAN_PART_10_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_10_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_10_v1.5.doc" as a baseline and adds new features included in [ITU-T H.810 (2016)]/[b-CDG 2016]:  • Adds PLX BLE device specialization  • Adds PLX CGM device specialization
1.7	2017-07-18	Second Maintenance Release for Test Tool DG2016. It uses "TSS&TP_DG2016_LP-PAN_PART_10_v1.6.doc" as a baseline and corrects minor typos.
1.8	2018-10-17	It uses version 1.7 as a baseline and adds corrections due to the inclusion of PLX BLE profile test cases.
1.9	2020-06-02	Updates related to the value of the Reg-Cert-Data-List according to [b-CDG 2017].

# **Recommendation ITU-T H.850.6**

# Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 10F: Transcoding for Bluetooth Low Energy: Personal Health Gateway – Pulse oximeter

#### 1 Scope

The scope of this Recommendation<sup>1</sup> 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 (2016)]. 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 10F.

- 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 Devices interface. 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 50: Sleep apnoea breathing therapy equipment (SABTE)
  - Part 5P: Continuous glucose monitor (CGM)
- Part 6: Device specializations. Personal Health Gateway

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 7: Continua Design Guidelines. BLE Personal Health Device
- Part 8: Continua Design Guidelines. BLE Personal Health Gateway
- Part 9: Personal Health Devices Transcoding Whitepaper. Personal Health Devices
- Part 10: Personal Health Devices Transcoding Whitepaper. Personal Health Gateway. In addition to the main part, the document is subdivided into the following subparts:
  - Part 10A: Whitepaper Thermometer requirements
  - Part 10B: Whitepaper Blood pressure requirements
  - Part 10C: Whitepaper Heart rate requirements
  - Part 10D: Whitepaper Glucose meter requirements
  - Part 10E: Whitepaper Weighing scales requirements
  - Part 10F: Whitepaper Pulse oximeter requirements
  - Part 10G: Whitepaper Continuous glucose monitoring requirements

#### 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 (2016)]	Recommendation ITU-T H.810 (2016), <i>Interoperability design</i> guidelines for personal health systems.
[Bluetooth PHDT v1.4]	Bluetooth SIG (2013), Personal Health Devices Transcoding White Paper, v1.4. <a href="https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=294539">https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=294539</a>
[Bluetooth PHDT v1.5]	Bluetooth SIG (2014), <i>Personal Health Devices Transcoding White Paper</i> , v1.5. <a href="https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=272346">https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=272346</a>
[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), <i>Health informatics</i> – <i>Personal health device communication</i> – <i>Device specialization</i> . 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 11073-20601-2015A]	ISO/IEEE 11073-20601:2010, <i>Health informatics – Personal health device communication – Part 20601: Application profile – Optimized exchange protocol</i> , including ISO/IEEE 11073-20601:2010 Amd 1:2015. <a href="https://www.iso.org/standard/54331.html">https://www.iso.org/standard/54331.html</a> with <a href="https://www.iso.org/standard/63972.html">https://www.iso.org/standard/63972.html</a>
[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

[IHE PCD TF 1] IHE PCD TF 1 (2012), IHE Patient Care Device Technical

Framework – Revision 2.0. Volume 1: Integration Profiles. http://www.ihe.net/Technical Framework/upload/IHE PCD TF Rev2-

0\_Vol1\_FT\_2012-08-16.pdf

[IHE PCD TF 2] IHE PCD TF 2 (2012), IHE Patient Care Device Technical

Framework – Revision 2.0. Volume 2: Transactions. http://www.ihe.net/Technical Framework/upload/IHE PCD TF Rev2-

0\_Vol2\_FT\_2012-08-16.pdf

[IHE PCD TF 3] IHE PCD TF 3 (2012), IHE Patient Care Device Technical

Framework – Revision 2.0. Volume 3: Semantic Content. http://www.ihe.net/Technical Framework/upload/IHE PCD TF Rev2-

0 Vol3 FT 2012-08-16.pdf

#### 3 Definitions

#### 3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

- **3.1.1 agent** [ISO/IEEE 11073-20601-2016C]: A node that collects and transmits personal health data to an associated manager.
- **3.1.2 manager** [ISO/IEEE 11073-20601-2016C]: A node receiving data from one or more agent systems. Some examples of managers include a cellular phone, health appliance, set top box, or a computer system.

#### 3.2 Terms defined in this Recommendation

None.

#### 4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ATS Abstract Test Suite

CDG Continua Design Guidelines

CGM Continuous Glucose Monitor

DUT Device Under Test

GUI Graphical User Interface

INR International Normalized Ratio

IP Insulin Pump

IUT Implementation Under Test

LSB Least Significant Bit

MDS Medical Device System

MSB Most Significant Bit

NFC Near Field Communication

PAN Personal Area Network

PCD Patient Care Device

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

RACP Record Access Control Point

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 Purposes

TSS Test Suite Structure
USB Universal Serial Bus

WDM Windows Driver Model

#### 5 Conventions

In this text, the uppercase letter L is used as the symbol for litre.

Several of the test purposes in Annex A refer to "WAN PCD-01 messages"; these messages are specified in the patient care device (PCD) technical framework defined in [IHE PCD TF 1], [IHE PCD TF 2] and [IHE PCD TF 3]. Similarly, the "IEEE 11073 Objects and Attributes" are defined in [ISO/IEEE 11073-104xx].

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, hexadecimal numbers are denoted either with the prefix "0x" or by "(hex)" after the number; "(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
2016 plus errata	[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 ITU-T H.810 is split into eight parts in the ITU-T 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 maintenance updates of the CDG 2010 and additional guidelines that cover new functionalities [b-CDG 2011].	Adrenaline
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

The test purposes (TP) for the Personal Health Devices interface have been divided into the groups and subgroups specified below. Annex A describes the TPs for subgroup 2.4.7 (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: Whitepaper general requirements (GEN)
    - Subgroup 1.4.2: Whitepaper thermometer requirements (TH)
    - Subgroup 1.4.3: Whitepaper blood pressure requirements (BPM)
    - Subgroup 1.4.4: Whitepaper heart rate requirements (HR)
    - Subgroup 1.4.5: Whitepaper glucose meter requirements (GL)
    - Subgroup 1.4.6: Whitepaper 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)
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    - Subgroup 2.3.4: Blood pressure monitor (BPM)
    - Subgroup 2.3.5: Thermometer (TH)
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- 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.

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 (Bluetooth low energy)
    - 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.
    - o 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 a test purpose.
- TP label: This is the TP's title.
- 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 were 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 2.4.7 – Whitepaper Pulse oximeter requirements (PLX)

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-000			
TP label		Whitepaper. Pulse Oximeter MDS Object - System-Type Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	PLX Specific MDS 1; M			
Test purpo	se	Check that:			
		PHG does not include MDS object, System-Type attribute in transcoder output.			
Applicabilit	ty	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS	i				
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.			
Test procee	dure	The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a measurement ready to be sent and it is in the Advertising state (it is discoverable).			
		The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).			
		When the pairing has been completed (Connection state) the simulated PHD sends the Measurement to the PHG under test.			
		4. Check in PHG transcoder output the MDS object, System-Type attribute			
Pass/Fail c	riteria	In Step 4, the MDS object, System-Type attribute is not present.			
Notes		Possible values in typical points of observation after transcoder output are:			
(To assist r testing)	nanuai	a) IEEE 11073 Objects and Attributes			
		System-Type attribute is not present:			
		☐ Object: MDS Object			
		☐ Attribute-id: MDC_ATTR_SYS_TYPE (2438)			
		☐ Attribute-type: TYPE			
		☐ Attribute-value: <not present=""></not>			
		b) WAN PCD-01 message			
		PCD-01 message does not include segments with System-Type attribute value (67974^MDC_ATTR_SYS_TYPE^MDC)			

TP Id	Pld TP/LP-PAN/PHG/PHDTW/PLX/BV-001			
TP label		Whitepaper. Pulse Oximeter MDS Object - Dev-Configuration-Id Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	Common MDS 17; M		
Test purpo	se	Check that:		
		PHG includes MDS object, Dev-Configuration-Id attribute in transcoder output.		
		[AND]		
		Dev-Configuration-Id value is set to any value in range of 0x4000 to 0x7FFF (Extended Configuration)		
Applicability C_MAN_BLE_000 AND C_MAN_BLE		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS				
Initial condition The PHG		The PHG under test and the simulated PHD are in the Standby state.		
Test Procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a measurement ready to be sent and it is in the Advertising state (it is		

	discoverable).		
	2. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).		
	3. When the pairing has been completed (Connection state) the simulated PHD sends the Measurement to the PHG under test.		
	4. Check in PHG transcoder output the MDS object, Dev-Configuration-Id attribute		
Pass/Fail criteria	In Step 4, the MDS object, Dev-Configuration-Id attribute is present, its value is inside the range 0x4000 - 0x7FFF		
Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
	Dev-Configuration-Id attribute is present:		
	☐ Object: MDS Object		
	☐ Attribute-id: MDC_ATTR_DEV_CONFIG_ID (2628)		
	☐ Attribute-type: INT-U16		
	<ul> <li>Attribute-value: Any value inside the range 16384 - 32767 (dec) or 0x4000 – 0x7FFF (hex)</li> </ul>		
	b) WAN PCD-01 message		
	According to Continua DG, the Dev-Configuration-Id shall not be transmitted in PCD-01 message, therefore it is not possible to check this attribute.		

		<del></del>			
TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-002			
TP label	I	Whitepaper. Pulse Oximeter MDS Object - System-Type-Spec-List Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	Common MDS 15; M PLX Specific MDS 2; M			
Test purpo	se	Check that:			
		PHG includes MDS object, System-Type-Spec-List attribute in transcoder output.			
		[AND]			
		System-Type-Spec-List is set to (MDC_DEV_SPEC_PROFILE_PULS_OXIM, Version 1)			
Applicabilit	ty	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS	i				
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.			
Test procedure		<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a measurement ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>			
		The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).			
		3. When the pairing has been completed (Connection state) the simulated PHD sends the Measurement to the PHG under test.			
		4. Check in PHG transcoder output the MDS object, System-Type-Spec-List attribute			
Pass/Fail c	riteria	In Step 4, the MDS object, System-Type-Spec-List attribute is present, its value is (MDC_DEV_SPEC_PROFILE_PULS_OXIM, Version 1)			
Notes		Possible values in typical points of observation after transcoder output are:			
(To assist r testing)	nanual	a) IEEE 11073 Objects and Attributes			
,g,		System-Type-Spec-List attribute is present:			
		☐ Object: MDS Object			
		☐ Attribute-id: MDC_ATTR_SYS_TYPE_SPEC_LIST (2650)			
		☐ Attribute-type: SEQUENCE OF [ {type (INT-U16), version (INT-U16)} ]			

	☐ Attribute-value:
	<ul> <li>type: MDC_DEV_SPEC_PROFILE_PULS_OXIM, 4100 (dec) or 10 04 (hex)</li> </ul>
	<ul> <li>version: 1 (dec) or 00 01 (hex)</li> </ul>
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with System-Type-Spec-List attribute value (check OBX-5):
	OBX ? NM 68186^MDC_ATTR_SYS_TYPE_SPEC_LIST^MDC 1.0.0.a  528388^MDC_DEV_SPEC_PROFILE_PULS_OXIM^MDC     R

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-003			
TP label		Whitepaper. Pulse Oximeter MDS Object - Reg-Cert-Data-List Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	Common MDS 14; M Regulatory Conv 1; M			
Test purpo	se	Check that:			
		PHG transcodes IEEE 11073-20601 Regulatory Certification Data List characteristic into MDS object, Reg-Cert-Data-List attribute			
Applicabilit	y	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS					
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.			
Test procee	dure	1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a measurement ready to be sent and it is in the Advertising state (it is discoverable).			
		The simulated PHD implements several BTLE characteristics. The characteristic of interest for this Test Case is:			
		a. IEEE 11073-20601 Regulatory Certification Data List (0x2A2A)			
		Format: reg-cert-data-list (opaque structure)			
		Value: 00 02 00 12 02 01 00 08 08 00 00 01 00 02 80 04 02 02 00 02 80 00 (hex)			
		i. Element:			
		auth-body-and-struc-type:			
		- auth-body: 02 (hex) auth-body-continua(2)			
		- auth-body-struc-type: 01 (hex). continua-version-struct(1)			
		auth-body-data:			
		- major-IG-version: 08 (hex)			
		- minor-IG-version: 00 (hex)			
		- certified-devices: 80 04 (hex) BTLE Pulse Oximeter			
		ii. Element:			
		auth-body-and-struc-type:			
		- auth-body: 02 (hex). auth-body-continua(2)			
		- auth-body-struc-type: 02 (hex). continua-reg-struct(2)			
		auth-body-data:			
		regulation-bit-field: 80 00 (hex). Unregulated device			
		The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD.			
		4. When the pairing has been completed (Connection state), force the PHG under test to read IEEE 11073-20601 Regulatory Certification Data List characteristic.			

	5. Check in PHG transcoder output the MDS object, Reg-Cert-Data-List attribute
Pass/Fail criteria	In Step 5, the MDS object, Reg-Cert-Data-List attribute is present and its value matches with IEEE 11073-20601 Regulatory Certification Data List characteristic value
Notes (To assist manual testing)	Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes
testing)	Reg-Cert-Data-List attribute is present:
	☐ Object: MDS Object
	☐ Attribute-id: MDC_ATTR_REG_CERT_DATA_LIST (2635)
	☐ Attribute-type: SEQUENCE OF [{auth-body-and-struc-type, auth-body-data}, {…}]
	Attribute-value: 00 02 00 12 02 01 00 08 08 00 00 01 00 02 80 04 02 02 00 02 80 00 (hex) [Note that 0x00 0x02 is the number of elements in the sequence and 0x00 0x12 is the length of the sequence]
	i. Reg-Cert-Data Element:
	auth-body-and-struc-type:
	- auth-body: 02 (hex) auth-body-continua(2)
	- auth-body-struc-type: 01 (hex). continua-version-struct(1)
	auth-body-data:
	- major-IG-version: 08 (hex)
	- minor-IG-version: 00 (hex)
	- certified-devices: 80 04 (hex). BTLE Pulse Oximeter
	ii. Reg-Cert-Data Element:
	auth-body-and-struc-type:
	- auth-body: 02 (hex). auth-body-continua(2)
	- auth-body-struc-type: 02 (hex). continua-reg-struct(2)
	auth-body-data:
	- regulation-bit-field: 80 00 (hex). Unregulated device
	b) WAN PCD-01 message
	PCD-01 message includes five segments like these with Reg-Cert-Data-List attribute value (check OBX-5 in five segments):
	OBX ? CWE 68218^MDC_REG_CERT_DATA_AUTH_BODY^MDC  1.0.0.a 2^auth-body-continua     R
	OBX ? ST 532352^MDC_REG_CERT_DATA_CONTINUA_VERSION^MDC  1.0.0.a.x  6.1     R
	OBX ? NA 532353^MDC_REG_CERT_DATA_CONTINUA_CERT_DEV_LIST
	OBX ? CWE 68218^MDC_REG_CERT_DATA_AUTH_BODY^MDC  1.0.0.b 2^auth-body-continua     R
	OBX ? CWE 532354^MDC_REG_CERT_DATA_CONTINUA_REG_STATUS ^MDC  1.0.0.b.z 1^unregulated-device(0)      R

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-004		
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) - Handle Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	SpO2 Numeric 1; O		
Test purpose		Check that:		
		PHG does not include SpO2 Numeric object, Handle Attribute in transcoder output when		

	using spot-check measurement mode.					
	[OR]					
	If PHG includes SpO2 Numeric object, Handle attribute in transcoder output, then its value shall be different than 0					
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040					
Other PICS	C_MAN_BLE_042					
Initial condition	The PHG under test and the simulated PHD are in the Standby state.					
Test procedure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>					
	<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>					
	a. PLX Features (0x2A60)					
	i. Field: Supported Features					
	Format: 16 bit					
	<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot- Check measurements is supported.</li> </ul>					
	ii. Field: Measurement Status Support					
	This field is not included					
	iii. Field: Device and Sensor Status Support					
	This field is not included					
	b. PLX Spot-Check Measurement (0x2A5E)					
	i. Field: Flags					
	Format: 8 bit					
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present.</li> <li>Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>					
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)					
	Format: SFLOAT					
	Value: Not Relevant					
	iii. Field: SpO2PR-Spot-Check – PR (bpm)					
	Format: SFLOAT					
	Value: Not Relevant					
	iv. Field: Time Stamp					
	Format: Date and Time					
	Value: Not Relevant					
	v. Field: Measurement Status					
	This field is not included					
	vi. Field: Device and Sensor Status					
	This field is not included					
	vii. Field: Pulse Amplitude Index (%)					
	This field is not included					
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).					
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.					

	5. The simulated PHD sends the measurement to the PHG under test.	
	6. Check in PHG transcoder output the SpO2 Numeric object, Handle attribute	
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN	
	<ul> <li>The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test</li> </ul>	
	b) Check in PHG transcoder output the SpO2 Numeric object, Handle attribute	
Pass/Fail criteria	In Step 6, the SpO2 Numeric object, Handle attribute is not present or, if it is present then its value is different than 0	
	If the PHG supports RACP, the same criteria applies to Step 7.b	
Notes	Possible values in typical points of observation after transcoder output are:	
(To assist manual testing)	a) IEEE 11073 Objects and Attributes	
	Handle attribute is not present, or if it is present then:	
	☐ Object: SpO2 Numeric Object	
	☐ Attribute-id: MDC_ATTR_ID_HANDLE (2337)	
	☐ Attribute-type: INT-U16	
	☐ Attribute-value: Any value different than 0	
	b) WAN PCD-01 message	
	PCD-01 message does not include segments with Handle attribute value	

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-005				
TP label		Whitepaper. SpO2 Numeric Object (Continuous Measurements) - Handle Attribute				
Coverage	Spec	[Bluetooth PHDT v1.6]				
	Testable items	SpO2 Numeric 11; O				
Test purpo	se	Check that:				
		PHG does not include SpO2 Numeric object, Handle Attribute in transcoder output when using continuous measurements				
		[OR]				
		If PHG includes SpO2 Numeric object, Handle attribute in transcoder output, then its value shall be different than 0				
Applicabilit	ty	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS	i					
Initial condition		The PHG under test and the simulated PHD are in the Standby state.				
Test procedure		1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).				
		2. The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
		a. PLX Features (0x2A60)				
		i. Field: Supported Features				
		Format: 16 bit				
		<ul> <li>Value: 0000 0000 0011 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5).</li> </ul>				
		ii. Field: Measurement Status Support				
		This field is not included				

		iii. Field: Device and Sensor Status Support
		III. I Iola. Device and denser status support
		This field is not included
	b.	PLX Continuous Measurement (0x2A5F)
		i. Field: Flags
		Format: 8 bit
		<ul> <li>Value: 0000 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.</li> </ul>
		ii. Field: SpO2PR-Normal - SpO2 (%)
		Format: SFLOAT
		Value: Not Relevant
		iii. Field: SpO2PR-Normal – PR (bpm)
		Format: SFLOAT
		Value: Not Relevant
		iv. Field: SpO2PR-Fast - SpO2 (%)
		Format: SFLOAT
		Value: Not Relevant
		v. Field: SpO2PR-Fast - PR (bpm)
		Format: SFLOAT
		Value: Not Relevant
		vi. Field: SpO2PR-Slow - SpO2 (%)
		Format: SFLOAT
		Value: Not Relevant
		vii. Field: SpO2PR-Slow - PR (bpm)
		Format: SFLOAT
		Value: Not Relevant
		viii. Field: Measurement Status
		This field is not included
		ix. Field: Device and Sensor Status
		This field is not included
		x. Field: Pulse Amplitude Index (%)
		This field is not included
		PHG under test initiates a discovery process (Scanning state), it discovers the ulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
		en the pairing has been completed (Connection state), force the PHG under test to the PLX Features characteristic.
	5. The	simulated PHD sends the Measurement to the PHG under test.
		ck in PHG transcoder output the SpO2 Numeric object, Handle attribute in all three 02 objects (continuous normal, fast and slow).
Pass/Fail criteria	In Step 6	$\mathfrak{S}$ ,
	•	There are three SpO2 objects (for normal, fast and slow measurement modes).
	•	In all three objects, the SpO2 Numeric object, Handle attribute is not present or, if it is present then its value is different than 0
Notes (To assist manual testing)		values in typical points of observation after transcoder output are: E 11073 Objects and Attributes

	Har	ndle attribute is not present in SpO2 objects, or if it is present then:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_ID_HANDLE (2337)
		Attribute-type: INT-U16
		Attribute-value: Any value different than 0
b)	WA	N PCD-01 message
	PCI	D-01 message does not include segments with Handle attribute value

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-006				
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) - Type Attribute				
Coverage	Spec	[Bluetooth PHDT v1.6]				
Covolago	Testable items	SpO2 Numeric 2; M				
Test purpos	se	Check that:				
		PHG includes SpO2 Numeric object, Type attribute in transcoder output when using spotcheck measurement mode.				
		[AND]				
		Type is set to {MDC_PART_SCADA, MDC_PULS_OXIM_SAT_O2}				
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS		C_MAN_BLE_042				
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.				
Test proced	dure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), is has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>				
		<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>				
		a. PLX Features (0x2A60)				
		i. Field: Supported Features				
		Format: 16 bit				
		<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported.</li> </ul>				
		ii. Field: Measurement Status Support				
		This field is not included				
		iii. Field: Device and Sensor Status Support				
		This field is not included				
		b. PLX Spot-Check Measurement (0x2A5E)				
		i. Field: Flags				
		Format: 8 bit				
		<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present. Measuremer Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>				
		ii. Field: SpO2PR-Spot-Check - SpO2 (%)				
		Format: SFLOAT				
		Value: Not Relevant				
		iii. Field: SpO2PR-Spot-Check – PR (bpm)				

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	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	6. Check in PHG transcoder output the SpO2 Numeric object, Type attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
	b. Check in PHG transcoder output the SpO2 Numeric object, Type attribute
Pass/Fail criteria	In Step 6, the SpO2 Numeric object, Type attribute is present and its value is {MDC_PART_SCADA, MDC_PULS_OXIM_SAT_O2}
	If the PHG supports RACP, the same criteria applies to Step 7.b
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
	Type attribute is present:
	☐ Object: SpO2 Numeric Object
	☐ Attribute-id: MDC_ATTR_ID_TYPE (2351)
	☐ Attribute-type : SEQUENCE {partition (INT-U16), code (INT-U16)}
	☐ Attribute-value:
	<ul> <li>partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex)</li> </ul>
	code: MDC_PULS_OXIM_SAT_O2 or 19384 (dec) or 4B B8 (hex)
	b) WAN PCD-01 message
	PCD-01 message includes a segment like this with Type attribute (check OBX-3):
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC    R   [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-007			
TP label		Whitepaper. SpO2 Numeric Object (Continuous Measurements) – Type Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	SpO2 Numeric 12;			
Test purpos	se	Check that:			

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	PHG includes SpO2 Numeric object, Type attribute in transcoder output when using continuous measurements.
	[AND]
	Type is set to {MDC_PART_SCADA, MDC_PULS_OXIM_SAT_O2}
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040
Other PICS	
Initial condition	The PHG under test and the simulated PHD are in the Standby state.
Test procedure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>
	<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>
	a. PLX Feature (0x2A60)
	i. Field: Supported Features
	Format: 16 bit
	<ul> <li>Value: 0000 0000 0011 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5).</li> </ul>
	ii. Field: Measurement Status Support
	This field is not included
	iii. Field: Device and Sensor Status Support
	This field is not included
	b. PLX Continuous Measurement (0x2A5F)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.</li> </ul>
	ii. Field: SpO2PR-Normal - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Normal – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: SpO2PR-Fast - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	v. Field: SpO2PR-Fast - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	vi. Field: SpO2PR-Slow - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	vii. Field: SpO2PR-Slow - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	viii. Field: Measurement Status

	This field is not included		
	ix. Field: Device and Sensor Status		
	This field is not included		
	x. Field: Pulse Amplitude Index (%)		
	This field is not included		
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).		
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.		
	5. The simulated PHD sends the Measurement to the PHG under test.		
	Check in PHG transcoder output the SpO2 Numeric object, Type attribute in all three SpO2 objects (continuous normal, fast and slow).		
Pass/Fail criteria	In Step 6,		
	There are three SpO2 objects (for normal, fast and slow measurement modes).		
	In all three objects, the SpO2 Numeric object, Type attribute is present and its value is {MDC_PART_SCADA, MDC_PULS_OXIM_SAT_O2}		
Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
, <b>g</b> ,	Type attribute is present in all three SpO2 objects:		
	☐ Object: SpO2 Numeric Object		
	☐ Attribute-id: MDC_ATTR_ID_TYPE (2351)		
	☐ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)}		
	☐ Attribute-value:		
	<ul> <li>partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex)</li> </ul>		
	code: MDC_PULS_OXIM_SAT_O2 or 19384 (dec) or 4B B8 (hex)		
	b) WAN PCD-01 message		
	PCD-01 message includes three segments like this with Type attribute (check OBX-3):		
	OBX n NM  <b>150456^MDC_PULS_OXIM_SAT_O2^MDC</b>  m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]		

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-008		
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) – Supplemental-Types Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	SpO2 Numeric 3; M		
Test purpos	se	Check that:		
		PHG includes SpO2 Numeric object, Supplemental-Types attribute in transcoder output when using spot-check measurement mode.		
		[AND]		
		Supplemental-Types attribute is set to {MDC_PART_SCADA, MDC_MODALITY_SPOT}.		
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS		C_MAN_BLE_042		
Initial condition		The PHG under test and the simulated PHD are in the Standby state.		
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). Simulated PHD also supports the RACP characteristic and has an		

identical spot-check measurement temporarily stored.

- The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:
  - a. PLX Features (0x2A60)
    - i. Field: Supported Features
      - Format: 16 bit
      - Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported.
    - ii. Field: Measurement Status Support
      - · This field is not included
    - iii. Field: Device and Sensor Status Support
      - · This field is not included
  - b. PLX Spot-Check Measurement (0x2A5E)
    - i. Field: Flags
      - Format: 8 bit
      - Value: 0000 0001 (MSB → LSB). Timestamp field is present.
         Measurement Status, Device and Sensor Status, and Pulse Amplitude
         Index fields are not present. Device Clock is set.
    - ii. Field: SpO2PR-Spot-Check SpO2 (%)
      - Format: SFLOAT
      - · Value: Not Relevant
    - iii. Field: SpO2PR-Spot-Check PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - iv. Field: Time Stamp
      - Format: Date and Time
      - Value: Not Relevant
    - v. Field: Measurement Status
      - This field is not included
    - vi. Field: Device and Sensor Status
      - This field is not included
    - vii. Field: Pulse Amplitude Index (%)
      - This field is not included
- The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- 4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test.
- Check in PHG transcoder output the SpO2 Numeric object, Supplemental-Types attribute
- 7. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in PHG transcoder output the SpO2 Numeric object, Supplemental-Types attribute

Pass/Fail criteria	In Step 6, the SpO2 Numeric object, Supplemental-Types attribute is present and its value is {MDC_PART_SCADA, MDC_MODALITY_SPOT}.  If the PHG supports RACP, the same criteria applies to Step 7.b.		
Notes			
(To assist manual	Possible values in typical points of observation after transcoder output are:		
testing)	a) IEEE 11073 Objects and Attributes		
	Supplemental-Types attribute is present:		
	☐ Object: SpO2 Numeric Object (Spot-Check measurement)		
	☐ Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)		
	☐ Attribute-type: SEQUENCE of SEQUENCE {partition (INT-U16), code (INT-U16)}		
	☐ Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_SPOT}.		
	b) WAN PCD-01 message		
	PCD-01 message includes a facet OBX segment of the SpO2 measurement OBX segment with Supplemental-Types attribute (check OBX-3 and OBX-5):		
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC    R   [current_date_time]		
	OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  150580^MDC_MODALITY_SPOT^MDC      R		

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-009			
TP label		Whitepaper. SpO2 Numeric Object (Continuous Measurements) – Supplemental-Types Attribute			
Coverage	erage Spec [Bluetooth PHDT v1.6]				
	Testable items	SpO2 Numeric 13; SpO2 Numeric 14; M SpO2 Numeric 15; M			
Test purpose		Check that:  PHG does not include SpO2 Numeric object, Supplemental-Types attribute in transcoder output for the SpO2 continuous measurement object (normal).  [AND]  PHG includes SpO2 Numeric object, Supplemental-Types attribute in transcoder output for the SpO2 continuous measurement object (fast mode). Supplemental-Types attribute is set to {MDC_PART_SCADA, MDC_MODALITY_FAST}.  [AND]  PHG includes SpO2 Numeric object, Supplemental-Types attribute in transcoder output for the SpO2 continuous measurement object (slow mode). Supplemental-Types attribute is set			
Applicabilit	у	to {MDC_PART_SCADA, MDC_MODALITY_SLOW}.  C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS					
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.			
Test procedure		has a continuous ready to be sent  2. The simulated P interest for this T  a. PLX Feature	The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).  The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:  a. PLX Feature (0x2A60)		
			i. Field: Supported Features		
		• Va	rmat: 16 bit lue: 0000 0000 00 <b>11</b> 0000 (MSE ides are supported (bits 4 and 5) leasurement Status Support	B → LSB). Fast and slow response).	

- This field is not included
- iii. Field: Device and Sensor Status Support
  - This field is not included
- b. PLX Continuous Measurement (0x2A5F)
  - i. Field: Flags
    - Format: 8 bit
    - Value: 0000 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.
  - ii. Field: SpO2PR-Normal SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - iii. Field: SpO2PR-Normal PR (bpm)
    - Format: SFLOAT
    - · Value: Not Relevant
  - iv. Field: SpO2PR-Fast SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - v. Field: SpO2PR-Fast PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - vi. Field: SpO2PR-Slow SpO2 (%)
    - Format: SFLOAT
    - · Value: Not Relevant
  - vii. Field: SpO2PR-Slow PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - viii. Field: Measurement Status
    - This field is not included
  - ix. Field: Device and Sensor Status
    - This field is not included
  - x. Field: Pulse Amplitude Index (%)
    - This field is not included
- The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test.
- Check in PHG transcoder output the SpO2 Numeric object, Supplemental-Types attribute in all three SpO2 objects (continuous normal, fast and slow).

#### Pass/Fail criteria

In Step 6,

- The SpO2 Numeric Object (normal) Supplemental-Types attribute is not present
- The SpO2 Numeric Object (fast response) Supplemental-Types attribute is present and its value is {MDC\_PART\_SCADA, MDC\_MODALITY\_FAST}.
- The SpO2 Numeric Object (slow response) Supplemental-Types attribute is present and its value is {MDC\_PART\_SCADA, MDC\_MODALITY\_SLOW}.

Notes	Ро	ssible values in typical points of observation after transcoder output are:	
(To assist manual testing)	a)	IEEE 11073 Objects and Attributes	
<b>3</b> ,		Supplemental Types attribute is not present for SpO2 Numeric Object (normal).	
		Supplemental-Types attribute is present for SpO2 Numeric Object (fast response):	
		☐ Object: SpO2 Numeric Object (fast response)	
		☐ Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)	
		☐ Attribute-type: SEQUENCE of SEQUENCE {partition (INT-U16), code (INT-U16)}	
		☐ Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_FAST}.	
		Supplemental-Types attribute is present for SpO2 Numeric Object (slow response):	
		☐ Object: SpO2 Numeric Object (slow response)	
		☐ Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)	
		☐ Attribute-type: SEQUENCE of SEQUENCE {partition (INT-U16), code (INT-U16)}	
		☐ Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_SLOW}.	
	b)	WAN PCD-01 message	
		For SpO2 Numeric Object (normal)	
		PCD-01 message does not include segments with Supplemental-Types attribute.	
		For SpO2 Numeric Object (fast)	
		PCD-01 message includes a facet OBX segment of the SpO2 measurement OBX segment with Supplemental-Types attribute (check OBX-3 and OBX-5):	
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC  <b>m.0.0.x</b>  [value]  262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]	
		OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  150580^MDC_MODALITY_FAST^MDC      R	
		For SpO2 Numeric Object (slow)	
		PCD-01 message includes a facet OBX segment of the SpO2 measurement OBX segment with Supplemental-Types attribute (check OBX-3 and OBX-5):	
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC  <b>m.0.0.y</b>  [value]  262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]	
		OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.y.z  150580^MDC_MODALITY_SLOW^MDC      R	

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-010			
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) - Metric-Spec-Small Attribute 1			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	SpO2 Numeric 4; M SpO2 Numeric 6; M			
Test purpos	se	Check that:			
		PHG includes SpO2 Numeric object, Metric-Spec-Small attribute in transcoder output when using spot-check measurement mode.			
		[AND]			
		Metric-Spec-Small is set to {0x5040} when the sensor device supports measurement storage.			
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS		C_MAN_BLE_042			
Initial condition		The PHG under test and the simulated PHD are in the Standby state.			
Test procedure		1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it			

has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). Simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.

- The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:
  - a. PLX Spot-Check Measurement (0x2A5E)
  - b. PLX Feature (0x2A60)
    - i. Field: Supported Features
      - Format: 16 bit
      - Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).
    - ii. Field: Measurement Status Support
      - This field is not included
    - iii. Field: Device and Sensor Status Support
      - · This field is not included
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- 4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
- The simulated PHD sends the Measurement to the PHG under test with the following value:
  - a. PLX Spot-Check Measurement (0x2A5E)
    - i. Field: Flags
      - Format: 8 bit
      - Value: 0000 0001 (MSB → LSB). Timestamp field is supported.
         Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.
    - ii. Field: SpO2PR-Spot-Check SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - iii. Field: SpO2PR-Spot-Check PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - iv. Field: Time Stamp
      - Format: Date and Time
      - Value: Not Relevant
    - v. Field: Measurement Status
      - This field is not included
    - vi. Field: Device and Sensor Status
      - This field is not included
    - vii. Field: Pulse Amplitude Index (%)
      - This field is not included
- 6. Check in PHG transcoder output the SpO2 numeric object, Metric-Spec-Small attribute
- 7. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to PHG under test

	<ul> <li>b) Check in PHG transcoder output the SpO2 numeric object, Metric-Spec-Small attribute</li> </ul>		
Pass/Fail criteria	In Step 6, the SpO2 Numeric Object – Metric-Spec-Small attribute is present and its value is {0x5040} (mss-avail-stored-data  mss-msmt-aperiodic  mss-acc-agent-initiated).		
	If the PHG supports RACP, the same criteria applies to Step 7.b		
Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
	Metric-Spec-Small attribute is present:		
	☐ Object: SpO2 Numeric Object		
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)		
	☐ Attribute-type: BITS-16		
	Attribute-value: 50 40 (hex) or BITS mss-avail-stored-data (1), mss- msmt - aperiodic(3), mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE		
	) WAN PCD-01 message		
	PCD-01 message does not include segments with Metric-Spec-Small attribute value		

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-011				
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) - Metric-Spec-Small Attribute 2				
Coverage	Spec	[Bluetooth PHDT v1.6]		<del></del>		
	Testable items	SpO2 Numeric 4; M SpO2 Numeric 5; M				
Test purpos	se	Check that:				
		PHG includes SpO2 Numeric Object – Metric-Spec-Small attribute in transcoder output when using spot-check measurement mode.				
		[AND]				
		Metric-Spec-Small is set measurement storage.	to {0x1040} when the sensor device	does not support		
Applicabilit	у	C_MAN_BLE_000 AND	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS						
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.				
Test proced	lure	The Simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable).				
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
		a. PLX Spot-Check Measurement (0x2A5E)				
		b. PLX Feature (0x2A60)				
		i. Field: Supported Features				
		• Forma	t: 16 bit			
		<ul> <li>Value: 0000 0000 0000 0000 (MSB → LSB). Measurement Storage for Spot-check measurements is not supported (bit 2).</li> </ul>				
		ii. Field: Measurement Status Support				
		This field is not included				
		iii. Field: Device and Sensor Status Support				
		This field is not included				
		3. The PHG under test initiates a discovery process (Scanning state), it discovers the				

	simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
	The simulated PHD sends the Measurement to the PHG under test with the following value:
	a. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 0000 (MSB → LSB). Timestamp, Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	This field is not included
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	Check in PHG transcoder output the SpO2 Numeric Object – Metric-Spec-Small attribute
Pass/Fail criteria	In Step 6, the SpO2 Numeric Object – Metric-Spec-Small attribute is present and its value is {0x1040} (mss-msmt-aperiodic   mss-acc-agent-initiated).
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
<b>5</b> /	Metric-Spec-Small attribute is present:
	☐ Object: SpO2 Numeric Object
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)
	☐ Attribute-type: BITS-16
	Attribute-value: 10 40 (hex) or BITS mss-msmt-aperiodic(3), mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE
	b) WAN PCD-01 message
	PCD-01 message does not include segments with Metric-Spec-Small attribute value

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-012	
TP label		Whitepaper. SpO2 Numeric Object (Continuous Measurements) - Metric-Spec-Small Attribute	
Coverage Spec [Bluetooth PHDT v1.6]		[Bluetooth PHDT v1.6]	
Testable SpO2 Numeric items		SpO2 Numeric 16; M	
Test purpose		Check that:	

	PHG includes SpO2 Numeric Object – Metric-Spec-Small attribute in transcoder output when using continuous measurements.		
	[AND]		
	Metric-Spec-Small is set to {0x0040} (mss-acc-agent-initiated)		
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS			
Initial condition	The PHG under test and the simulated PHD are in the Standby state.		
Test procedure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), has a continuous measurement (including fast and slow response measurement values ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>		
	The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:		
	a. PLX Feature (0x2A60)		
	i. Field: Supported Features		
	Format: 16 bit		
	<ul> <li>Value: 0000 0000 0011 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5).</li> </ul>		
	ii. Field: Measurement Status Support		
	This field is not included		
	iii. Field: Device and Sensor Status Support		
	This field is not included		
	b. PLX Continuous Measurement (0x2A5F)		
	i. Field: Flags		
	Format: 8 bit		
	<ul> <li>Value: 0000 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.</li> </ul>		
	ii. Field: SpO2PR-Normal - SpO2 (%)		
	Format: SFLOAT		
	Value: Not Relevant		
	iii. Field: SpO2PR-Normal – PR (bpm)		
	Format: SFLOAT		
	Value: Not Relevant		
	iv. Field: SpO2PR-Fast - SpO2 (%)		
	Format: SFLOAT		
	Value: Not Relevant		
	v. Field: SpO2PR-Fast - PR (bpm)		
	Format: SFLOAT		
	Value: Not Relevant		
	vi. Field: SpO2PR-Slow - SpO2 (%)		
	Format: SFLOAT		
	Value: Not Relevant		
	vii. Field: SpO2PR-Slow - PR (bpm)		
	Format: SFLOAT		
	Value: Not Relevant		
	viii. Field: Measurement Status		

	This field is not included		
	ix. Field: Device and Sensor Status		
	This field is not included		
	x. Field: Pulse Amplitude Index (%)		
	This field is not included		
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).		
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.		
	5. The simulated PHD sends the Measurement to the PHG under test.		
	Check in PHG transcoder output the SpO2 Numeric Object – Metric-Spec-Small attribute in all three SpO2 objects (continuous normal, fast and slow).		
Pass/Fail criteria	In Step 6,		
	There are three SpO2 objects (for normal, fast and slow measurement modes).		
	In all three objects, the SpO2 Numeric Object – Metric-Spec-Small attribute is present and its value is {0x0040} (mss-acc-agent-initiated).		
Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
,g,	Metric-Spec-Small attribute is present in all three SpO2 objects:		
	☐ Object: SpO2 Numeric Object		
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)		
	☐ Attribute-type: BITS-16		
	☐ Attribute-value: 00 40 (hex) or BITS mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE		
	b) WAN PCD-01 message		
	PCD-01 message does not include segments with Metric-Spec-Small attribute value		

		<u> </u>		
TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-013		
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) – Measurement-Status Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	SpO2 Numeric 7; M		
Test purpos	se	Check that:		
		PHG includes SpO2 Numeric Object – Measurement-Status attribute in transcoder output when using spot-check measurement mode.		
		[AND]		
		PHG transcodes the Bluetooth Measurement Status field of the PLX Spot-Check characteristic to 11073 Measurement-Status attribute properly		
Applicabilit	:y	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS		C_MAN_BLE_042		
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.		
Test procedure		1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). Simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.		
		The simulated PHD imple interest for this Test Case	ements several BTLE characteris e are:	stics. The characteristics of

- a. PLX Spot-Check Measurement (0x2A5E)
- b. PLX Feature (0x2A60)
  - i. Field: Supported Features
    - Format: 16 bit
    - Value: 0000 0000 0000 1101 (MSB → LSB). Measurement Status support is present (bit 0). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).
  - ii. Field: Measurement Status Support
    - Format: 16 bit
    - Value: 1111 1111 1110 0000 (MSB → LSB). All Measurement Status bits are supported
  - iii. Field: Device and Sensor Status Support
    - · This field is not included
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- 4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
- The simulated PHD sends the Measurement to the PHG under test with the following value:
  - a. PLX Spot-Check Measurement (0x2A5E)
    - i. Field: Flags
      - Format: 8 bit
      - Value: 0000 0011 (MSB → LSB). Measurement Status and Timestamp fields are present. Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.
    - ii. Field: SpO2PR-Spot-Check SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - iii. Field: SpO2PR-Spot-Check PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - iv. Field: Time Stamp
      - This field is not included
    - v. Field: Measurement Status
      - Format: 16 bit
      - Value: 1000 0000 0000 0000 (MSB → LSB). Invalid measurement detected (bit 15).
    - vi. Field: Device and Sensor Status
      - This field is not included
    - vii. Field: Pulse Amplitude Index (%)
      - This field is not included
- Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 7. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG

under test

- b) Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0100 0000 0000 0000 (MSB → LSB), questionable measurement detected (bit 14). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 10. IF C MAN BLE 042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 11. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0010 0000 0000 0000 (MSB → LSB), measurement not available (bit 13). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 12. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 13. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 14. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0001 0000 0000 0000 (MSB → LSB), calibration ongoing (bit 12). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 16. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 17. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 1000 0000 0000 (MSB → LSB), data for testing (bit 11). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 19. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 20. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0100 0000 0000 (MSB → LSB), data for demonstration (bit 10). All

- remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 21. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 22. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 23. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 1000 0000 (MSB → LSB), fully qualified data (bit 7). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 24. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 25. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 26. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0100 0000 (MSB → LSB), early estimated data (bit 6). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 27. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 28. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 29. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0010 0000 (MSB → LSB), measurement ongoing (bit 5). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute
- 31. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute

### Pass/Fail criteria

In Step 6, the SpO2 Numeric Object – Measurement-Status attribute is present and its set to "invalid" (0x8000). If PHG supports RACP, same criteria applies to 7.b.

In Step 9, the SpO2 Numeric Object – Measurement-Status attribute is present and its set to "questionable" (0x4000). If PHG supports RACP, same criteria applies to 10.b.

In Step 12, the SpO2 Numeric Object – Measurement-Status attribute is present and its set to "not-available" (0x2000). If PHG supports RACP, same criteria applies to 13.b.

In Step 15, the SpO2 Numeric Object - Measurement-Status attribute is present and its set to "calibration-ongoing" (0x1000). If PHG supports RACP, same criteria applies to 16.b. In Step 18, the SpO2 Numeric Object - Measurement-Status attribute is present and its set to "test-data" (0x0800). If PHG supports RACP, same criteria applies to 19.b. In Step 21, the SpO2 Numeric Object - Measurement-Status attribute is present and its set to "demo-data" (0x0400). If PHG supports RACP, same criteria applies to 22.b. In Step 24, the SpO2 Numeric Object - Measurement-Status attribute is present and its set to "validated-data" (0x0080). If PHG supports RACP, same criteria applies to 25.b. In Step 27, the SpO2 Numeric Object - Measurement-Status attribute is present and its set to "early-indication" (0x0040). If PHG supports RACP, same criteria applies to 28.b. In Step 30, the SpO2 Numeric Object - Measurement-Status attribute is present and its set to "msmt-ongoing" (0x0020). If PHG supports RACP, same criteria applies to 31.b. In step 6 (and step 7.b if applicable), possible values in typical points of observation after Notes transcoder output are: (To assist manual testina) IEEE 11073 Objects and Attributes Measurement-Status attribute is present: □ Object: SpO2 Numeric Object ☐ Attribute-id: MDC ATTR MSMT STAT (2375) ☐ Attribute-type: BITS16 ☐ Attribute-value: 80 00 (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):  $OBX|n|NM|150456^{\wedge}MDC\_PULS\_OXIM\_SAT\_O2^{\wedge}MDC|m.0.0.x|[value]|$ 262688^MDC\_DIM\_PERCENT^MDC||INV|||X|||[current\_date\_time] In step 9 (and step 10.b if applicable), possible values in typical points of observation after transcoder output are: IEEE 11073 Objects and Attributes Measurement-Status attribute is present: □ Object: SpO2 Numeric Object ☐ Attribute-id: MDC ATTR MSMT STAT (2375) ☐ Attribute-type: BITS16 ☐ Attribute-value: 40 00 (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11): OBX|n|NM|150456^MDC\_PULS\_OXIM\_SAT\_O2^MDC|m.0.0.x|[value]| 262688^MDC\_DIM\_PERCENT^MDC||QUES|||R|||[current\_date\_time] In step 12 (and step 13.b if applicable), possible values in typical points of observation after transcoder output are: IEEE 11073 Objects and Attributes Measurement-Status attribute is present: □ Object: SpO2 Numeric Object ☐ Attribute-id: MDC\_ATTR\_MSMT\_STAT (2375) ☐ Attribute-type: BITS16 ☐ Attribute-value: 20 00 (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):

		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>NAV</b>     <b>X</b>    [current_date_time]
		15 (and step 16.b if applicable), possible values in typical points of observation after der output are:
a)	IEE	E 11073 Objects and Attributes
	Me	asurement-Status attribute is present:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: 10 00 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>CAL</b>     <b>R</b>    [current_date_time]
	•	18 (and step 19.b if applicable), possible values in typical points of observation after der output are:
a)	IEE	E 11073 Objects and Attributes
	Me	asurement-Status attribute is present:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: 08 00 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>TEST</b>     <b>R</b>    [current_date_time]
		21 (and step 22.b if applicable), possible values in typical points of observation after der output are:
a)	IEE	E 11073 Objects and Attributes
	Me	asurement-Status attribute is present:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: <b>04 00</b> (hex)
b)	WA	N PCD-01 message
-		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>DEMO</b>     <b>R</b>    [current_date_time]
	-	24 (and step 25.b if applicable), possible values in typical points of observation after der output are:
a)	IEE	E 11073 Objects and Attributes
	Me	asurement-Status attribute is present:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16

		Attribute-value: 00 80 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC      F   [current_date_time]
		27 (and step 28.b if applicable), possible values in typical points of observation after der output are:
a)	IEE	E 11073 Objects and Attributes
	Ме	asurement-Status attribute is present:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: 00 40 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>EARLY</b>     <b>R</b>    [current_date_time]
	n step 30 (and step 31.b if applicable), possible values in typical points of observation after anscoder output are:	
a)	IEE	E 11073 Objects and Attributes
	Me	asurement-Status attribute is present:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: 00 20 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC  BUSY   X   [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-014			
TP label		Whitepaper. SpO2 Numeric Object (Continuous Measurements) – Measurement-Status Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	SpO2 Numeric 17; M			
Test purpos	se	Check that:			
		PHG includes SpO2 Numeric Object – Measurement-Status attribute in transcoder output when using continuous measurements.			
		[AND]			
		PHG transcodes the Bluetooth Measurement Status field of the PLX Continuous Measurement characteristic to 11073 Measurement-Status attribute properly			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS					
Initial cond	ial condition The PHG under test and the simulated PHD are in the Standby state.				

### Test procedure

- 1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).
- The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:
  - a. PLX Continuous Measurement (0x2A5F)
  - b. PLX Feature (0x2A60)
    - i. Field: Supported Features
      - Format: 16 bit
      - Value: 0000 0000 0011 0001 (MSB → LSB). Measurement Status support is present (bit 0). Fast and slow response modes are supported (bits 4 and 5).
    - ii. Field: Measurement Status Support
      - Format: 16 bit
      - Value: 1111 1111 1110 0000 (MSB → LSB). All Measurement Status bits are supported
    - iii. Field: Device and Sensor Status Support
      - This field is not included
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- 4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test with the following value:
  - a. PLX Continuous Measurement (0x2A5F)
    - i. Field: Flags
      - Format: 8 bit
      - Value: 0000 0111 (MSB → LSB). Measurement Status, SpO2PR-Fast and SpO2PR-Slow fields are present. Device and Sensor Status and Pulse Amplitude Index fields are not present.
    - ii. Field: SpO2PR-Normal SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - iii. Field: SpO2PR-Normal PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - iv. Field: SpO2PR-Fast SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - v. Field: SpO2PR-Fast PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - vi. Field: SpO2PR-Slow SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - vii. Field: SpO2PR-Slow PR (bpm)
      - Format: SFLOAT

Value: Not Relevant

viii. Field: Measurement Status

- Format: 16 bit
- Value: 1000 0000 0000 0000 (MSB → LSB). Invalid measurement detected (bit 15).
- ix. Field: Device and Sensor Status
  - This field is not included
- x. Field: Pulse Amplitude Index (%)
  - This field is not included
- 6. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.
- 7. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0100 0000 0000 0000 (MSB → LSB), questionable measurement detected (bit 14). All remaining fields remain equal to those in step 5.
- 8. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.
- 9. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0010 0000 0000 0000 (MSB → LSB), measurement not available (bit 13). All remaining fields remain equal to those in step 5.
- Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.
- 11. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0001 0000 0000 0000 (MSB → LSB), calibration ongoing (bit 12). All remaining fields remain equal to those in step 5.
- 12. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.
- 13. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 1000 0000 0000 (MSB → LSB), data for testing (bit 11). All remaining fields remain equal to those in step 5.
- 14. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.
- 15. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0100 0000 0000 (MSB → LSB), data for demonstration (bit 10). All remaining fields remain equal to those in step 5.
- 16. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.
- 17. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 1000 0000 (MSB → LSB), fully qualified data (bit 7). All remaining fields remain equal to those in step 5.
- 18. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.
- 19. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0100 0000 (MSB → LSB), early estimated data (bit 6). All remaining fields remain equal to those in step 5.
- 20. Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.
- 21. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0010 0000 (MSB → LSB), measurement ongoing (bit 5). All remaining fields remain equal to those in step 5.
- Check in PHG transcoder output the SpO2 Numeric Object Measurement-Status attribute in all three SpO2 objects.

## Pass/Fail criteria

In Step 6, the SpO2 Numeric Object – Measurement-Status attribute is present in all three SpO2 objects and its set to "invalid" (0x8000)

In Step 8, the SpO2 Numeric Object – Measurement-Status attribute is present in all three

SpO2 objects and its set to "questionable" (0x4000) In Step 10, the SpO2 Numeric Object - Measurement-Status attribute is present in all three SpO2 objects and its set to "not-available" (0x2000) In Step 12, the SpO2 Numeric Object - Measurement-Status attribute is present in all three SpO2 objects and its set to "calibration-ongoing" (0x1000) In Step 14, the SpO2 Numeric Object - Measurement-Status attribute is present in all three SpO2 objects and its set to "test-data" (0x0800) In Step 16, the SpO2 Numeric Object - Measurement-Status attribute is present in all three SpO2 objects and its set to "demo-data" (0x0400) In Step 18, the SpO2 Numeric Object - Measurement-Status attribute is present in all three SpO2 objects and its set to "validated-data" (0x0080) In Step 20, the SpO2 Numeric Object - Measurement-Status attribute is present in all three SpO2 objects and its set to "early-indication" (0x0040) In Step 22, the SpO2 Numeric Object - Measurement-Status attribute is present in all three SpO2 objects and its set to "msmt-ongoing" (0x0020) **Notes** In step 6, possible values in typical points of observation after transcoder output are: (To assist manual IEEE 11073 Objects and Attributes testing) Measurement-Status attribute is present in all three SpO2 objects: □ Object: SpO2 Numeric Object ☐ Attribute-id: MDC\_ATTR\_MSMT\_STAT (2375) ☐ Attribute-type: BITS16 ☐ Attribute-value: 80 00 (hex) WAN PCD-01 message PCD-01 message includes a segment like for each SpO2 object this with Measurement-Status attribute value (check OBX-8 and OBX-11): OBXInINMI150456^MDC PULS OXIM SAT O2^MDCIm.0.0.xl[value]| 262688^MDC\_DIM\_PERCENT^MDC||INV|||X|||[current\_date\_time] In step 8, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Measurement-Status attribute is present in all three SpO2 objects: □ Object: SpO2 Numeric Object ☐ Attribute-id: MDC\_ATTR\_MSMT\_STAT (2375) ☐ Attribute-type: BITS16 ☐ Attribute-value: 40 00 (hex) WAN PCD-01 message PCD-01 message includes a segment like this for each SpO2 object with Measurement-Status attribute value (check OBX-8 and OBX-11): OBXIn|NM|150456^MDC PULS OXIM SAT O2^MDC|m.0.0.x|[value]| 262688^MDC\_DIM\_PERCENT^MDC||QUES|||R|||[current\_date\_time] In step 10, possible values in typical points of observation after transcoder output are: IEEE 11073 Objects and Attributes Measurement-Status attribute is present in all three SpO2 objects: □ Object: SpO2 Numeric Object ☐ Attribute-id: MDC\_ATTR\_MSMT\_STAT (2375) ☐ Attribute-type: BITS16 ☐ Attribute-value: 20 00 (hex) WAN PCD-01 message PCD-01 message includes a segment like this for each SpO2 object with Measurement-Status attribute value (check OBX-8 and OBX-11):

		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>NAV</b>     <b>X</b>    [current_date_time]
In s	step 1	12, possible values in typical points of observation after transcoder output are:
a)	IEE	E 11073 Objects and Attributes
	Mea	asurement-Status attribute is present in all three SpO2 objects:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: 10 00 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this for each SpO2 object with Measurement-tus attribute value (check OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>CAL</b>     <b>R</b>    [current_date_time]
In s	step 1	14, possible values in typical points of observation after transcoder output are:
a)	IEE	E 11073 Objects and Attributes
	Mea	asurement-Status attribute is present in all three SpO2 objects:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: 08 00 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this for each SpO2 object with Measurement-tus attribute value (check OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>TEST</b>     <b>R</b>    [current_date_time]
In s	step 1	16, possible values in typical points of observation after transcoder output are:
a)	IEE	E 11073 Objects and Attributes
	Mea	asurement-Status attribute is present in all three SpO2 objects:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: <b>04 00</b> (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this for each SpO2 object with Measurement-tus attribute value (check OBX-8 and OBX-11):
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>DEMO</b>     <b>R</b>    [current_date_time]
In s	step 1	18, possible values in typical points of observation after transcoder output are:
a)	IEE	E 11073 Objects and Attributes
	Mea	asurement-Status attribute is present in all three SpO2 objects:
		Object: SpO2 Numeric Object
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)
		Attribute-type: BITS16
		Attribute-value: 00 80 (hex)
b)	WA	N PCD-01 message
	PCI	D-01 message includes a segment like this for each SpO2 object with Measurement-

	Stat	us attribute value (check OBX-8 and OBX-11):		
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC       <b>F</b>    [current_date_time]			
In	In step 20, possible values in typical points of observation after transcoder output are:			
a)	IEE	IEEE 11073 Objects and Attributes		
	Mea	surement-Status attribute is present in all three SpO2 objects:		
		Object: SpO2 Numeric Object		
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)		
		Attribute-type: BITS16		
		Attribute-value: 00 40 (hex)		
b)	1AW	N PCD-01 message		
		0-01 message includes a segment like this for each SpO2 object with Measurementus attribute value (check OBX-8 and OBX-11):		
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>EARLY</b>     <b>R</b>    [current_date_time]			
In	step 22, possible values in typical points of observation after transcoder output are:			
a)	IEEE 11073 Objects and Attributes			
	Measurement-Status attribute is present in all three SpO2 objects:			
		Object: SpO2 Numeric Object		
		Attribute-id: MDC_ATTR_MSMT_STAT (2375)		
		Attribute-type: BITS16		
		Attribute-value: 00 20 (hex)		
b)	1AW	N PCD-01 message		
		0-01 message includes a segment like this for each SpO2 object with Measurementus attribute value (check OBX-8 and OBX-11):		
		OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC   <b>BUSY</b>     <b>X</b>    [current_date_time]		

TD		TOUR DAAMEN OF DESTAUDING AS			
TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-015			
TP label	T	Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) – Unit-Code Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	SpO2 Numeric 8; M			
Test purpos	se	Check that:			
		PHG includes SpO2 Numeric Object –Unit-Code attribute in transcoder output when using spot-check measurement mode.			
		[AND]			
		Unit-Code is set to MDC_DIM_PERCENT			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS		C_MAN_BLE_042			
Initial condi	nitial condition The PHG under test and the simulated PHD are in the Standby state.				
Test procedure		<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>			
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:			
		a. PLX Features (0x2A60)			

	i. Field: Supported Features
	Format: 16 bit
	<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>
	ii. Field: Measurement Status Support
	This field is not included
	iii. Field: Device and Sensor Status Support
	This field is not included
	b. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present. Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	6. Check in PHG transcoder output the SpO2 Numeric Object – Unit-Code attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
	b) Check in PHG transcoder output the SpO2 Numeric Object – Unit-Code attribute
Pass/Fail criteria	In Step 6, the SpO2 Numeric Object – Unit-Code attribute is present and its set to MDC_DIM_PERCENT.
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes

Unit-Code attribute is present:		
	□ Object: SpO2 Numeric Object	
	☐ Attribute-id: MDC_ATTR_UNIT_CODE (2454)	
	☐ Attribute-type: INT-U16	
	☐ Attribute-value: MDC_DIM_PERCENT or 544 (dec) or 02 20 (hex)	
b)	WAN PCD-01 message	
	PCD-01 message includes a segment like this with Unit-Code attribute value (check OBX-6):	
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]	

TP ld	Id TP/LP-PAN/PHG/PHDTW/PLX/BV-016								
TP label		Whitepaper. SpO2 Numeric Object (Continuous Measurements) – Unit-Code Attribute							
Coverage	Spec	[Bluetooth PHDT v1.6]							
	Testable items	oO2 Numeric 18; M							
Test purpo	se	Check that:							
		PHG includes SpO2 Numeric Object – Unit-Code attribute in transcoder output when using continuous measurements.							
		[AND]							
		nit-Code is set to MDC_DIM_PERCENT							
Applicabilit	y	_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MA	AN_BLE_040						
Other PICS									
Initial cond	ition	ne PHG under test and the simulated PHD are in the	Standby state.						
Test procedure		<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>							
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:							
		a. PLX Feature (0x2A60)							
		i. Field: Supported Features							
		Format: 16 bit							
		<ul> <li>Value: 0000 0000 0011 0000 (MSB modes are supported (bits 4 and 5).</li> </ul>	→ LSB). Fast and slow response						
		ii. Field: Measurement Status Support							
		<ul> <li>This field is not included</li> </ul>							
		iii. Field: Device and Sensor Status Support							
		<ul> <li>This field is not included</li> </ul>							
		b. PLX Continuous Measurement (0x2A5F)							
		i. Field: Flags							
		Format: 8 bit							
		<ul> <li>Value: 0000 0011(MSB → LSB). Sponsore.</li> <li>present. Measurement Status, Device Amplitude Index fields are not present.</li> </ul>							
		ii. Field: SpO2PR-Normal - SpO2 (%)							
		Format: SFLOAT							
		<ul> <li>Value: Not Relevant</li> </ul>							

	iii. Field: SpO2PR-Normal – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: SpO2PR-Fast - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	v. Field: SpO2PR-Fast - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	vi. Field: SpO2PR-Slow - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	vii. Field: SpO2PR-Slow - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	viii. Field: Measurement Status
	This field is not included
	ix. Field: Device and Sensor Status
	This field is not included
	x. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	Check in PHG transcoder output the SpO2 Numeric Object – Unit-Code attribute in all three SpO2 objects (continuous normal, fast and slow).
Pass/Fail criteria	In Step 6,
	There are three SpO2 objects (for normal, fast and slow measurement modes).
	In all three objects, the SpO2 Numeric Object – Unit-Code attribute is present and its set to MDC_DIM_PERCENT.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
3,	Unit-Code attribute is present in all three SpO2 objects:
	☐ Object: SpO2 Numeric Object
	☐ Attribute-id: MDC_ATTR_UNIT_CODE (2454)
	☐ Attribute-type: INT-U16
	☐ Attribute-value: MDC_DIM_PERCENT or 544 (dec) or 02 20 (hex)
	b) WAN PCD-01 message
	PCD-01 message includes a segment like this for each SpO2 object with Unit-Code attribute value (check OBX-6):
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]

TP ld		TP/LP-PA	N/PHG/PHDT	W/PLX/BV-017			
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) – Absolute-Time-Stamp Attribute					
Coverage	Spec	[Bluetooth PHDT v1.6]					
	Testable	SpO2 Nur	meric 9; M	Date-Time Conv 2; M	Date-Time Conv 3; M		
	items	Date-Time	e Conv 4; M	Date-Time Conv 5; M			
Test purpos	ie	Check that:					
		PHG transcodes Time Stamp field of Spot-Check Measurement characteristic into SpO2 Numeric Object - Absolute-Time-Stamp attribute [AND]					
		PHG trans	scodes the Blu	uetooth Time Stamp field form	nat to Absolute Time format		
		[AND]					
		The fraction	on of seconds	in Absolute Time at transcode	er output is 0		
Applicability	y	C_MAN_E	BLE_000 AND	C_MAN_BLE_002 AND C_N	/IAN_BLE_040		
Other PICS		C_MAN_E	BLE_042				
Initial condi	tion	The PHG	under test and	d the simulated PHD are in the	e Standby state.		
Test procedure		has a disco	Spot-Check rverable). The	measurement ready to be sen	ximeter Profile (device specialization), it and it is in Advertising state (it is the RACP characteristic and has an ored.		
			simulated PHD est for this Tes		naracteristics. The characteristics of		
		a. PLX Features (0x2A60)					
		i.	. Field: Sup	ported Features			
			• Forma	at: 16 bit			
			spot-o		B → LSB). Measurement Storage for orted (bit 2). Timestamp for Spot-Check		
		i	i. Field: Mea	asurement Status Support			
			• This f	ield is not included			
		i	ii. Field: Dev	ice and Sensor Status Suppo	rt		
			• This f	ield is not included			
		b. F	PLX Spot-Che	ck Measurement (0x2A5E)			
		i.	. Field: Flag	gs			
			• Forma	at: 8 bit			
			Status		imestamp field is present. Measurement and Pulse Amplitude Index fields are		
		ii	i. Field: SpC	)2PR-Spot-Check - SpO2 (%)			
			• Forma	at: SFLOAT			
			<ul> <li>Value</li> </ul>	: Not Relevant			
		ii	ii. Field: SpC	02PR-Spot-Check – PR (bpm)	)		
			• Forma	at: SFLOAT			
			<ul> <li>Value</li> </ul>	: Not Relevant			
			v. Field: Time	e Stamp			
			• Forma	at: Date and Time			
			• Value	e: October 12nd, 2015, 10:39:2	27		

	v. Field: Measurement Status				
	This field is not included				
	vi. Field: Device and Sensor Status				
	This field is not included				
	vii. Field: Pulse Amplitude Index (%)				
	This field is not included				
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).				
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.				
	5. The simulated PHD sends the Measurement to the PHG under test.				
	Check in PHG transcoder output the SpO2 Numeric Object – Absolute-Time-Stamp attribute				
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN				
	<ul> <li>The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test</li> </ul>				
	b) Check in PHG transcoder output the SpO2 Numeric Object – Absolute-Time-Stamp attribute				
Pass/Fail criteria	In Step 6, the SpO2 Numeric Object – Absolute-Time-Stamp attribute is present, its value matches with Time Stamp field of Spot-Check Measurement characteristic and fraction of seconds is set to 0.				
	If the PHG supports RACP, the same criteria applies to Step 7.b.				
Notes	Possible values in typical points of observation after transcoder output are:				
(To assist manual testing)	a) IEEE 11073 Objects and Attributes				
3,	Absolute-Time-Stamp attribute is present:				
	☐ Object: SpO2 Numeric Object				
	☐ Attribute-id: MDC_ATTR_TIME_STAMP_ABS (2448)				
	Attribute-type: SEQUENCE {century (INT-U8), year (INT-U8), month (INT-U8), day (INT-U8), hour (INT-U8), minute (INT-U8), second (INT-U8), sec-fractions (INT-U8)} (BCD encoding)				
	☐ Attribute-value:				
	• century: 20 (hex) or 32 (dec)				
	<ul> <li>year: 15 (hex) or 21 (dec)</li> </ul>				
	month: 10 (hex) or 16 (dec)				
	day: 12 (hex) or 18 (dec)				
	hour: 10 (hex) or 16 (dec)				
	<ul> <li>minute: 39 (hex) or 57 (dec)</li> </ul>				
	• second: 27 (hex) or 39 (dec)				
	sec-fractions: 00 (hex) or 0 (dec)				
	b) WAN PCD-01 message				
	PCD-01 message includes a segment like this with Absolute-Time-Stamp attribute value (check OBX-14):				
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC    R    <b>20151012103927+0000</b>				

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-018				
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) – Basic-Nu-Observed-Value Attribute 1				
Coverage	Spec	[Bluetooth PHDT v1.6]				
	Testable items	SpO2 Numeric 10; M Short Float Type 1; C				
Test purpos	se	Check that:				
		PHG transcodes SpO2 value of the SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic into SpO2 Numeric Object - Basic-Nu-Observed-Value attribute				
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS		C_MAN_BLE_042				
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.				
Test proced	dure	The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a Spot-Check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.				
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:      The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:      The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
		a. PLX Features (0x2A60)				
		i. Field: Supported Features				
		• Format: 16 bit				
		<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>				
		ii. Field: Measurement Status Support				
		This field is not included				
		iii. Field: Device and Sensor Status Support				
		This field is not included				
		b. PLX Spot-Check Measurement (0x2A5E)				
		i. Field: Flags				
		Format: 8 bit				
		<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present. Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>				
		ii. Field: SpO2PR-Spot-Check - SpO2 (%)				
		Format: SFLOAT				
		• Value: 96.0 (%)				
		iii. Field: SpO2PR-Spot-Check – PR (bpm)				
		Format: SFLOAT				
		Value: Not Relevant				
		iv. Field: Time Stamp				
		Format: Date and Time				
		Value: Not Relevant				
		v. Field: Measurement Status				
		This field is not included				
		vi. Field: Device and Sensor Status				
		This field is not included				

	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
	<ul> <li>b) Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed- Value attribute</li> </ul>
Pass/Fail criteria	In Step 6, the SpO2 Numeric Object – Basic-Nu-Observed-Value attribute is present and its value matches with the value of the SpO2 subfield of the SpO2PR-Spot-Check field in the PLX Spot-Check Measurement characteristic (96.0%).
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
,g,	Basic-Nu-Observed-Value attribute is present:
	☐ Object: SpO2 Numeric Object
	☐ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
	☐ Attribute-type: SFLOAT
	☐ Attribute-value: 00 60 (hex) or F3C0 (hex) or 96.0 (dec)
	b) WAN PCD-01 message
	PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribute value (check OBX-5):
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x  <b>96.0</b>   262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-019				
TP label		Whitepaper. SpO2 Numeric Object (Spot-Check Measurement) – Basic-Nu-Observed-Value Attribute 2				
Coverage	Spec	[Bluetooth PHDT v1.6]				
	Testable items	SpO2 Numeric 10; M	SpO2 Numeric 20; M	Short Float Type 2; M		
Test purpose		Measurement characteristic in [AND]	of the SpO2PR-Spot-Check field to SpO2 Numeric Object - Basic	c-Nu-Observed-Value attribute		
Applicability		PHG assigns special value NaN (0x07FF) when SpO2 value is unavailable.  C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS		C_MAN_BLE_042				
Initial condition		The PHG under test and the simulated PHD are in the Standby state.				
Test procedure			figured with a Pulse Oximeter Prement ready to be sent and it is	` ' '		

- discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.
- The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:
  - a. PLX Features (0x2A60)
    - i. Field: Supported Features
      - Format: 16 bit
      - Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).
    - ii. Field: Measurement Status Support
      - · This field is not included
    - iii. Field: Device and Sensor Status Support
      - · This field is not included
- b. PLX Spot-Check Measurement (0x2A5E)
  - i. Field: Flags
    - Format: 8 bit
    - Value: 0000 0001 (MSB → LSB). Timestamp field is present. Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.
  - ii. Field: SpO2PR-Spot-Check SpO2 (%)
    - Format: SFLOAT
    - Value: 07 FF (hex). Special value: NaN
  - iii. Field: SpO2PR-Spot-Check PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - iv. Field: Time Stamp
    - Format: Date and Time
    - Value: Not Relevant
  - v. Field: Measurement Status
    - This field is not included
  - vi. Field: Device and Sensor Status
    - · This field is not included
  - vii. Field: Pulse Amplitude Index (%)
    - · This field is not included
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- 4. When the pairing has been completed (Connection state), force the PHG under test to read PLX Features characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test.
- Check in PHG transcoder output the SpO2 Numeric Object Basic-Nu-Observed-Value attribute
- 7. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in PHG transcoder output the SpO2 Numeric Object Basic-Nu-Observed-Value attribute

Pass/Fail criteria	In Step 6, the SpO2 Numeric Object – Basic-Nu-Observed-Value attribute is present and its value is 0x07FF (NaN).				
	If the PHG supports RACP, the same criteria applies to Step 7.b.				
Notes	Possible values in typical points of observation after transcoder output are:				
(To assist manual testing)	a) IEEE 11073 Objects and Attributes				
	Basic-Nu-Observed-Value attribute is present:				
	□ Object: SpO2 Numeric Object				
	☐ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)				
	☐ Attribute-type: SFLOAT				
	☐ Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)				
	b) WAN PCD-01 message				
	PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribute value (check OBX-5):				
	OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x   262688^MDC_DIM_PERCENT^MDC  NAN   X   [current_date_time]				

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-020				
TP label		Whitepaper. SpO2 Numeric Object (Continuous Measurements) – Basic-Nu-Observed-Value Attribute 1				
Coverage	Spec	[Bluetooth PHDT v1.6]				
	Testable items	SpO2 Numeric 19; M Short	Float Type 1; C			
Test purpos	se	Check that:				
		PHG transcodes SpO2 value of characteristic into SpO2 Numer Observed-Value attribute		in PLX Continuous Measurement lal response) - Basic-Nu-		
		[AND]				
		PHG transcodes SpO2 value of characteristic into SpO2 Numer Value attribute		PLX Continuous Measurement response) - Basic-Nu-Observed-		
		[AND]				
		PHG transcodes SpO2 value of the SpO2PR-Slow field in PLX Continuous Measurement characteristic into SpO2 Numeric Object (Continuous slow response) - Basic-Nu-Observed-Value attribute				
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS						
Initial condi	ition	The PHG under test and the sir	nulated PHD are in the Star	ndby state.		
Test proced	lure	The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).				
		The Simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
		a. PLX Feature (0x2A60)				
		i. Field: Supported Features				
		Format: 16 bit				
		<ul> <li>Value: 0000 0000 0011 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5).</li> </ul>				
		ii. Field: Measurement Status Support				
		This field is not included				

- Field: Device and Sensor Status SupportThis field is not included
- b. PLX Continuous Measurement (0x2A5F)
  - i. Field: Flags
    - Format: 8 bit
    - Value: 0000 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.
  - ii. Field: SpO2PR-Normal SpO2 (%)
    - Format: SFLOAT
    - Value: 96.0 (%)
  - iii. Field: SpO2PR-Normal PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - iv. Field: SpO2PR-Fast SpO2 (%)
    - Format: SFLOAT
    - Value: 98.0 (%)
  - v. Field: SpO2PR-Fast PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - vi. Field: SpO2PR-Slow SpO2 (%)
    - Format: SFLOAT
    - Value: 94.0 (%)
  - vii. Field: SpO2PR-Slow PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - viii. Field: Measurement Status
  - ix. Field: Device and Sensor Status

This field is not included

- This field is not included
- x. Field: Pulse Amplitude Index (%)
  - This field is not included
- The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- 4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test.
- 6. Check in PHG transcoder output the SpO2 Numeric Object Basic-Nu-Observed-Value attribute in all three SpO2 objects.

# Pass/Fail criteria

## In Step 6,

- The SpO2 Numeric Object (Continuous measurement normal) Basic-Nu-Observed-Value attribute is present and its value matches with the value of the SpO2 subfield of the SpO2PR-Normal field in the PLX Continuous Measurement characteristic (96.0%).
- The SpO2 Numeric Object (Continuous measurement fast) Basic-Nu-Observed-Value attribute is present and its value matches with the value of the SpO2 subfield of the SpO2PR-Fast field in the PLX Continuous Measurement characteristic (98.0%).

The SpO2 Numeric Object (Continuous measurement slow) - Basic-Nu-Observed-Value attribute is present and its value matches with the value of the SpO2 subfield of the SpO2PR-Slow field in the PLX Continuous Measurement characteristic (94.0%). Possible values in typical points of observation after transcoder output are: Notes (To assist manual IEEE 11073 Objects and Attributes testing) SpO2 Numeric object (Continuous measurement normal): Supplemental-types attribute is not present. Basic-Nu-Observed-Value attribute is present: □ Object: SpO2 Numeric Object ☐ Attribute-id: MDC\_ATTR\_NU\_VAL\_OBS\_BASIC (2636) ☐ Attribute-type: SFLOAT Attribute-value: 00 60 (hex) or F3 C0 (hex) or 96.0 (dec) SpO2 Numeric object (Continuous measurement fast): Supplemental-types attribute is present: □ Object: SpO2 Numeric Object (fast response) ☐ Attribute-id: MDC ATTR SUPPLEMENTAL TYPES (2657) Attribute-type: SEQUENCE of SEQUENCE (partition (INT-U16), code (INT-Attribute-value: {MDC\_PART\_SCADA, MDC\_MODALITY\_FAST}. Basic-Nu-Observed-Value attribute is present: □ Object: SpO2 Numeric Object ☐ Attribute-id: MDC\_ATTR\_NU\_VAL\_OBS\_BASIC (2636) ☐ Attribute-type: SFLOAT ☐ Attribute-value: 00 62 (hex) or F3D4 (hex) or 98.0 (dec) SpO2 Numeric object (Continuous measurement slow): Supplemental-types attribute is present: Object: SpO2 Numeric Object (slow response) ☐ Attribute-id: MDC\_ATTR\_SUPPLEMENTAL\_TYPES (2657) Attribute-type: SEQUENCE of SEQUENCE (partition (INT-U16), code (INT-U16)} ☐ Attribute-value: {MDC\_PART\_SCADA, MDC\_MODALITY\_SLOW}. • Basic-Nu-Observed-Value attribute is present: ■ Object: SpO2 Numeric Object ☐ Attribute-id: MDC\_ATTR\_NU\_VAL\_OBS\_BASIC (2636) ☐ Attribute-type: SFLOAT ☐ Attribute-value: 00 5E (hex) or F3AC (hex) or 94.0 (dec) WAN PCD-01 message SpO2 Numeric object (Continuous measurement normal): PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribute value (check OBX-5): OBX|n|NM|150456^MDC\_PULS\_OXIM\_SAT\_O2^MDC|m.0.0.x|96.0| 262688^MDC\_DIM\_PERCENT^MDC|||||R|||[current\_date\_time] SpO2 Numeric object (Continuous measurement fast): PCD-01 message includes two segments like these for SpO2 Numeric object (Fast response), with Basic-Nu-Observed-Value attribute and Supplemental-Types attribute values (check OBX-5 in both segments): OBX|n|NM|150456^MDC\_PULS\_OXIM\_SAT\_O2^MDC|m.0.0.x|98.0|

262688^MDC_DIM_PERCENT^MDC    R   [current_date_time]
OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  150580^MDC_MODALITY_FAST^MDC        obx-11 of the parent]
SpO2 Numeric object (Continuous measurement slow):
PCD-01 message includes two segments like these for SpO2 Numeric object (Slow response), with Basic-Nu-Observed-Value attribute and Supplemental-Types attribute values (check OBX-5 in both segments):
OBX n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x  <b>94.0</b>   262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]
OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  150580^MDC_MODALITY_SLOW^MDC     [obx-11 of the parent]

TP ld		TP/LP-PAN/PHG/PHDTV	V/PLX/BV-021				
TP label		Whitepaper. SpO2 Numeric Object (Continuous Measurements) – Basic-Nu-Observed-Value Attribute 2					
Coverage	Spec	[Bluetooth PHDT v1.6]					
	Testable items	SpO2 Numeric 19; M	SpO2 Numeric 20; M	Short Float Type 2; M			
Test purpo	se	Check that:					
		PHG transcodes SpO2 value of the SpO2PR-Normal field in PLX Continuous Measurement characteristic into SpO2 Numeric Object (Continuous normal response) - Basic-Nu-Observed-Value attribute					
		[AND]					
			alue of the SpO2PR-Fast field in Numeric Object (Continuous fast	PLX Continuous Measurement response) - Basic-Nu-Observed-			
		[AND]					
			alue of the SpO2PR-Slow field in Numeric Object (Continuous slow	PLX Continuous Measurement response) - Basic-Nu-Observed-			
		[AND]					
		PHG assigns special value NaN (0x07FF) when SpO2 value is unavailable.					
Applicabili	ty	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040					
Other PICS	}						
Initial cond	lition	The PHG under test and	the simulated PHD are in the Sta	ndby state.			
Test proce	dure	has a continuous me		ter Profile (device specialization), it ow response measurement values) discoverable).			
		The simulated PHD interest for this Test	mplements several BTLE charac Case are:	teristics. The characteristics of			
		a. PLX Feature (0)	(2A60)				
		i. Field: Supp	orted Features				
		<ul> <li>Format</li> </ul>	:: 16 bit				
			0000 0000 0011 0000 (MSB → L are supported (bits 4 and 5).	SB). Fast and slow response			
		ii. Field: Meas	urement Status Support				
		This fie	eld is not included				
		iii. Field: Devid	e and Sensor Status Support				
		This fie	eld is not included				
		b. PLX Continuous	Measurement (0x2A5F)				

<ul> <li>Format: 8 bit</li> <li>Value: 0000 0011 (MSB → LSB). Sp02PR-Fast, Sp02PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.</li> <li>iii. Field: Sp02PR-Normal - Sp02 (%)</li> <li>Format: SFL0AT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>iii. Field: Sp02PR-Normal - PR (bpm)</li> <li>Format: SFL0AT</li> <li>Value: Not Relevant</li> <li>iv. Field: Sp02PR-Fast - Sp02 (%)</li> <li>Format: SFL0AT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>V. Field: Sp02PR-Fast - PR (bpm)</li> <li>Format: SFL0AT</li> <li>Value: Not Relevant</li> <li>vi. Field: Sp02PR-Fast - PR (bpm)</li> <li>Format: SFL0AT</li> <li>Value: Not Relevant</li> <li>vi. Field: Sp02PR-Slow - Sp02 (%)</li> <li>Format: SFL0AT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>vii. Field: Sp02PR-Slow - PR (bpm)</li> <li>Format: SFL0AT</li> <li>Value: Not Relevant</li> <li>viii. Field: Measurement Status</li> <li>This field is not included</li> <li>ix. Field: Device and Sensor Status</li> <li>This field is not included</li> <li>x. Field: Pulse Amplitude Index (%)</li> <li>This field is not included</li> <li>3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> <li>4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.</li> <li>5. The simulated PHD sends the Measurement to the PHG under test.</li> <li>6. Check in PHG transcoder output the Sp02 Numeric Object – Basic-Nu-Observed-Value attribute for all Sp02 objects.</li> </ul>		i. Field: Flags
<ul> <li>Value: 0000 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.</li> <li>iii. Field: SpO2PR-Normal - SpO2 (%)</li> <li>Format: SFLOAT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>iii. Field: SpO2PR-Normal - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>iv. Field: SpO2PR-Fast - SpO2 (%)</li> <li>Format: SFLOAT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>V. Field: SpO2PR-Fast - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>vi. Field: SpO2PR-Slow - SpO2 (%)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>vii. Field: SpO2PR-Slow - SpO2 (%)</li> <li>Format: SFLOAT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>viii. Field: SpO2PR-Slow - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>viii. Field: SpO2PR-Slow - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>viii. Field: Measurement Status</li> <li>This field is not included</li> <li>ix. Field: Device and Sensor Status</li> <li>This field is not included</li> <li>x. Field: Pulse Amplitude Index (%)</li> <li>This field is not included</li> <li>3. The PHG under test intitates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> <li>4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.</li> <li>5. The simulated PHD sends the Measurement to the PHG under test.</li> <li>6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value</li> </ul>		
present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.  ii. Field: Sp02PR-Normal - Sp02 (%)  • Format: SFLOAT  • Value: 07 FF (hex). Special value: NaN  iii. Field: Sp02PR-Normal - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  iv. Field: Sp02PR-Fast - Sp02 (%)  • Format: SFLOAT  • Value: Not Ff (hex). Special value: NaN  v. Field: Sp02PR-Fast - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  vi. Field: Sp02PR-Fast - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  vi. Field: Sp02PR-Slow - Sp02 (%)  • Format: SFLOAT  • Value: 07 FF (hex). Special value: NaN  vii. Field: Sp02PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: Sp02PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: Measurement Status  • This field is not included  ix. Field: Device and Sensor Status  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Sp02 Numeric Object – Basic-Nu-Observed-Value		
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Value: 07 FF (hex). Special value: NaN  iii. Field: SpO2PR-Normal - PR (bpm)  Format: SFLOAT  Value: Not Relevant  iv. Field: SpO2PR-Fast - SpO2 (%)  Format: SFLOAT  Value: 07 FF (hex). Special value: NaN  V. Field: SpO2PR-Fast - PR (bpm)  Format: SFLOAT  Value: Not Relevant  vi. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: Not Relevant  vi. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: 07 FF (hex). Special value: NaN  vii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  viii. Field: Measurement Status  This field is not included  ix. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value		ii. Field: SpO2PR-Normal - SpO2 (%)
iii. Field: SpO2PR-Normal - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Value: Not Relevant  Value: O7 FF (hex). Special value: NaN  V. Field: SpO2PR-Fast - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Value: Not Relevant  Vi. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: O7 FF (hex). Special value: NaN  Vii. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: O7 FF (hex). Special value: NaN  Viii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viii. Field: Measurement Status  This field is not included  ix. Field: Pulse Amplitude Index (%)  This field is not included  This field is not included  The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value		Format: SFLOAT
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iv. Field: SpO2PR-Fast - SpO2 (%)  • Format: SFLOAT  • Value: 07 FF (hex). Special value: NaN  v. Field: SpO2PR-Fast - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  vi. Field: SpO2PR-Slow - SpO2 (%)  • Format: SFLOAT  • Value: 07 FF (hex). Special value: NaN  vii. Field: SpO2PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: Measurement Status  • This field is not included  ix. Field: Device and Sensor Status  • This field is not included  x. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value		Format: SFLOAT
Format: SFLOAT  Value: 07 FF (hex). Special value: NaN  V. Field: SpO2PR-Fast - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Vi. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: Not PF (hex). Special value: NaN  Vii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viiii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value		Value: Not Relevant
<ul> <li>Value: 07 FF (hex). Special value: NaN</li> <li>V. Field: SpO2PR-Fast - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>vi. Field: SpO2PR-Slow - SpO2 (%)</li> <li>Format: SFLOAT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>viii. Field: SpO2PR-Slow - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>viiii. Field: Measurement Status</li> <li>This field is not included</li> <li>ix. Field: Device and Sensor Status</li> <li>This field in ot included</li> <li>x. Field: Pulse Amplitude Index (%)</li> <li>This field is not included</li> <li>3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> <li>4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.</li> <li>5. The simulated PHD sends the Measurement to the PHG under test.</li> <li>6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value</li> </ul>		iv. Field: SpO2PR-Fast - SpO2 (%)
v. Field: SpO2PR-Fast - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  vi. Field: SpO2PR-Slow - SpO2 (%)  • Format: SFLOAT  • Value: 07 FF (hex). Special value: NaN  vii. Field: SpO2PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: Measurement Status  • This field is not included  ix. Field: Device and Sensor Status  • This field is not included  x. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value		Format: SFLOAT
<ul> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>Vi. Field: SpO2PR-Slow - SpO2 (%)</li> <li>Format: SFLOAT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>Viii. Field: SpO2PR-Slow - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>Viii. Field: Measurement Status</li> <li>This field is not included</li> <li>ix. Field: Device and Sensor Status</li> <li>This field is not included</li> <li>x. Field: Pulse Amplitude Index (%)</li> <li>This field is not included</li> <li>3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> <li>4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.</li> <li>5. The simulated PHD sends the Measurement to the PHG under test.</li> <li>6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value</li> </ul>		<ul> <li>Value: 07 FF (hex). Special value: NaN</li> </ul>
<ul> <li>Value: Not Relevant</li> <li>vi. Field: SpO2PR-Slow - SpO2 (%)</li> <li>Format: SFLOAT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>vii. Field: SpO2PR-Slow - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>viii. Field: Measurement Status</li> <li>This field is not included</li> <li>ix. Field: Device and Sensor Status</li> <li>This field is not included</li> <li>x. Field: Pulse Amplitude Index (%)</li> <li>This field is not included</li> <li>3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> <li>4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.</li> <li>5. The simulated PHD sends the Measurement to the PHG under test.</li> <li>6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value</li> </ul>		v. Field: SpO2PR-Fast - PR (bpm)
vi. Field: SpO2PR-Slow - SpO2 (%)  • Format: SFLOAT  • Value: 07 FF (hex). Special value: NaN  vii. Field: SpO2PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: Measurement Status  • This field is not included  ix. Field: Device and Sensor Status  • This field is not included  x. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value		Format: SFLOAT
<ul> <li>Format: SFLOAT</li> <li>Value: 07 FF (hex). Special value: NaN</li> <li>Vii. Field: SpO2PR-Slow - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>Viii. Field: Measurement Status</li> <li>This field is not included</li> <li>ix. Field: Device and Sensor Status</li> <li>This field is not included</li> <li>x. Field: Pulse Amplitude Index (%)</li> <li>This field is not included</li> <li>3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> <li>4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.</li> <li>5. The simulated PHD sends the Measurement to the PHG under test.</li> <li>6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value</li> </ul>		Value: Not Relevant
<ul> <li>Value: 07 FF (hex). Special value: NaN</li> <li>Vii. Field: SpO2PR-Slow - PR (bpm)</li> <li>Format: SFLOAT</li> <li>Value: Not Relevant</li> <li>Viii. Field: Measurement Status</li> <li>This field is not included</li> <li>ix. Field: Device and Sensor Status</li> <li>This field is not included</li> <li>x. Field: Pulse Amplitude Index (%)</li> <li>This field is not included</li> <li>3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> <li>4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.</li> <li>5. The simulated PHD sends the Measurement to the PHG under test.</li> <li>6. Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value</li> </ul>		vi. Field: SpO2PR-Slow - SpO2 (%)
vii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the SpO2 Numeric Object – Basic-Nu-Observed-Value		Format: SFLOAT
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		5. The simulated PHD sends the Measurement to the PHG under test.
Pass/Fail criteria In Step 6,	Pass/Fail criteria	In Step 6,
The SpO2 Numeric Object (Continuous measurement normal) – Basic-Nu-Observed-Value attribute is present and its value is 0x07FF (NaN).		
The SpO2 Numeric Object (Continuous measurement fast) – Basic-Nu-Observed-Value attribute is present and its value is 0x07FF (NaN).		
The SpO2 Numeric Object (Continuous measurement slow) – Basic-Nu-Observed-Value attribute is present and its value is 0x07FF (NaN).		
Notes Possible values in typical points of observation after transcoder output are:		Possible values in typical points of observation after transcoder output are:
(To assist manual testing) a) IEEE 11073 Objects and Attributes		a) IEEE 11073 Objects and Attributes
SpO2 Numeric object (Continuous measurement normal):	<b></b>	SpO2 Numeric object (Continuous measurement normal):

	•	Su	pplemental-types attribute is not present.
	Bas	sic-N	lu-Observed-Value attribute is present:
		Ob	ject: SpO2 Numeric Object
		Att	ribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
		Att	ribute-type: SFLOAT
			ribute-value: Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not owed)
	Spo	)2 N	lumeric object (Continuous measurement fast):
	•	Su	pplemental-types attribute is present:
			Object: SpO2 Numeric Object (fast response)
			Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)
			Attribute-type: SEQUENCE of SEQUENCE {partition (INT-U16), code (INT-U16)}
			Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_FAST}.
	•	Bas	sic-Nu-Observed-Value attribute is present:
			Object: SpO2 Numeric Object
			Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
			Attribute-type: SFLOAT
			Attribute-value: Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)
	Spo	)2 N	lumeric object (Continuous measurement slow):
	•	Su	pplemental-types attribute is present:
			Object: SpO2 Numeric Object (slow response)
			Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)
			Attribute-type: SEQUENCE of SEQUENCE {partition (INT-U16), code (INT-U16)}
			Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_SLOW}.
	•	Bas	sic-Nu-Observed-Value attribute is present:
			Object: SpO2 Numeric Object
			Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
			Attribute-type: SFLOAT
			Attribute-value: Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)
b)	WA	N P	CD-01 message
	Spo	)2 N	lumeric object (Continuous measurement normal):
			message includes a segment like this with Basic-Nu-Observed-Value attribute check OBX-5):
			X n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x   2688^MDC_DIM_PERCENT^MDC   <b>NAN</b>    X   [current_date_time]
	Spo	)2 N	lumeric object (Continuous measurement fast):
	res	pons	message includes two segments like these for SpO2 Numeric object (Fast se), with Basic-Nu-Observed-Value attribute and Supplemental-Types attribute (check OBX-5 in both segments):
			X n NM 150456^MDC_PULS_OXIM_SAT_O2^MDC m.0.0.x   2688^MDC_DIM_PERCENT^MDC   <b>NAN</b>    X   [current_date_time]
			X n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  0580^MDC_MODALITY_FAST^MDC      [obx-11 of the parent]
	Spo	<b>)</b> 2 N	lumeric object (Continuous measurement slow):

PCD-01 message includes two segments like these for SpO2 Numeric object (Slow response), with Basic-Nu-Observed-Value attribute and Supplemental-Types attribute values (check OBX-5 in both segments):

OBX|n|NM|150456^MDC\_PULS\_OXIM\_SAT\_O2^MDC|m.0.0.x||
262688^MDC\_DIM\_PERCENT^MDC||NAN|||X|||[current\_date\_time]

OBX|n|CWE|68193^MDC\_ATTR\_SUPPLEMENTAL\_TYPES^MDC|m.0.0.x.y|
150580^MDC\_MODALITY\_SLOW^MDC||||||||[obx-11 of the parent]

TP ld	TP/LP-PAN/PHG/PHDTW/PLX/BV-022						
TP label		Whitepaper. SpO2 measurement value (Spot-Check Measurement)					
Coverage	Spec	[Bluetooth PHDT v1.6]					
oo ro. ago	Testable	Short Float	_	Date-Time Conv 1; M	SpO2 Numeric 9; M		
	items	SpO2 Nume		Bate Time Conv. 1, IVI	Opon Hamono o, m		
Test purpos	se	Check that:					
. ост рапро		PHG processes correctly the SpO2 value (%) of the SpO2PR-Spot-Check field and the					
				of the PLX Spot-Check charac			
Applicabilit	у	C_MAN_BL	E_000 AND C_MA	N_BLE_002 AND C_MAN_BI	_E_040		
Other PICS		C_MAN_BL	E_042				
Initial cond	ition	The PHG ur	nder test and the s	imulated PHD are in the Stand	lby state.		
Test proced	dure	has a S discove	Spot-Check measurerable). The simula		Profile (device specialization), it is in the Advertising state (it is CP characteristic and has an		
			nulated PHD imple for this Test Case	ments several BTLE character are:	ristics. The characteristics of		
		a. PL	X Features (0x2A6	60)			
		i.	Field: Supported	Features			
			• Format: 16 k	pit			
			spot-check r	0000 0000 1100 (MSB $\rightarrow$ LSE measurements is supported (bit 3).	B). Measurement Storage for it 2). Timestamp for Spot-Check		
		ii.	Field: Measurem	ent Status Support			
			This field is:	not included			
		iii.	Field: Device and	d Sensor Status Support			
			This field is:	not included			
		b. PLX Sp	ot-Check Measure	ement (0x2A5E)			
		i.	Field: Flags				
			Format: 8 bi	t			
			Measureme	0001 (MSB → LSB). Timestar nt Status, Device and Sensor are not present. Device Clock	Status, and Pulse Amplitude		
		ii.	Field: SpO2PR-S	Spot-Check - SpO2 (%)			
			Format: SFL	.OAT			
			• Value: 96.0	(%)			
		iii.	Field: SpO2PR-S	Spot-Check – PR (bpm)			
			Format: SFL	.OAT			
			Value: Not F	Relevant			
		iv.	Field: Time Stam	ip			

Format: Date and Time Value: October 12nd, 2015, 10:39:27  V. Field: Measurement Status This field is not included Vi. Field: Device and Sensor Status This field is not included Vii. Field: Pulse Amplitude Index (%) This field is not included Viii. Field: Pulse Amplitude Index (%) This field is not included  The PHG under test the pHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check that the PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp).  The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test  This PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp)  The PHG under test shows the following measurement SpO2 = 96.0 (%) with timestamp '2015-10-12 10:39:27'.  If the PHG supports RACP, the same criteria applies to Step 7.b.		
v. Field: Measurement Status  • This field is not included  vi. Field: Device and Sensor Status  • This field is not included  vii. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check that the PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp).  7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN  a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test  b) Check that PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp)  In Step 6, the PHG under test shows the following measurement SpO2 = 96.0 (%) with timestamp '2015-10-12 10:39:27'.  If the PHG supports RACP, the same criteria applies to Step 7.b.		Format: Date and Time
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6. Check that the PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp).  7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN  a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test  b) Check that PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp)  Pass/Fail criteria  In Step 6, the PHG under test shows the following measurement SpO2 = 96.0 (%) with timestamp '2015-10-12 10:39:27'.  If the PHG supports RACP, the same criteria applies to Step 7.b.		
measurement value, units and time stamp).  7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN  a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test  b) Check that PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp)  Pass/Fail criteria  In Step 6, the PHG under test shows the following measurement SpO2 = 96.0 (%) with timestamp '2015-10-12 10:39:27'.  If the PHG supports RACP, the same criteria applies to Step 7.b.		5. The simulated PHD sends the Measurement to the PHG under test.
a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test  b) Check that PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp)  Pass/Fail criteria  In Step 6, the PHG under test shows the following measurement SpO2 = 96.0 (%) with timestamp '2015-10-12 10:39:27'.  If the PHG supports RACP, the same criteria applies to Step 7.b.		
performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test  b) Check that PHG accepts the measurement and decodes its value properly (SpO2 measurement value, units and time stamp)  Pass/Fail criteria  In Step 6, the PHG under test shows the following measurement SpO2 = 96.0 (%) with timestamp '2015-10-12 10:39:27'.  If the PHG supports RACP, the same criteria applies to Step 7.b.		7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
measurement value, units and time stamp)  In Step 6, the PHG under test shows the following measurement SpO2 = 96.0 (%) with timestamp '2015-10-12 10:39:27'.  If the PHG supports RACP, the same criteria applies to Step 7.b.		performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG
timestamp '2015-10-12 10:39:27'.  If the PHG supports RACP, the same criteria applies to Step 7.b.		
	Pass/Fail criteria	
Notes		If the PHG supports RACP, the same criteria applies to Step 7.b.
110.00	Notes	

TP ld		TD/LD DAN/DUC/DUDTW/DLV/DV 022				
II IU		TP/LP-PAN/PHG/PHDTW/PLX/BV-023				
TP label	Τ	Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) - Handle Attribute				
Coverage	Spec	[Bluetooth PHDT v1.6]				
	Testable items	PR Numeric 1; O				
Test purpos	se	Check that:				
		PHG does not include Pulse Rate Numeric Object – Handle Attribute in transcoder output when using spot-check measurement mode.				
		[OR]				
		If PHG includes Pulse Rate Numeric Object – Handle attribute in transcoder output, then its value shall be different than 0				
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS		C_MAN_BLE_042				
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.				
Test procedure		<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>				
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
		a. PLX Features (0x2A60)				
		i. Field: Supported Features				

	Farmert 40 hit
	• Format: 16 bit
	<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>
	ii. Field: Measurement Status Support
	This field is not included
	iii. Field: Device and Sensor Status Support
	This field is not included
	b. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present.</li> <li>Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the measurement to the PHG under test.
	6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	<ul> <li>a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test</li> </ul>
	b) Check in PHG transcoder output the SpO2 Numeric Object – Handle attribute
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0.
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
	Handle attribute is not present, or if it is present then:

	Object: Pulse Rate Numeric Object
	Attribute-id: MDC_ATTR_ID_HANDLE (2337)
	Attribute-type: INT-U16
	Attribute-value: Any value different than 0
b) W	VAN PCD-01 message
Р	CD-01 message does not include segments with Handle attribute value

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-024	
TP label		Whitepaper. Pulse Rate Numeric Object (Continuous Measurements) - Handle Attribute	
Coverage	Spec	[Bluetooth PHDT v1.6]	
Coverage	Testable		
	items		
Test purpos	se	Check that:	
		PHG does not include Pulse Rate Numeric Object – Handle Attribute in transcoder output when using continuous measurements	
		[OR]	
		If PHG includes Pulse Rate Numeric Object – Handle attribute in transcoder output, then its value shall be different than 0	
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040	
Other PICS			
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.	
Test proced	lure	1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), has a continuous measurement (including fast and slow response measurement values ready to be sent and it is in the advertising state (it is discoverable).	
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:	
		a. PLX Features (0x2A60)	
		i. Field: Supported Features	
		Format: 16 bit	
		<ul> <li>Value: 0000 0000 0011 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5).</li> </ul>	
		ii. Field: Measurement Status Support	
		This field is not included	
		iii. Field: Device and Sensor Status Support	
		This field is not included	
		b. PLX Continuous Measurement (0x2A5F)	
		i. Field: Flags	
		Format: 8 bit	
		<ul> <li>Value: 0000 0011 (MSB → LSB). SpO2PR–Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.</li> </ul>	
		ii. Field: SpO2PR-Normal - SpO2 (%)	
		Format: SFLOAT	
		Value: Not Relevant	
		iii. Field: SpO2PR-Normal – PR (bpm)	
		Format: SFLOAT	

Value: Not Relevant  iv. Field: SpO2PR-Fast - SpO2 (%)  Format: SFLOAT  Value: Not Relevant  V. Field: SpO2PR-Fast - PR (bpm)  Format: SFLOAT  Value: Not Relevant  vi. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: Not Relevant  vii. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: Not Relevant  viii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  X. Field: Duse Amplitude Index (%)  This field is not included  X. Field: Pulse Amplitude Index (%)  This field is not included  X. Field: Pulse Amplitude Index (%)  The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (initiating state).  The simulated PHD sends the Measurement to the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  (a) IEEE T1073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-di: MDC_ATTR_ID_HANDLE (2337)  Attribute-dype: INT-U16		
Possifail criteria  Format: SFLOAT  Value: Not Relevant  V. Field: SpO2PR-Fast - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Vi. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: Not Relevant  Vii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  X. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  (a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		Value: Not Relevant
Value: Not Relevant V. Field: SpO2PR-Fast - PR (bpm) Format: SFLOAT Value: Not Relevant Vi. Field: SpO2PR-Slow - SpO2 (%) Format: SFLOAT Value: Not Relevant Vii. Field: SpO2PR-Slow - PR (bpm) Value: Not Relevant Viii. Field: SpO2PR-Slow - PR (bpm) Format: SFLOAT Value: Not Relevant Viii. Field: Measurement Status This field is not included ix. Field: Measurement Status This field is not included This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Amplitude Index (%) This field is not included X. Field: Pulse Relevant X. Field: Pulse X. Field:		iv. Field: SpO2PR-Fast - SpO2 (%)
v. Field: SpO2PR-Fast - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  vi. Field: SpO2PR-Slow - SpO2 (%)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: SpO2PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: SpO2PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: Measurement Status  • This field is not included  ix. Field: Device and Sensor Status  • This field is not included  ix. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  • There are three Pulse Rate objects (for normal, fast and slow measurement modes).  • In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute-id: MDC_ATTR_ID_HANDLE (2337)		Format: SFLOAT
Pass/Fail criteria  Format: SFLOAT  Value: Not Relevant  Vi. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: Not Relevant  Vii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute-id: MDC_ATTR_ID_HANDLE (2337)		Value: Not Relevant
Value: Not Relevant vi. Field: SpO2PR-Slow - SpO2 (%)  Format: SFLOAT  Value: Not Relevant vii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant viii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant viii. Field: Measurement Status  This field is not included ix. Field: Device and Sensor Status  This field is not included  X. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6, There are three Pulse Rate objects (for normal, fast and slow measurement modes). In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:    Possible values in typical points of observation after transcoder output are:   Object: Pulse Rate Numeric Object   Attribute-id: MDC_ATTR_ID_HANDLE (2337)		v. Field: SpO2PR-Fast - PR (bpm)
vi. Field: SpO2PR-Slow - SpO2 (%)  • Format: SFLOAT  • Value: Not Relevant  vii. Field: SpO2PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: SpO2PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: Measurement Status  • This field is not included  ix. Field: Device and Sensor Status  • This field is not included  x. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  • There are three Pulse Rate objects (for normal, fast and slow measurement modes).  • In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  □ Object: Pulse Rate Numeric Object  □ Attribute-id: MDC_ATTR_ID_HANDLE (2337)		Format: SFLOAT
Possible value: Not Relevant  Viii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  Viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		Value: Not Relevant
Value: Not Relevant  vii. Field: SpO2PR-Slow - PR (bpm)  Format: SFLOAT  Value: Not Relevant  viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes  To assist manual testing)  Notes  To assist manual testingue:  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		vi. Field: SpO2PR-Slow - SpO2 (%)
vii. Field: SpO2PR-Slow - PR (bpm)  • Format: SFLOAT  • Value: Not Relevant  viii. Field: Measurement Status  • This field is not included  ix. Field: Device and Sensor Status  • This field is not included  x. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  • There are three Pulse Rate objects (for normal, fast and slow measurement modes).  • In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes  (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_D_HANDLE (2337)		Format: SFLOAT
Pass/Fail criteria  Format: SFLOAT  Value: Not Relevant  Viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  X. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  (To assist manual testing)  Notes  Thore are three Pulse Rate Numeric Objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		Value: Not Relevant
Value: Not Relevant  viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		vii. Field: SpO2PR-Slow - PR (bpm)
viii. Field: Measurement Status  This field is not included  ix. Field: Device and Sensor Status  This field is not included  The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		Format: SFLOAT
This field is not included  ix. Field: Device and Sensor Status  This field is not included  X. Field: Pulse Amplitude Index (%)  This field is not included  X. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		Value: Not Relevant
ix. Field: Device and Sensor Status  • This field is not included  x. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  • There are three Pulse Rate objects (for normal, fast and slow measurement modes).  • In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		viii. Field: Measurement Status
This field is not included  x. Field: Pulse Amplitude Index (%)  This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes  (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		This field is not included
x. Field: Pulse Amplitude Index (%)  • This field is not included  3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  • There are three Pulse Rate objects (for normal, fast and slow measurement modes).  • In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		ix. Field: Device and Sensor Status
This field is not included  This field is not included  The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  The simulated PHD sends the Measurement to the PHG under test.  Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  (a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		This field is not included
3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  • There are three Pulse Rate objects (for normal, fast and slow measurement modes).  • In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		x. Field: Pulse Amplitude Index (%)
simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).  4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  • There are three Pulse Rate objects (for normal, fast and slow measurement modes).  • In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		This field is not included
read the PLX Features characteristic.  5. The simulated PHD sends the Measurement to the PHG under test.  6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  Pass/Fail criteria  In Step 6,  In all three objects, the Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		
6. Check in PHG transcoder output the Pulse Rate Numeric Object – Handle attribute in all three Pulse Rate objects (continuous normal, fast and slow).  In Step 6,  • There are three Pulse Rate objects (for normal, fast and slow measurement modes).  • In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		
three Pulse Rate objects (continuous normal, fast and slow).  In Step 6,  There are three Pulse Rate objects (for normal, fast and slow measurement modes).  In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0  Notes (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		5. The simulated PHD sends the Measurement to the PHG under test.
<ul> <li>There are three Pulse Rate objects (for normal, fast and slow measurement modes).</li> <li>In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0</li> <li>Notes         <ul> <li>(To assist manual testing)</li> </ul> </li> <li>Possible values in typical points of observation after transcoder output are:         <ul> <li>a) IEEE 11073 Objects and Attributes</li> <li>Handle attribute is not present in SpO2 objects, or if it is present then:</li> <li>Object: Pulse Rate Numeric Object</li> <li>Attribute-id: MDC_ATTR_ID_HANDLE (2337)</li> </ul> </li> </ul>		
<ul> <li>In all three objects, the Pulse Rate Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0</li> <li>Notes         (To assist manual testing)</li> <li>Possible values in typical points of observation after transcoder output are:         <ul> <li>a) IEEE 11073 Objects and Attributes</li> <li>Handle attribute is not present in SpO2 objects, or if it is present then:</li> <li>Object: Pulse Rate Numeric Object</li> <li>Attribute-id: MDC_ATTR_ID_HANDLE (2337)</li> </ul> </li> </ul>	Pass/Fail criteria	In Step 6,
Notes (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		There are three Pulse Rate objects (for normal, fast and slow measurement modes).
a) IEEE 11073 Objects and Attributes Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		
a) IEEE 11073 Objects and Attributes  Handle attribute is not present in SpO2 objects, or if it is present then:  □ Object: Pulse Rate Numeric Object □ Attribute-id: MDC_ATTR_ID_HANDLE (2337)		Possible values in typical points of observation after transcoder output are:
Handle attribute is not present in SpO2 objects, or if it is present then:  Object: Pulse Rate Numeric Object  Attribute-id: MDC_ATTR_ID_HANDLE (2337)		a) IEEE 11073 Objects and Attributes
Attribute-id: MDC_ATTR_ID_HANDLE (2337)	, <b></b>	Handle attribute is not present in SpO2 objects, or if it is present then:
		☐ Object: Pulse Rate Numeric Object
☐ Attribute-type: INT-U16		☐ Attribute-id: MDC_ATTR_ID_HANDLE (2337)
		☐ Attribute-type: INT-U16
☐ Attribute-value: Any value different than 0		☐ Attribute-value: Any value different than 0
b) WAN PCD-01 message		b) WAN PCD-01 message
PCD-01 message does not include segments with Handle attribute value		PCD-01 message does not include segments with Handle attribute value

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-025
TP label	Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) - Type Attribute	
Coverage	Spec	[Bluetooth PHDT v1.6]
	Testable items	PR Numeric 2; M

Test purpose	Check that:
. 20. 62. 600	PHG includes Pulse Rate Numeric Object – Type attribute in transcoder output when using
	spot-check measurement mode.
	[AND]
	Type is set to {MDC_PART_SCADA, MDC_PULS_OXIM_PULS_RATE}
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040
Other PICS	C_MAN_BLE_042
Initial condition	The PHG under test and the simulated PHD are in the Standby state.
Test procedure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>
	The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:
	a. PLX Features (0x2A60)
	i. Field: Supported Features
	Format: 16 bit
	<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>
	ii. Field: Measurement Status Support
	This field is not included
	iii. Field: Device and Sensor Status Support
	This field is not included
	b. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present.         Measurement Status, Device and Sensor Status, and Pulse Amplitude         Index fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).

	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	6. Check in PHG transcoder output the Pulse Rate Numeric Object – Type attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	<ul> <li>The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test</li> </ul>
	b) Check in PHG transcoder output the SpO2 Numeric Object – Type attribute
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Type attribute is present and its value is {MDC_PART_SCADA, MDC_PULS_OXIM_PULS_RATE}
	If the PHG supports RACP, the same criteria applies to Step 7.b
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
<b>0</b> ,	Type attribute is present:
	☐ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_ID_TYPE (2351)
	☐ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)}
	☐ Attribute-value:
	<ul> <li>partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex)</li> </ul>
	code: MDC_PULS_OXIM_PULS_RATE or 18458 (dec) or 48 1A (hex)
	b) WAN PCD-01 message
	PCD-01 message includes a segment like this with Type attribute (check OBX-3):
	OBX n NM  <b>149530^MDC_PULS_OXIM_PULS_RATE^MDC</b>  m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC     R   [current_date_time]

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-026	
TP label		Whitepaper. Pulse Rate Numeric Object (Continuous Measurements) - Type Attribute	
Coverage	Spec	[Bluetooth PHDT v1.6]	
	Testable items	SpO2 Numeric 12; M	
Test purpose		Check that:	
		PHG includes Pulse Rate Numeric Object – Type attribute in transcoder output when using continuous measurements.	
		[AND]	
		Type is set to {MDC_PART_SCADA, MDC_PULS_OXIM_PULS_RATE}	
Applicability C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040	
Other PICS			
Initial condition The PHG under test and the simulated PHD are in the Standby state.		The PHG under test and the simulated PHD are in the Standby state.	
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).	
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:	
		a. PLX Features (0x2A60)	
		i. Field: Supported Features	

- Format: 16 bit
- Value: 0000 0000 0011 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5).
- ii. Field: Measurement Status Support
  - · This field is not included
- iii. Field: Device and Sensor Status Support
  - This field is not included
- b. PLX Continuous Measurement (0x2A5F)
  - i. Field: Flags
    - Format: 8 bit
    - Value: 0000 0011 (MSB → LSB). SpO2PR–Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.
  - ii. Field: SpO2PR-Normal SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - iii. Field: SpO2PR-Normal PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - iv. Field: SpO2PR-Fast SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - v. Field: SpO2PR-Fast PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - vi. Field: SpO2PR-Slow SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - vii. Field: SpO2PR-Slow PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - viii. Field: Measurement Status
    - This field is not included
  - ix. Field: Device and Sensor Status
    - This field is not included
  - x. Field: Pulse Amplitude Index (%)
    - This field is not included
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test.
- Check in PHG transcoder output the Pulse Rate Numeric Object Type attribute in all three Pulse Rate objects (continuous normal, fast and slow).

#### Pass/Fail criteria

In Step 6,

	There are three Pulse Rate objects (for normal, fast and slow measurement modes).
	In all three objects, the Pulse Rate Numeric Object – Type attribute is present and its value is {MDC_PART_SCADA, MDC_PULS_OXIM_PULS_RATE}
Notes (To assist manual	Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes
testing)	a) IEEE 11073 Objects and Attributes  Type attribute is present in all three SpO2 objects:
	Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_ID_TYPE (2351)
	☐ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)}
	☐ Attribute-value:
	<ul> <li>partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex)</li> </ul>
	code: MDC_PULS_OXIM_PULS_RATE or 18458 (dec) or 48 1A (hex)
	b) WAN PCD-01 message
	PCD-01 message includes three segments like this with Type attribute (check OBX-3):
	OBX n NM  <b>149530^MDC_PULS_OXIM_PULS_RATE^MDC</b>  m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC     R   [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-027	
TP label		Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) – Supplemental-Types Attribute	
Coverage	Spec	[Bluetooth PHDT v1.6]	
	Testable items	PR Numeric 3; M	
Test purpos	se	Check that:  PHG includes Pulse Rate Numeric Object – Supplemental-Types attribute in transcoder output when using spot-check measurement mode.  [AND]  Supplemental-Types attribute is set to {MDC_PART_SCADA, MDC_MODALITY_SPOT}.	
Applicabilit	v	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040	
Other PICS	,	C_MAN_BLE_042	
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.	
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.	
		2. The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:	
		a. PLX Features (0x2A60)	
		i. Field: Supported Features	
		Format: 16 bit	
		<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>	
		ii. Field: Measurement Status Support	
		This field is not included	
		iii. Field: Device and Sensor Status Support	
		This field is not included	

	b. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	• Format: 8 bit
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present. Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	Check in PHG transcoder output the Pulse Rate Numeric Object – Supplemental-Types attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	<ul> <li>a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test</li> </ul>
	<ul> <li>b) Check in PHG transcoder output the Pulse Rate Numeric Object – Supplemental- Types attribute</li> </ul>
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Supplemental-Types attribute is present and its value is {MDC_PART_SCADA, MDC_MODALITY_SPOT}.
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
-	Supplemental-Types attribute is present:
	☐ Object: Pulse Rate Numeric Object (Spot-Check measurement)
	☐ Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)
	☐ Attribute-type: SEQUENCE of SEQUENCE {partition (INT-U16), code (INT-U16)}
	☐ Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_SPOT}.
	b) WAN PCD-01 message
	PCD-01 message includes a facet OBX segment of the SpO2 measurement OBX segment with Supplemental-Types attribute (check OBX-3 and OBX-5):

OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC     R   [current_date_time]
OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  150580^MDC_MODALITY_SPOT^MDC       R

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-028				
TP label		Whitepaper. Pulse Rate Numeric Object (Continuous Measurements) – Supplemental-Types Attribute				
Coverage	Spec	[Bluetooth PHDT v1.6]				
	Testable items	PR Nu	meric	13; M	PR Numeric 14; M	PR Numeric 15; M
Test purpose		Check that:				
		PHG does not include Pulse Rate Numeric Object – Supplemental-Types attribute in transcoder output for the Pulse Rate continuous measurement object (normal).				
		[AND]				
		PHG includes Pulse Rate Numeric Object – Supplemental-Types attribute in transcoder output for the Pulse Rate continuous measurement object (fast mode). Supplemental-Types attribute is set to {MDC_PART_SCADA, MDC_MODALITY_FAST}.				
		[AND]				
		PHG includes Pulse Rate Numeric Object – Supplemental-Types attribute in transcoder output for the Pulse Rate continuous measurement object (slow mode). Supplemental-Types attribute is set to {MDC_PART_SCADA, MDC_MODALITY_SLOW}.				
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS						
Initial condition		The PHG under test and the simulated PHD are in the Standby state.				
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).				
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
		a. PLX Features (0x2A60) i. Field: Supported Features				
					: 0000 0000 0011 0000 (MSB $\rightarrow$ LSs are supported (bits 4 and 5).	SB). Fast and slow response
			ii.	Field: Mea	surement Status Support	
				• This fi	ield is not included	
			iii.	Field: Dev	ice and Sensor Status Support	
				• This f	ield is not included	
		b.	PL	X Continuou	us Measurement (0x2A5F)	
			i.	Field: Flag	JS .	
				• Forma	at: 8 bit	
				prese	: 0000 0011 (MSB → LSB). SpO2F nt. Measurement Status, Device ar tude Index fields are not present.	
			ii.	Field: SpC	2PR-Normal - SpO2 (%)	
				• Forma	at: SFLOAT	
				<ul> <li>Value</li> </ul>	: Not Relevant	
			iii.	Field: SpC	02PR-Normal - PR (bpm)	

	5 4 251 247
•	Format: SFLOAT
•	Value: Not Relevant
iv. Fie	ld: SpO2PR-Fast - SpO2 (%)
•	Format: SFLOAT
•	Value: Not Relevant
v. Fie	ld: SpO2PR-Fast - PR (bpm)
•	Format: SFLOAT
•	Value: Not Relevant
vi. Fie	ld: SpO2PR-Slow - SpO2 (%)
•	Format: SFLOAT
•	Value: Not Relevant
vii. Fie	ld: SpO2PR-Slow - PR (bpm)
•	Format: SFLOAT
•	Value: Not Relevant
viii. Fie	ld: Measurement Status
•	This field is not included
ix. Fie	ld: Device and Sensor Status
•	This field is not included
x. Fie	ld: Pulse Amplitude Index (%)
•	This field is not included
	nder test initiates a discovery process (Scanning state), it discovers the HD and it starts a pairing process with the simulated PHD (Initiating state).
	airing has been completed (Connection state), force the PHG under test to X Features characteristic.
5. The simulate	ed PHD sends the Measurement to the PHG under test.
	PHG transcoder output the Pulse Rate Numeric Object – Supplementalute in all three Pulse Rate objects (continuous normal, fast and slow).
Pass/Fail criteria In Step 6,	
The Pulse R	ate Numeric Object (normal) – Supplemental-Types attribute is not present
	ate Numeric Object (fast response) Supplemental-Types attribute is present is {MDC_PART_SCADA, MDC_MODALITY_FAST}.
	ate Numeric Object (slow response) Supplemental-Types attribute is its value is {MDC_PART_SCADA, MDC_MODALITY_SLOW}.
Notes Possible values i	in typical points of observation after transcoder output are:
(To assist manual testing) a) IEEE 11073	Objects and Attributes
<u> </u>	al Types attribute is not present for Pulse Rate Numeric Object (normal).
Supplement	al-Types attribute is present for Pulse Rate Numeric Object (fast response):
	Pulse Rate Numeric Object (fast response)
☐ Attribute	e-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)
☐ Attribute	e-type: SEQUENCE of SEQUENCE {partition (INT-U16), code (INT-U16)}
☐ Attribute	e-value: {MDC_PART_SCADA, MDC_MODALITY_FAST}.
Supplements response):	al-Types attribute is present for Pulse Rate Numeric Object (slow
□ Object:	Pulse Rate Numeric Object (slow response)
	e-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)

			Attribute-type: SEQUENCE of SEQUENCE (partition (INT-U16), code (INT-U16))
			Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_SLOW}.
	b)	WA	N PCD-01 message
		For	Pulse Rate Numeric Object (normal)
		•	PCD-01 message does not include segments with Supplemental-Types attribute.
		For	Pulse Rate Numeric Object (fast)
		•	PCD-01 message includes a facet OBX segment of the Pulse Rate measurement OBX segment with Supplemental-Types attribute (check OBX-3 and OBX-5):
			OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC     R   [current_date_time]
			OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  150580^MDC_MODALITY_FAST^MDC      R
		For	Pulse Rate Numeric Object (slow)
		•	PCD-01 message includes a facet OBX segment of the Pulse Rate measurement OBX segment with Supplemental-Types attribute (check OBX-3 and OBX-5):
			OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC     R   [current_date_time]
			OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.y.z  150580^MDC_MODALITY_SLOW^MDC      R

TP ld		TP/I P-P	AN/PHG/PHDTW//PL	Y/R\/_020		
TP label		TP/LP-PAN/PHG/PHDTW/PLX/BV-029  Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) - Metric-Spec-Small Attribute 1				
Coverage	Spec	[Bluetoo	th PHDT v1.6]			
	Testable items	PR Num	eric 4; M	PR Numeric 6; M		
Test purpos	se	Check th	at:			
			ludes Pulse Rate Nur ing spot-check measu	neric Object – Metric-Spec-Sma urement mode.	Il attribute in transcoder output	
		[AND]				
		Metric-S storage.	pec-Small is set to {0:	x5040} when the sensor device s	supports measurement	
Applicabilit	у	C_MAN_	BLE_000 AND C_MA	AN_BLE_002 AND C_MAN_BLE	_040	
Other PICS		C_MAN_BLE_042				
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.				
Test procedure		1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.				
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
		a.	PLX Spot-Check Mea	asurement (0x2A5E)		
		b.	PLX Feature (0x2A6	0)		
			i. Field: Supported	Features		
			Format: 16	bit		
			spot-check	0000 0000 <b>11</b> 00 (MSB → LSB) measurements is supported (bit nts is supported.		
		ii. Field: Measurement Status Support				

	<del>-</del> 1. 6.11
	This field is not included
	iii. Field: Device and Sensor Status Support
	This field is not included
	<ol> <li>The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> </ol>
	<ol> <li>When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.</li> </ol>
	5. The simulated PHD sends the Measurement to the PHG under test with the following value:
	a. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present.</li> <li>Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	Check in the PHG transcoder output the Pulse Rate Numeric Object – Metric-Spec- Small attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
	b) Check in PHG transcoder output the Pulse Rate Numeric Object – Metric-Spec- Small attribute
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Metric-Spec-Small attribute is present and its value is {0x5040} (mss-avail-stored-data  mss-msmt-aperiodic  mss-acc-agent-initiated).
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
	Metric-Spec-Small attribute is present:
	☐ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)

	☐ Attribute-type: BITS-16
	Attribute-value: 50 40 (hex) or BITS mss-avail-stored-data (1), mss- msmt - aperiodic(3), mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE
b)	WAN PCD-01 message
	PCD-01 message does not include segments with Metric-Spec-Small attribute value

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-030					
TP label		Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) - Metric-Spec-Small Attribute 2					
Coverage	Spec	[Blu	[Bluetooth PHDT v1.6]				
	Testable items	PR	Numeric 4; M	1	PR Numeric 5; M		
Test purpos	se	Check that:					
					neric Object – Metric-Spec-Smal rement mode.	I attribute in transcoder output	
		[AN	ID]				
			tric-Spec-Sma	•	(1040) when the sensor device of	does not support	
Applicabilit	у	C_I	MAN_BLE_00	00 AND C_MA	N_BLE_002 AND C_MAN_BLE	_040	
Other PICS							
Initial condi	tion	The	e PHG under	test and the si	mulated PHD are in the Standb	y state.	
Test proced	lure	1.		heck measure	figured with a Pulse Oximeter Pement ready to be sent and it is		
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:					
			a. PLX Sp	ot-Check Mea	asurement (0x2A5E)		
			b. PLX Fe	atures (0x2A6	60)		
			i. Fie	ld: Supported	Features		
			•	Format: 16 b	pit		
			•		0000 0000 0 <b>0</b> 00 (MSB → LSB). measurements is not supported		
			ii. Fie	ld: Measurem	ent Status Support		
			•	This field is a	not included		
			iii. Fie	ld: Device and	d Sensor Status Support		
			•	This field is a	not included		
		3.			es a discovery process (Scanni ts a pairing process with the sim		
		4.		airing has bee X Features ch	n completed (Connection state), aracteristic.	force the PHG under test to	
		5.	The simulate value:	ed PHD sends	s the Measurement to the PHG u	under test with the following	
			a. PLX Sp	ot-Check Mea	asurement (0x2A5E)		
			i. Fie	ld: Flags			
			•	Format: 8 bit	t		
			•	Device and	0000 (MSB → LSB). Timestamp Sensor Status, and Pulse Amplit vice Clock is set.		

	T
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	This field is not included
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	Check in the PHG transcoder output the Pulse Rate Numeric Object – Metric-Spec- Small attribute
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Metric-Spec-Small attribute is present and its value is {0x1040} (mss-msmt-aperiodic   mss-acc-agent-initiated).
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
100g/	Metric-Spec-Small attribute is present:
	☐ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)
	☐ Attribute-type: BITS-16
	Attribute-value: 10 40 (hex) or BITS mss-msmt-aperiodic(3), mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE
	b) WAN PCD-01 message
	PCD-01 message does not include segments with Metric-Spec-Small attribute value

TP Id TP/L		TP/LP-PAN/PHG/PHDTW/PLX/BV-031			
TP label		Whitepaper. Pulse Rate Numeric Object (Continuous Measurements) - Metric-Spec-Small Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	PR Numeric 16; M			
Test purpos	se	Check that:			
		PHG includes Pulse Rate Numeric Object – Metric-Spec-Small attribute in transcoder output when using continuous measurements.			
		[AND]			
		Metric-Spec-Small is set to {0x0040} (mss-acc-agent-initiated)			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS					
Initial condition		The PHG under test and the simulated PHD are in the Standby state.			
Test procedure		has a continuous measure	ofigured with a Pulse Oximeter Perment (including fast and slow rently the Advertising state (it is disc	esponse measurement values)	

- The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:
  - a. PLX Features (0x2A60)
    - i. Field: Supported Features
      - Format: 16 bit
      - Value: 0000 0000 0011 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5).
    - ii. Field: Measurement Status Support
      - · This field is not included
    - iii. Field: Device and Sensor Status Support
      - This field is not included
  - b. PLX Continuous Measurement (0x2A5F)
    - i. Field: Flags
      - Format: 8 bit
      - Value: 0000 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.
    - ii. Field: SpO2PR-Normal SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - iii. Field: SpO2PR-Normal PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - iv. Field: SpO2PR-Fast SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - v. Field: SpO2PR-Fast PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - vi. Field: SpO2PR-Slow SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - vii. Field: SpO2PR-Slow PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - viii. Field: Measurement Status
      - This field is not included
    - ix. Field: Device and Sensor Status
      - This field is not included
    - x. Field: Pulse Amplitude Index (%)
      - This field is not included
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.

	5.	The simulated PHD sends the Measurement to the PHG under test.		
	6.	Check in PHG transcoder output the Pulse Rate Numeric Object – Metric-Spec-Small attribute in all three Pulse Rate objects (continuous normal, fast and slow).		
Pass/Fail criteria	In S	In Step 6,		
	•	There are three Pulse Rate objects (for normal, fast and slow measurement modes).		
	•	In all three objects, the Pulse Rate Numeric Object – Metric-Spec-Small attribute is present and its value is {0x0040} (mss-acc-agent-initiated).		
Notes	Pos	ssible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a)	IEEE 11073 Objects and Attributes		
, <b>g,</b>		Metric-Spec-Small attribute is present in all three SpO2 objects:		
		□ Object: Pulse Rate Numeric Object		
		☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)		
		☐ Attribute-type: BITS-16		
		□ Attribute-value: 00 40 (hex) or BITS mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE		
	b)	WAN PCD-01 message		
		PCD-01 message does not include segments with Metric-Spec-Small attribute value		

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-032			
TP label		Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) – Measurement-Status Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	PR Numeric 7; M			
Test purpo	se	Check that:			
		PHG includes Pulse Rate Numeric Object – Measurement-Status attribute in transcoder output when using spot-check measurement mode.			
		[AND]			
		PHG transcodes the Bluetooth Measurement Status field of the PLX Spot-Check characteristic to 11073 Measurement-Status attribute properly			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS		C_MAN_BLE_042			
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.			
Test procedure		<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>			
		<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>			
		a. PLX Spot-Check Measurement (0x2A5E)			
		b. PLX Features (0x2A60)			
		i. Field: Supported Features			
		Format: 16 bit			
		<ul> <li>Value: 0000 0000 0000 1101 (MSB → LSB). Measurement Status support is present (bit 0). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>			
		ii. Field: Measurement Status Support			

- Format: 16 bit
- Value: 1111 1111 1110 0000 (MSB → LSB). All Measurement Status bits are supported
- iii. Field: Device and Sensor Status Support
  - This field is not included
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- 4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
- The simulated PHD sends the Measurement to the PHG under test with the following value:
  - a. PLX Spot-Check Measurement (0x2A5E)
    - i. Field: Flags
      - Format: 8 bit
      - Value: 0000 0011 (MSB → LSB). Timestamp and Measurement Status fields are present. Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.
    - ii. Field: SpO2PR-Spot-Check SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - iii. Field: SpO2PR-Spot-Check PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - iv. Field: Time Stamp
      - Format: SFLOAT
      - Value: Not Relevant
    - v. Field: October 12nd, 2015, 10:39:27
      - Format: 16 bit
      - Value: 1000 0000 0000 0000 (MSB → LSB). Invalid measurement detected (bit 15).
    - vi. Field: Device and Sensor Status
      - This field is not included
    - vii. Field: Pulse Amplitude Index (%)
      - This field is not included
- Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 7. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0100 0000 0000 0000 (MSB → LSB), questionable measurement detected (bit 14). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute

- 10. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 11. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0010 0000 0000 0000 (MSB → LSB), measurement not available (bit 13). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 12. Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 13. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 14. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0001 0000 0000 0000 (MSB → LSB), calibration ongoing (bit 12). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 16. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 17. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 1000 0000 0000 (MSB → LSB), data for testing (bit 11). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 18. Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 19. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 20. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0100 0000 0000 (MSB → LSB), data for demonstration (bit 10). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 21. Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 22. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test

- b) Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 23. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 1000 0000 (MSB → LSB), fully qualified data (bit 7). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 24. Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 25. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 26. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0100 0000 (MSB → LSB), early estimated data (bit 6). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 27. Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 28. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - b) Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 29. Simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0010 0000 (MSB → LSB), measurement ongoing (bit 5). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 30. Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute
- 31. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute

## Pass/Fail criteria

In Step 6, the Pulse Rate Numeric Object – Measurement-Status attribute is present and its set to "invalid" (0x8000). If PHG supports RACP, same criteria applies to 7.b.

In Step 9, the Pulse Rate Numeric Object – Measurement-Status attribute is present and its set to "questionable" (0x4000). If PHG supports RACP, same criteria applies to 10.b.

In Step 12, the Pulse Rate Numeric Object – Measurement-Status attribute is present and its set to "not-available" (0x2000). If PHG supports RACP, same criteria applies to 13.b.

In Step 15, the Pulse Rate Numeric Object – Measurement-Status attribute is present and its set to "calibration-ongoing" (0x1000). If PHG supports RACP, same criteria applies to 16.b.

In Step 18, the Pulse Rate Numeric Object – Measurement-Status attribute is present and its set to "test-data" (0x0800). If PHG supports RACP, same criteria applies to 19.b.

In Step 21, the Pulse Rate Numeric Object – Measurement-Status attribute is present and its set to "demo-data" (0x0400). If PHG supports RACP, same criteria applies to 22.b.

In Step 24, the Pulse Rate Numeric Object – Measurement-Status attribute is present and its set to "validated-data" (0x0080). If PHG supports RACP, same criteria applies to 25.b.

In Step 27, the Pulse Rate Numeric Object - Measurement-Status attribute is present and its

	set to "early-indication" (0x0040). If PHG supports RACP, same criteria applies to 28.b.				
	In Step 30, the Pulse Rate Numeric Object – Measurement-Status attribute is present and its set to "msmt-ongoing" (0x0020). If PHG supports RACP, same criteria applies to 31.b.				
Notes (To assist manual	In step 6 (and step 7.b if applicable), possible values in typical points of observation after transcoder output are:				
testing)	a) IEEE 11073 Objects and Attributes				
	Measurement-Status attribute is present:				
	☐ Object: Pulse Rate Numeric Object				
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)				
	☐ Attribute-type: BITS16				
	☐ Attribute-value: <b>80 00</b> (hex)				
	b) WAN PCD-01 message				
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):				
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>INV</b>     <b>X</b>    [current_date_time]				
	In step 9 (and step 10.b if applicable), possible values in typical points of observation after transcoder output are:				
	a) IEEE 11073 Objects and Attributes				
	Measurement-Status attribute is present:				
	□ Object: Pulse Rate Numeric Object				
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)				
	☐ Attribute-type: BITS16				
	☐ Attribute-value: <b>40 00</b> (hex)				
	b) WAN PCD-01 message				
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):				
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>QUES</b>     <b>R</b>    [current_date_time]				
	In step 12 (and step 13.b if applicable), possible values in typical points of observation after transcoder output are:				
	a) IEEE 11073 Objects and Attributes				
	Measurement-Status attribute is present:				
	☐ Object: Pulse Rate Numeric Object				
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)				
	☐ Attribute-type: BITS16				
	☐ Attribute-value: <b>20 00</b> (hex)				
	b) WAN PCD-01 message				
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):				
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>NAV</b>     <b>X</b>    [current_date_time]				
	In step 15 (and step 16.b if applicable), possible values in typical points of observation after transcoder output are:				
	a) IEEE 11073 Objects and Attributes				
	Measurement-Status attribute is present:				
	☐ Object: Pulse Rate Numeric Object				
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)				

	☐ Attribute-type: BITS16
	☐ Attribute-value: 10 00 (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>CAL</b>     <b>R</b>    [current_date_time]
	step 18 (and step 19.b if applicable), possible values in typical points of observation after ascoder output are:
a)	IEEE 11073 Objects and Attributes
	Measurement-Status attribute is present:
	□ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>08 00</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>TEST</b>     <b>R</b>    [current_date_time]
	step 21 (and step 22.b if applicable), possible values in typical points of observation after ascoder output are:
a)	IEEE 11073 Objects and Attributes
	Measurement-Status attribute is present:
	□ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>04 00</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>DEMO</b>     <b>R</b>    [current_date_time]
	step 24 (and step 25.b if applicable), possible values in typical points of observation after ascoder output are:
a)	IEEE 11073 Objects and Attributes
	Measurement-Status attribute is present:
	□ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>00 80</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC     F   [current_date_time]
	step 27 (and step 28.b if applicable), possible values in typical points of observation after ascoder output are:

T T	
a)	IEEE 11073 Objects and Attributes
	Measurement-Status attribute is present:
	□ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>00 40</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>EARLY</b>    <b>R</b>    [current_date_time]
	step 30 (and step 31.b if applicable), possible values in typical points of observation after nscoder output are:
a)	IEEE 11073 Objects and Attributes
	Measurement-Status attribute is present:
	□ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>00 20</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-8 and OBX-11):
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>BUSY</b>    <b>X</b>    [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-033		
TP label		Whitepaper. Pulse Rate Numeric Object (Continuous Measurements) – Measurement-Status Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	PR Numeric 17; M		
Test purpos	se	Check that:		
		PHG includes Pulse Rate Numeric Object – Measurement-Status attribute in transcoder output when using continuous measurements.		
		[AND]		
		PHG transcodes the Bluetooth Measurement Status field of the PLX Continuous Measurement characteristic to 11073 Measurement-Status attribute properly		
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS				
Initial condition The PHG under test and the simulated PHD are in the Standby state.		The PHG under test and the simulated PHD are in the Standby state.		
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).		
		<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>		
		a. PLX Continuous Measurement (0x2A5F)		
		b. PLX Features (0x2A60)		
		i. Field: Supported Features		

- Format: 16 bit
- Value: 0000 0000 0011 0001 (MSB → LSB). Measurement Status support is present (bit 0). Fast and slow response modes are supported (bits 4 and 5).
- ii. Field: Measurement Status Support
  - Format: 16 bit
  - Value: 1111 1111 1110 0000 (MSB → LSB). All Measurement Status bits are supported
- iii. Field: Device and Sensor Status Support
  - This field is not included
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- 4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
- The simulated PHD sends the Measurement to the PHG under test with the following value:
  - a. PLX Continuous Measurement (0x2A5F)
    - i. Field: Flags
      - Format: 8 bit
      - Value: 0000 0111 (MSB → LSB). Measurement Status, SpO2PR-Fast and SpO2PR-Slow fields are present. Device and Sensor Status and Pulse Amplitude Index fields are not present.
    - ii. Field: SpO2PR-Normal SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - iii. Field: SpO2PR-Normal PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - iv. Field: SpO2PR-Fast SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - v. Field: SpO2PR-Fast PR (bpm)
      - Format: SFLOAT
      - · Value: Not Relevant
    - vi. Field: SpO2PR-Slow SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - vii. Field: SpO2PR-Slow PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - viii. Field: Measurement Status
      - Format: 16 bit
      - Value: 1000 0000 0000 0000 (MSB → LSB). Invalid measurement detected (bit 15).
    - ix. Field: Device and Sensor Status
      - This field is not included

- x. Field: Pulse Amplitude Index (%)
  - This field is not included
- Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.
- 7. The simulated PHD sends a Measurement to the PHG under test with the Measurement Status field set to 0100 0000 0000 0000 (MSB → LSB), questionable measurement detected (bit 14). All remaining fields remain equal to those in step 5.
- 8. Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.
- 9. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0010 0000 0000 0000 (MSB → LSB), measurement not available (bit 13). All remaining fields remain equal to those in step 5.
- 10. Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.
- 11. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0001 0000 0000 0000 (MSB → LSB), calibration ongoing (bit 12). All remaining fields remain equal to those in step 5.
- 12. Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.
- 13. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 1000 0000 0000 (MSB → LSB), data for testing (bit 11). All remaining fields remain equal to those in step 5.
- 14. Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.
- 15. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0100 0000 0000 (MSB → LSB), data for demonstration (bit 10). All remaining fields remain equal to those in step 5.
- 16. Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.
- 17. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 1000 0000 (MSB → LSB), fully qualified data (bit 7). All remaining fields remain equal to those in step 5.
- 18. Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.
- 19. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0100 0000 (MSB → LSB), early estimated data (bit 6). All remaining fields remain equal to those in step 5.
- 20. Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.
- 21. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0010 0000 (MSB → LSB), measurement ongoing (bit 5). All remaining fields remain equal to those in step 5.
- 22. Check in the PHG transcoder output the Pulse Rate Numeric Object Measurement-Status attribute in all three Pulse Rate objects.

## Pass/Fail criteria

In Step 6, the Pulse Rate Numeric Object – Measurement-Status attribute is present in all three Pulse Rate objects and its set to "invalid" (0x8000)

In Step 8, the Pulse Rate Numeric Object – Measurement-Status attribute is present in all three Pulse Rate objects and its set to "questionable" (0x4000)

In Step 10, the Pulse Rate Numeric Object – Measurement-Status attribute is present in all three Pulse Rate objects and its set to "not-available" (0x2000)

In Step 12, the Pulse Rate Numeric Object – Measurement-Status attribute is present in all three Pulse Rate objects and its set to "calibration-ongoing" (0x1000)

In Step 14, the Pulse Rate Numeric Object – Measurement-Status attribute is present in all three Pulse Rate objects and its set to "test-data" (0x0800)

In Step 16, the Pulse Rate Numeric Object - Measurement-Status attribute is present in all

	thre	ee Pı	ulse Rate objects and its set to "demo-data" (0x0400)
			18, the Pulse Rate Numeric Object – Measurement-Status attribute is present in all ulse Rate objects and its set to "validated-data" (0x0080)
			20, the Pulse Rate Numeric Object – Measurement-Status attribute is present in all ulse Rate objects and its set to "early-indication" (0x0040)
			22, the Pulse Rate Numeric Object – Measurement-Status attribute is present in all ulse Rate objects and its set to "msmt-ongoing" (0x0020)
Notes	In s	step (	6, possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a)	IEE	E 11073 Objects and Attributes
		Me	asurement-Status attribute is present in all three Pulse Rate objects:
			Object: Pulse Rate Numeric Object
			Attribute-id: MDC_ATTR_MSMT_STAT (2375)
			Attribute-type: BITS16
			Attribute-value: 80 00 (hex)
	b)	WΑ	N PCD-01 message
			D-01 message includes a segment like for each SpO2 object this with Measurement-tus attribute value (check OBX-8 and OBX-11):
			OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>INV</b>     <b>X</b>    [current_date_time]
	In s	step (	8, possible values in typical points of observation after transcoder output are:
	a)	IEE	E 11073 Objects and Attributes
		Me	asurement-Status attribute is present in all three Pulse Rate objects:
			Object: Pulse Rate Numeric Object
			Attribute-id: MDC_ATTR_MSMT_STAT (2375)
			Attribute-type: BITS16
			Attribute-value: 40 00 (hex)
	b)	WA	N PCD-01 message
			D-01 message includes a segment like this for each SpO2 object with Measurement-tus attribute value (check OBX-8 and OBX-11):
			OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC  QUES   R   [current_date_time]
	In s	step '	10, possible values in typical points of observation after transcoder output are:
	a)	IEE	E 11073 Objects and Attributes
		Me	asurement-Status attribute is present in all three Pulse Rate objects:
			Object: Pulse Rate Numeric Object
			Attribute-id: MDC_ATTR_MSMT_STAT (2375)
			Attribute-type: BITS16
			Attribute-value: 20 00 (hex)
	b)	WA	N PCD-01 message
			D-01 message includes a segment like this for each SpO2 object with Measurement-tus attribute value (check OBX-8 and OBX-11):
			OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>NAV</b>     <b>X</b>    [current_date_time]
	In s	step '	12, possible values in typical points of observation after transcoder output are:
	a)	IEE	E 11073 Objects and Attributes
		Me	asurement-Status attribute is present in all three Pulse Rate objects:
			Object: Pulse Rate Numeric Object
			Attribute-id: MDC ATTR MSMT STAT (2375)

☐ Attribute-type: BITS16
☐ Attribute-value: <b>10 00</b> (hex)
b) WAN PCD-01 message
PCD-01 message includes a segment like this for each SpO2 object with Measurement-Status attribute value (check OBX-8 and OBX-11):
OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>CAL</b>     <b>R</b>    [current_date_time]
In step 14, possible values in typical points of observation after transcoder output are:
a) IEEE 11073 Objects and Attributes
Measurement-Status attribute is present in all three Pulse Rate objects:
□ Object: Pulse Rate Numeric Object
☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
☐ Attribute-type: BITS16
☐ Attribute-value: <b>08 00</b> (hex)
b) WAN PCD-01 message
PCD-01 message includes a segment like this for each SpO2 object with Measurement-Status attribute value (check OBX-8 and OBX-11):
OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>TEST</b>     <b>R</b>    [current_date_time]
In step 16, possible values in typical points of observation after transcoder output are:
a) IEEE 11073 Objects and Attributes
Measurement-Status attribute is present in all three Pulse Rate objects:
□ Object: Pulse Rate Numeric Object
☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
☐ Attribute-type: BITS16
☐ Attribute-value: <b>04 00</b> (hex)
b) WAN PCD-01 message
PCD-01 message includes a segment like this for each SpO2 object with Measurement-Status attribute value (check OBX-8 and OBX-11):
OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>DEMO</b>     <b>R</b>    [current_date_time]
In step 18, possible values in typical points of observation after transcoder output are:
a) IEEE 11073 Objects and Attributes
Measurement-Status attribute is present in all three Pulse Rate objects:
□ Object: Pulse Rate Numeric Object
☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
☐ Attribute-type: BITS16
☐ Attribute-value: <b>00 80</b> (hex)
b) WAN PCD-01 message
PCD-01 message includes a segment like this for each SpO2 object with Measurement-Status attribute value (check OBX-8 and OBX-11):
OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC     F   [current_date_time]
In step 20, possible values in typical points of observation after transcoder output are:
a) IEEE 11073 Objects and Attributes
Measurement-Status attribute is present in all three Pulse Rate objects:
□ Object: Pulse Rate Numeric Object

	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
	□ Attribute-type: BITS16
	☐ Attribute-value: <b>00 40</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this for each SpO2 object with Measurement-Status attribute value (check OBX-8 and OBX-11):
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>EARLY</b>    <b>R</b>    [current_date_time]
In s	tep 22, possible values in typical points of observation after transcoder output are:
a)	IEEE 11073 Objects and Attributes
	Measurement-Status attribute is present in all three Pulse Rate objects:
	□ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_MSMT_STAT (2375)
	□ Attribute-type: BITS16
	☐ Attribute-value: <b>00 20</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this for each SpO2 object with Measurement-Status attribute value (check OBX-8 and OBX-11):
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>BUSY</b>    <b>X</b>    [current_date_time]

		TRUE BANGRUS (BURTAUR) V/DV co. 4			
TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-034			
TP label		Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) – Unit-Code Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	PR Numeric 8; M			
Test purpos	se	Check that:			
		PHG includes Pulse Rate Numeric Object –Unit-Code attribute in transcoder output when using spot-check measurement mode.			
		[AND]			
		Unit-Code is set to MDC_DIM_BEAT_PER_MIN			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS		C_MAN_BLE_042			
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state			
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.			
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:			
		a. PLX Features (0x2A60)			
		i. Field: Supported Features			
		Format: 16 bit			
		<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>			
		ii. Field: Measurement Status Support			
		This field is not included			

	iii Field Device and Concer Status Connect
	iii. Field: Device and Sensor Status Support
	This field is not included
	b. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present. Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	6. Check in PHG transcoder output the Pulse Rate Numeric Object – Unit-Code attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	<ul> <li>a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test</li> </ul>
	<ul> <li>b) Check in PHG transcoder output the Pulse Rate Numeric Object – Unit-Code attribute</li> </ul>
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Unit-Code attribute is present and its set to MDC_DIM_BEAT_PER_MIN.
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
,	Unit-Code attribute is present:
	□ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_UNIT_CODE (2454)
	☐ Attribute-type: INT-U16
	☐ Attribute-value: MDC_DIM_BEAT_PER_MIN or 2720 (dec) or 0A A0 (hex)
	b) WAN PCD-01 message

PCD-01 message includes a segment like this with Unit-Code attribute value (check OBX-6):
OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC    R   [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-035			
TP label		Whitepaper. Pulse Rate Numeric Object (Continuous Measurements) – Unit-Code Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
)	Testable items	PR Numeric 18; M			
Test purpos	se	Check that:			
		PHG includes Pulse Rate Numeric Object – Unit-Code attribute in transcoder output when using continuous measurements.			
		[AND]			
		Unit-Code is set to MDC_DIM_BEAT_PER_MIN			
Applicability	y	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS					
Initial condi	tion	The PHG under test and the simulated PHD are in the Standby state.			
Test proced	lure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>			
		<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>			
		a. PLX Features (0x2A60)			
		i. Field: Supported Features			
		Format: 16 bit			
		<ul> <li>Value: 0000 0000 0011 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5).</li> </ul>			
		ii. Field: Measurement Status Support			
		This field is not included			
		iii. Field: Device and Sensor Status Support			
		This field is not included			
		b. PLX Continuous Measurement (0x2A5F)			
		i. Field: Flags			
		Format: 8 bit			
		<ul> <li>Value: 0000 0011(MSB → LSB). SpO2PR–Fast, SpO2PR-Slow fields are present. Measurement Status, Device and Sensor Status and Pulse Amplitude Index fields are not present.</li> </ul>			
		ii. Field: SpO2PR-Normal - SpO2 (%)			
		Format: SFLOAT			
		Value: Not Relevant			
		iii. Field: SpO2PR-Normal – PR (bpm)			
		Format: SFLOAT			
		Value: Not Relevant			
		iv. Field: SpO2PR-Fast - SpO2 (%)			
		Format: SFLOAT			
		Value: Not Relevant			

	<del>-</del>	
	v. Field: SpO2PR-Fast - PR (bpm)	
	Format: SFLOAT	
	Value: Not Relevant	
	vi. Field: SpO2PR-Slow - SpO2 (%)	
	Format: SFLOAT	
	Value: Not Relevant	
	vii. Field: SpO2PR-Slow - PR (bpm)	
	Format: SFLOAT	
	Value: Not Relevant	
	viii. Field: Measurement Status	
	This field is not included	
	ix. Field: Device and Sensor Status	
	This field is not included	
	x. Field: Pulse Amplitude Index (%)	
	This field is not included	
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).	
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.	
	5. The simulated PHD sends the Measurement to the PHG under test.	
	6. Check in PHG transcoder output the Pulse Rate Numeric Object – Unit-Code attribute in all three Pulse Rate objects (continuous normal, fast and slow).	
Pass/Fail criteria	Step 6,	
	There are three Pulse Rate objects (for normal, fast and slow measurement modes).	
	In all three objects, the Pulse Rate Numeric Object – Unit-Code attribute is present and its set to MDC_DIM_BEAT_PER_MIN.	
Notes	ossible values in typical points of observation after transcoder output are:	
(To assist manual testing)	a) IEEE 11073 Objects and Attributes	
tooting)	Unit-Code attribute is present in all three Pulse Rate objects:	
	☐ Object: Pulse Rate Numeric Object	
	☐ Attribute-id: MDC_ATTR_UNIT_CODE (2454)	
	☐ Attribute-type: INT-U16	
	- Authorite type. IIVI 616	
	Attribute-value: MDC_DIM_BEAT_PER_MIN or 2720 (dec) or 0A A0 (hex)	
	☐ Attribute-value: MDC_DIM_BEAT_PER_MIN or 2720 (dec) or 0A A0 (hex)	

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-036		
TP label		Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) – Absolute-Time-Stamp Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]	[Bluetooth PHDT v1.6]	
	Testable	PR Numeric 9; M	Date-Time Conv 2; M	Date-Time Conv 3; M
	items	Date-Time Conv 4; M	Date-Time Conv 5; M	
Test purpose Check that:				

	PHG transcodes Time Stamp field of Spot-Check Measurement characteristic into Pulse				
	Rate Numeric Object - Absolute-Time-Stamp attribute				
	[AND]				
	PHG transcodes the Bluetooth Time Stamp field format to Absolute Time format				
	[AND]				
	The fraction of seconds in Absolute Time at transcoder output is 0				
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS	C_MAN_BLE_042				
Initial condition	The PHG under test and the simulated PHD are in the Standby state.				
Test procedure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a Spot-Check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>				
	<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>				
	a. PLX Features (0x2A60)				
	i. Field: Supported Features				
	Format: 16 bit				
	<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>				
	ii. Field: Measurement Status Support				
	This field is not included				
	iii. Field: Device and Sensor Status Support				
	This field is not included				
	b. PLX Spot-Check Measurement (0x2A5E)				
	i. Field: Flags				
	Format: 8 bit				
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present. Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>				
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)				
	Format: SFLOAT				
	Value: Not Relevant				
	iii. Field: SpO2PR-Spot-Check – PR (bpm)				
	Format: SFLOAT				
	Value: Not Relevant				
	iv. Field: Time Stamp				
	Format: Date and Time				
	<ul> <li>Value: October 12nd, 2015, 10:39:27</li> </ul>				
	v. Field: Measurement Status				
	This field is not included				
	vi. Field: Device and Sensor Status				
	This field is not included				
	vii. Field: Pulse Amplitude Index (%)				
	This field is not included				
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the				

	simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).				
	4. When the pairing has been completed (Connection state), force the PHG to read the PLX Features characteristic.				
	5. The simulated PHD sends the Measurement to the PHG under test.				
	6. Check in PHG transcoder output the Pulse Rate Numeric Object – Absolute-Time-Stamp attribute				
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN				
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test				
	b) Check in PHG transcoder output the Pulse Rate Numeric Object – Absolute-Time- Stamp attribute				
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Absolute-Time-Stamp attribute is present, its value matches with Time Stamp field of Spot-Check Measurement characteristic and fraction of seconds is set to 0.				
	If the PHG supports RACP, the same criteria applies to Step 7.b.				
Notes	Possible values in typical points of observation after transcoder output are:				
(To assist manual testing)	a) IEEE 11073 Objects and Attributes				
	Absolute-Time-Stamp attribute is present:				
	☐ Object: Pulse Rate Numeric Object				
	☐ Attribute-id: MDC_ATTR_TIME_STAMP_ABS (2448)				
	Attribute-type: SEQUENCE {century (INT-U8), year (INT-U8), month (INT-U8), day (INT-U8), hour (INT-U8), minute (INT-U8), second (INT-U8), sec-fractions (INT-U8)} (BCD encoding)				
	☐ Attribute-value:				
	• century: 20 (hex) or 32 (dec)				
	• year: 15 (hex) or 21 (dec)				
	• month: 10 (hex) or 16 (dec)				
	• day: 12 (hex) or 18 (dec)				
	• hour: 10 (hex) or 16 (dec)				
	• minute: 39 (hex) or 57 (dec)				
	• second: 27 (hex) or 39 (dec)				
	sec-fractions: 00 (hex) or 0 (dec)				
	b) WAN PCD-01 message				
	PCD-01 message includes a segment like this with Absolute-Time-Stamp attribute value (check OBX-14):				
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x [value]  264864^MDC_DIM_BEAT_PER_MIN^MDC    R    <b>20151012103927+0000</b>				

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-037				
TP label  Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) – Basic-Nu-Obsevalue Attribute 1						
Coverage	Spec	[Bluetooth PHDT v1.6]	<u>,                                      </u>			
	Testable items	PR Numeric 10; M	Short Float Type 1; C			
Test purpo	se	Check that:				
			ue of the SpO2PR-Spot-Check fie istic into Pulse Rate Numeric Obje			

	attribute				
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS	C_MAN_BLE_042				
Initial condition	The PHG under test and the simulated PHD are in the Standby state.				
Test procedure	. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a Spot-Check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.				
	The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
	a. PLX Features (0x2A60)				
	i. Field: Supported Features				
	Format: 16 bit				
	<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>				
	ii. Field: Measurement Status Support				
	This field is not included				
	iii. Field: Device and Sensor Status Support				
	This field is not included				
	b. PLX Spot-Check Measurement (0x2A5E)				
	i. Field: Flags				
	Format: 8 bit				
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present. Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>				
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)				
	Format: SFLOAT				
	Value: Not Relevant				
	iii. Field: SpO2PR-Spot-Check – PR (bpm)				
	Format: SFLOAT				
	• Value: 90.0 (bpm)				
	iv. Field: Time Stamp				
	Format: Date and Time				
	Value: Not relevant				
	v. Field: Measurement Status				
	This field is not included				
	vi. Field: Device and Sensor Status				
	This field is not included				
	vii. Field: Pulse Amplitude Index (%)				
	This field is not included				
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).				
	<ol> <li>When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.</li> </ol>				
	5. The simulated PHD sends the Measurement to PHG under test.				
	Check in PHG transcoder output the Pulse Rate Numeric Object – Basic-Nu-Observed-Value attribute				

	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN			
	<ul> <li>The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test</li> </ul>			
	<ul> <li>b) Check in PHG transcoder output the Pulse Rate Numeric Object – Basic-Nu- Observed-Value attribute</li> </ul>			
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Basic-Nu-Observed-Value attribute is present and its value matches with the value of the PR subfield of the SpO2PR-Spot-Check field in the PLX Spot-Check Measurement characteristic (90.0 bpm).			
	If the PHG supports RACP, the same criteria applies to Step 7.b.			
Notes	Possible values in typical points of observation after transcoder output are:			
(To assist manual testing)	a) IEEE 11073 Objects and Attributes			
C,	Basic-Nu-Observed-Value attribute is present:			
	☐ Object: Pulse Rate Numeric Object			
	☐ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)			
	☐ Attribute-type: SFLOAT			
	☐ Attribute-value: F3 84 (hex) or 10 09 (hex) or 00 5A (hex) or 90.0 (dec)			
	b) WAN PCD-01 message			
	PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribute value (check OBX-5):			
	OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x  <b>90.0</b>   264864^MDC_DIM_BEAT_PER_MIN^MDC    R   [current_date_time]			

TP Id		TP/LP-PAN/PHG/PI	HDTW/PLX/BV-038					
TP label		Whitepaper. Pulse Rate Numeric Object (Spot-Check Measurement) – Basic-Nu-Observed-Value Attribute 2						
Coverage	Spec	[Bluetooth PHDT v1.6]						
	Testable items	PR Numeric 10; M	PR Numeric 10; M PR Numeric 20; M Short Float Typ					
Test purpo	se	Check that:						
		PHG transcodes Pulse Rate value of the PR subfield of the SpO2PR-Spot-Check field in PLX Spot-Check Measurement characteristic into Pulse Rate Numeric Object - Basic-Nu-Observed-Value attribute						
		[AND]	[AND]					
		PHG assigns specia	l value NaN (0x07FF) when Pulse	Rate value is unavailable.				
Applicabili	ty	C_MAN_BLE_000 A	AND C_MAN_BLE_002 AND C_MA	N_BLE_040				
Other PICS	3	C_MAN_BLE_042						
Initial cond	lition	The PHG under test	and the simulated PHD are in the	Standby state.				
Test procedure		<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a Spot-Check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>						
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:						
		a. PLX Features (0x2A60)						
		i. Field: Supported Features						
		Format: 16 bit						
		<ul> <li>Value: 0000 0000 0000 1100 (MSB → LSB). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check</li> </ul>						

	measurements is supported (bit 3).			
	ii. Field: Measurement Status Support			
	This field is not included			
	iii. Field: Device and Sensor Status Support			
	This field is not included			
	b. PLX Spot-Check Measurement (0x2A5E)			
	i. Field: Flags			
	Format: 8 bit			
	<ul> <li>Value: 0000 0001 (MSB → LSB). Timestamp field is present.</li> <li>Measurement Status, Device and Sensor Status, and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>			
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)			
	Format: SFLOAT			
	Value: Not Relevant			
	iii. Field: SpO2PR-Spot-Check – PR (bpm)			
	Format: SFLOAT			
	Value: 07 FF (hex). Special value: NaN			
	iv. Field: Time Stamp			
	Format: Date and Time			
	Value: Not Relevant			
	v. Field: Measurement Status			
	This field is not included			
	vi. Field: Device and Sensor Status			
	This field is not included			
	vii. Field: Pulse Amplitude Index (%)			
	This field is not included			
	The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).			
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.			
	5. The simulated PHD sends the Measurement to the PHG under test.			
	Check in PHG transcoder output the Pulse Rate Numeric Object – Basic-Nu-Observed-Value attribute			
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN			
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test			
	<ul> <li>b) Check in PHG transcoder output the Pulse Rate Numeric Object – Basic-Nu- Observed-Value attribute</li> </ul>			
Pass/Fail criteria	In Step 6, the Pulse Rate Numeric Object – Basic-Nu-Observed-Value attribute is present and its value is 0x07FF (NaN).			
	If the PHG supports RACP, the same criteria applies to Step 7.b.			
Notes	Possible values in typical points of observation after transcoder output are:			
(To assist manual testing)	a) IEEE 11073 Objects and Attributes			
<del></del>	Basic-Nu-Observed-Value attribute is present:			
	☐ Object: Pulse Rate Numeric Object			

☐ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
☐ Attribute-type: SFLOAT
☐ Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)
b) WAN PCD-01 message
PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribute value (check OBX-5):
OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x   264864^MDC_DIM_BEAT_PER_MIN^MDC   <b>NAN</b>    X   [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-039					
TP label		Pulse Rate Numeric Object (Continuous Measurements) – Basic-Nu-Observed-Value Attribute 1					
Coverage	Spec	[Bluetooth PHDT v1.6]					
	Testable items	PR Numeric 19; M	Short Float Type 1; C				
Test purpos	se	Check that:					
		PHG transcodes Pulse Rate value of the PR subfield of the SpO2PR-Normal field in PLX Continuous Measurement characteristic into Pulse Rate Numeric Object (Continuous normal response) - Basic-Nu-Observed-Value attribute					
		[AND]					
		Continuous Measureme	Rate value of the PR subfield of the ent characteristic into Pulse Rate No Observed-Value attribute				
		[AND]					
		Continuous Measureme	Rate value of the PR subfield of the ent characteristic into Pulse Rate No Observed-Value attribute				
Applicabilit	у	C_MAN_BLE_000 AND	C_MAN_BLE_002 AND C_MAN_I	BLE_040			
Other PICS							
Initial condi	ition	The PHG under test an	d the simulated PHD are in the Star	ndby state.			
Test proced	lure	The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).					
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:					
		a. PLX Features (0x2A60)					
		i. Field: Supported Features					
		Format: 16 bit					
			e: 0000 0000 0011 0000 (MSB $\rightarrow$ LS es are supported (bits 4 and 5).	SB). Fast and slow response			
		ii. Field: Me	asurement Status Support				
		• This	field is not included				
		iii. Field: Dev	vice and Sensor Status Support				
		• This	field is not included				
		b. PLX Continuo	us Measurement (0x2A5F)				
		i. Field: Fla	gs				
		• Form	at: 8 bit				
			e: 0000 0011 (MSB $ ightarrow$ LSB). SpO2F ent. Measurement Status, Device an				

	Amplitude Index fields are not present.
	ii. Field: SpO2PR-Normal - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Normal - PR (bpm)
	Format: SFLOAT
	Value: 90.0 (bpm)
	iv. Field: SpO2PR-Fast - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	v. Field: SpO2PR-Fast - PR (bpm)
	Format: SFLOAT
	Value: 91.0 (bpm)
	vi. Field: SpO2PR-Slow - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	vii. Field: SpO2PR-Slow - PR (bpm)
	Format: SFLOAT
	Value: 92.0 (bpm)  viii. Field: Measurement Status
	This field is not included  ix. Field: Device and Sensor Status
	This field is not included  Field: Rules Amplitude Index (%)
	x. Field: Pulse Amplitude Index (%)  This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX. Features characteristic.
	5. The simulated PHD sends the Measurement to PHG under test.
	Check in PHG transcoder output the Pulse Rate Numeric Object – Basic-Nu-Observed-Value attribute in all three Pulse Rate objects.
Pass/Fail criteria	In Step 6,
r ass/r all criteria	The Pulse Rate Numeric Object (Continuous measurement normal) – Basic-Nu-
	Observed-Value attribute is present and its value matches with the value of the PR field of the SpO2PR-Normal field in the PLX Continuous Measurement characteristic (90.0 bpm).
	The Pulse Rate Numeric Object (Continuous measurement fast) – Basic-Nu-Observed-Value attribute is present and its value matches with the value of the PR subfield of the SpO2PR-Fast field in the PLX Continuous Measurement characteristic (91.0 bpm).
	The Pulse Rate Numeric Object (Continuous measurement slow) – Basic-Nu-Observed-Value attribute is present and its value matches with the value of the PR subfield of the SpO2PR-Slow field in the PLX Continuous Measurement characteristic (92.0 bpm).
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
<b>-</b> - <b>-</b>	Pulse Rate Numeric object (Continuous measurement normal):
	Supplemental-types attribute is not present.

•	Ba	sic-Nu-Observed-Value attribute is present:
		Object: Pulse Rate Numeric Object
		Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
		Attribute-type: SFLOAT
		Attribute-value: F3 84 (hex) or 10 09 (hex) or 00 5A (hex) or 90.0 (dec)
Р	ulse R	ate Numeric object (Continuous measurement fast):
•	Su	oplemental-types attribute is present:
		Object: Pulse Rate Numeric Object (fast response)
		Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)
		Attribute-type: SEQUENCE of SEQUENCE (partition (INT-U16), code (INT-U16))
		Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_FAST}.
•	Ba	sic-Nu-Observed-Value attribute is present:
		Object: Pulse Rate Numeric Object
		Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
		Attribute-type: SFLOAT
		Attribute-value: F3 8E (hex) or 00 5B (hex) or 91.0 (dec)
Р	ulse R	ate Numeric object (Continuous measurement slow):
•	Su	oplemental-types attribute is present:
		Object: Pulse Rate Numeric Object (slow response)
		Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)
		Attribute-type: SEQUENCE of SEQUENCE (partition (INT-U16), code (INT-U16))
		Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_SLOW}.
•	Ba	sic-Nu-Observed-Value attribute is present:
		Object: Pulse Rate Numeric Object
		Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
		Attribute-type: SFLOAT
		Attribute-value: F3 98 (hex) or 00 5C (hex) or 92.0(dec)
b) W	AN P	CD-01 message
Р	ulse R	ate Numeric object (Continuous measurement normal):
•		D-01 message includes a segment like this with Basic-Nu-Observed-Value ibute value (check OBX-5):
		X n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x  <b>90.0</b>   4864^MDC_DIM_BEAT_PER_MIN^MDC    R   [current_date_time]
Р	ulse R	ate Numeric object (Continuous measurement fast):
•	(Fa	D-01 message includes two segments like these for Pulse Rate Numeric object st response), with Basic-Nu-Observed-Value attribute and Supplemental-Types ibute values (check OBX-5 in both segments):
		X n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x  <b>91.0</b>   4864^MDC_DIM_BEAT_PER_MIN^MDC    R   [current_date_time]
		X n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  0580^MDC_MODALITY_FAST^MDC     [obx-11 of the parent]
Р	ulse R	ate Numeric object (Continuous measurement slow):
•	(SI	D-01 message includes two segments like these for Pulse Rate Numeric object by response), with Basic-Nu-Observed-Value attribute and Supplemental-Types in the segments.

OBX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x  <b>92.0</b>   264864^MDC_DIM_BEAT_PER_MIN^MDC    R   [current_date_time]
OBX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  150580^MDC_MODALITY_SLOW^MDC      [obx-11 of the parent]

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-040					
TP label		Whitepaper. Pulse Rate Numeric Object (Continuous Measurements) – Basic-Nu-Observed- Value Attribute 2					
Coverage	Spec	[Bluetooth PHDT v1.6]					
	Testable items	PR Numeric 19;	М	PR Numeric 20; M	Short Float Type 2; M		
Test purpo	se	Check that:					
		PHG transcodes Pulse Rate value of the PR subfield of the SpO2PR-Normal field in PLX Continuous Measurement characteristic into Pulse Rate Numeric Object (Continuous normal response) - Basic-Nu-Observed-Value attribute					
		[AND]					
		Continuous Mea	surement cha	ralue of the PR subfield of the Sparacteristic into Pulse Rate Numberd-Value attribute			
		[AND]					
		Continuous Mea	surement cha	value of the PR subfield of the Sparacteristic into Pulse Rate Numbered-Value attribute			
		[AND]					
		PHG assigns sp	ecial value Na	aN (0x07FF) when Pulse Rate va	alue is unavailable.		
Applicabili	ty	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040					
Other PICS	1						
Initial cond	lition	The PHG under	test and the s	simulated PHD are in the Standb	y state.		
Test proce	dure	The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).					
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:					
		a. PLX Fe	atures (0x2A	60)			
		i. Field: Supported Features					
		•	Format: 16	bit			
		•		0 0000 00 <b>11</b> 0000 (MSB $\rightarrow$ LSB) supported (bits 4 and 5).	. Fast and slow response		
		ii. Fie	eld: Measuren	nent Status Support			
		•	This field is	not included			
		iii. Fie	eld: Device an	d Sensor Status Support			
		•	This field is	not included			
		b. PLX Co	ontinuous Mea	asurement (0x2A5F)			
		i. Fie	eld: Flags				
		•	Format: 8 b	it			
		•	present. Me	0 0011 (MSB → LSB). SpO2PR- easurement Status, Device and Sendex fields are not present.			
		ii. Field: SpO2PR-Normal - SpO2 (%)					

	F
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Normal - PR (bpm)
	Format: SFLOAT
	Value: 07 FF (hex). Special value: NaN
	iv. Field: SpO2PR-Fast - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	v. Field: SpO2PR-Fast - PR (bpm)
	Format: SFLOAT
	Value: 07 FF (hex). Special value: NaN
	vi. Field: SpO2PR-Slow - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	vii. Field: SpO2PR-Slow - PR (bpm)
	Format: SFLOAT
	Value: 07 FF (hex). Special value: NaN
	viii. Field: Measurement Status
	This field is not included
	ix. Field: Device and Sensor Status
	This field is not included
	x. Field: Pulse Amplitude Index (%)
	This field is not included
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to PHG under test.
	Check in PHG transcoder output the Pulse Rate Numeric Object – Basic-Nu-Observed-Value attribute for all Pulse Rate objects.
Pass/Fail criteria	In Step 6,
	The Pulse Rate Numeric Object (Continuous measurement normal) – Basic-Nu- Observed-Value attribute is present and its value is 0x07FF (NaN).
	The Pulse Rate Numeric Object (Continuous measurement fast) – Basic-Nu-Observed-Value attribute is present and its value is 0x07FF (NaN).
	The Pulse Rate Numeric Object (Continuous measurement slow) – Basic-Nu-Observed-Value attribute is present and its value is 0x07FF (NaN).
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual	a) IEEE 11073 Objects and Attributes
testing)	Pulse Rate Numeric object (Continuous measurement normal):
	Supplemental-types attribute is not present.
	Basic-Nu-Observed-Value attribute is present:
	□ Object: Pulse Rate Numeric Object
	☐ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
	☐ Attribute-type: SFLOAT

			Attribute-value: Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)	,
	F	Pulse F	Rate Numeric object (Continuous measurement fast):	
	•	• Su	upplemental-types attribute is present:	
			Object: Pulse Rate Numeric Object (fast response)	
			Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)	
			Attribute-type: SEQUENCE of SEQUENCE (partition (INT-U16), code (INT-U16))	
			Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_FAST}.	
		•	Basic-Nu-Observed-Value attribute is present:	
			☐ Object: Pulse Rate Numeric Object	
			☐ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)	
			☐ Attribute-type: SFLOAT	
			☐ Attribute-value: Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)	
	F	Pulse F	Rate Numeric object (Continuous measurement slow):	
	•	• Su	upplemental-types attribute is present:	
			Object: Pulse Rate Numeric Object (slow response)	
			Attribute-id: MDC_ATTR_SUPPLEMENTAL_TYPES (2657)	
			Attribute-type: SEQUENCE of SEQUENCE (partition (INT-U16), code (INT-U16))	
			Attribute-value: {MDC_PART_SCADA, MDC_MODALITY_SLOW}.	
	•	<ul><li>Basi</li></ul>	ic-Nu-Observed-Value attribute is present:	
			Object: Pulse Rate Numeric Object	
			Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)	
			Attribute-type: SFLOAT	
			Attribute-value: Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)	•
b)	١	WAN F	PCD-01 message	
	F	Pulse F	Rate Numeric object (Continuous measurement normal):	
	•		CD-01 message includes a segment like this with Basic-Nu-Observed-Value tribute value (check OBX-5):	
			BX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x   i4864^MDC_DIM_BEAT_PER_MIN^MDC   <b>NAN</b>    X   [current_date_time]	
	F	Pulse F	Rate Numeric object (Continuous measurement fast):	
	•	(Fa	CD-01 message includes two segments like these for Pulse Rate Numeric object ast response), with Basic-Nu-Observed-Value attribute and Supplemental-Typestribute values (check OBX-5 in both segments):	
			BX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x   i4864^MDC_DIM_BEAT_PER_MIN^MDC   <b>NAN</b>    X   [current_date_time]	
			BX n CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y  0580^MDC_MODALITY_FAST^MDC       cobx-11 of the parent]	
	F	Pulse F	Rate Numeric object (Continuous measurement slow):	
	•	(S	CD-01 message includes two segments like these for Pulse Rate Numeric object low response), with Basic-Nu-Observed-Value attribute and Supplemental-Type tribute values (check OBX-5 in both segments):	
		OE 26	BX n NM 149530^MDC_PULS_OXIM_PULS_RATE^MDC m.0.0.x   4864^MDC_DIM_BEAT_PER_MIN^MDC   <b>NAN</b>    X   [current_date_time]	
	(	OBX[n]	CWE 68193^MDC_ATTR_SUPPLEMENTAL_TYPES^MDC m.0.0.x.y	

TP ld		TP/LP-	PAN/	PHG/PHDTW/PL>	(/BV-041		
TP label					urement value (Spot-Check	(Measurement)	
Coverage	Spec			HDT v1.6]	\ 1	,	
J	Testable			Гуре 1; С	Date-Time Conv 1; M	PR Numeric 9; M	
items		PR Nur			,	1 2 2 1,	
Test purpose		Check that:					
1 cor barbose		PHG processes correctly the Pulse Rate value (bpm) of the PR subfield of the SpO2PR-					
		Spot-Cl	heck	field and the value	of the Time Stamp field of t	the PLX Spot-Check characteristic	
Applicability	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040					
Other PICS		C_MAN_BLE_042					
Initial condi	tion	The PH	IG ur	der test and the si	mulated PHD are in the Sta	ndby state.	
Test proced	lure	ha: dis	s a S cove	pot-Check measur rable). The simula	rement ready to be sent and	ter Profile (device specialization), it I it is in the Advertising state (it is RACP characteristic and has an	
				ulated PHD imple for this Test Case		teristics. The characteristics of	
		a.	PL	X Features (0x2A6	50)		
			i.	Field: Supported	Features		
				• Format: 16 b	pit		
				spot-check n		SB). Measurement Storage for (bit 2). Timestamp for Spot-Check	
			ii.	Field: Measurem	ent Status Support		
				This field is r	not included		
			iii.	Field: Device and	d Sensor Status Support		
				This field is r	not included		
		b.	PL	X Spot-Check Mea	surement (0x2A5E)		
			i.	Field: Flags			
				Format: 8 bit	t .		
				Measuremer	0001 (MSB → LSB). Times nt Status, Device and Senso are not present. Device Cloo	or Status, and Pulse Amplitude	
			ii.	Field: SpO2PR-S	Spot-Check - SpO2 (%)		
				Format: SFL	OAT		
				Value: Not R	Relevant		
			iii.	Field: SpO2PR-S	Spot-Check – PR (bpm)		
				Format: SFL	OAT		
				• Value: 90.0	(bpm)		
			iv.	Field: Time Stam	p		
				Format: Date	e and Time		
				Value: Octob	per 12nd, 2015, 10:39:27		
			٧.	Field: Measurem	ent Status		
				This field is r	not included		
			vi.	Field: Device and	d Sensor Status		

	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	This field is not included
	<ol><li>The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li></ol>
	<ol> <li>When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.</li> </ol>
	5. The simulated PHD sends the Measurement to the PHG under test.
	<ol><li>Check that PHG accepts the measurement and decodes its value properly (Pulse Rate measurement value, units and time stamp).</li></ol>
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
	<ul> <li>b) Check that the PHG accepts the measurement and decodes its value properly (Pulse Rate measurement value, units and time stamp)</li> </ul>
Pass/Fail criteria	In Step 6, the PHG under test shows the following measurement Pulse Rate = 90.0 (bpm) with timestamp '2015-10-12 10:39:27'.
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-042					
TP label		Whitepaper. Pulsatile Quality Numeric Object (Spot-Check Measurement) - Handle Attribute					
Coverage	Spec	[Bluetooth PHDT v1.6]					
	Testable items	PQ Numeric 1; O					
Test purpos	se	Check that:					
		PHG does not include Pulsatile Quality Numeric Object – Handle Attribute in transcoder output when using spot-check measurement mode.					
		[OR]					
		If PHG includes Pulsatile Quality Numeric Object – Handle attribute in transcoder output, then its value shall be different than 0					
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040					
Other PICS		C_MAN_BLE_042					
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.					
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.					
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:					
		a. PLX Features (0x2A60)					
		i. Field: Supported Features					
		Format: 16 bit					
		<ul> <li>Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field is supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>					
		ii. Field: Measurement Status Support					

	This field is not included
	iii. Field: Device and Sensor Status Support
	This field is not included
	b. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 1001 (MSB → LSB). Timestamp and Pulse Amplitude Index fields are present. Measurement Status and Device and Sensor Status fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	Format: SFLOAT
	Value: Not Relevant
	The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the measurement to the PHG under test.
	6. Check in PHG transcoder output the Pulsatile Quality Numeric Object – Handle attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
	b) Check in PHG transcoder output the Pulsatile Quality Numeric Object – Handle attribute
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
-	Handle attribute is not present, or if it is present then:
	☐ Object: Pulsatile Quality Numeric Object
	☐ Attribute-id: MDC_ATTR_ID_HANDLE (2337)
	☐ Attribute-type: INT-U16

☐ Attribute-value: Any value different than 0
b) WAN PCD-01 message
PCD-01 message does not include segments with Handle attribute value

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-043					
TP label		Whitepaper. Pulsatile Quality Numeric Object (Continuous Measurements) - Handle Attribut					
Coverage	Spec	[Bluetooth PHDT v1.6]					
<b>G</b> G vo. age	Testable items	PQ Numeric 9; O					
Test purpos	se	Check that:					
		PHG does not include Pulsatile Quality Numeric Object – Handle Attribute in transcoder					
		output when using continuous measurements					
		[OR]					
		If PHG includes Pulsatile Quality Numeric Object – Handle attribute in transcoder output, then its value shall be different than 0					
Applicability	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040					
Other PICS							
Initial condi	tion	The PHG under test and the simulated PHD are in the Standby state.					
Test proced	lure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), has a continuous measurement (including fast and slow response measurement values ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>					
		<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>					
		a. PLX Features (0x2A60)					
		i. Field: Supported Features					
		Format: 16 bit					
		<ul> <li>Value: 0000 0000 0111 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5). Pulse Amplitude Index field is supported.</li> </ul>					
		ii. Field: Measurement Status Support					
		This field is not included					
		iii. Field: Device and Sensor Status Support					
		This field is not included					
		b. PLX Continuous Measurement (0x2A5F)					
		i. Field: Flags					
		Format: 8 bit					
		<ul> <li>Value: 0001 0011 (MSB → LSB). SpO2PR–Fast, SpO2PR-Slow and Pulse Amplitude Index fields are present. Measurement Status, and Device and Sensor Status and fields are not present.</li> </ul>					
		ii. Field: SpO2PR-Normal - SpO2 (%)					
		Format: SFLOAT					
		Value: Not Relevant					
		iii. Field: SpO2PR-Normal – PR (bpm)					
		Format: SFLOAT					
		Value: Not Relevant					
		iv. Field: SpO2PR-Fast - SpO2 (%)					
		Format: SFLOAT					

	Value: Not Relevant
	v. Field: SpO2PR-Fast - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	vi. Field: SpO2PR-Slow - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	vii. Field: SpO2PR-Slow - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	viii. Field: Measurement Status
	This field is not included
	ix. Field: Device and Sensor Status
	This field is not included
	x. Field: Pulse Amplitude Index (%)
	Format: SFLOAT
	Value: Not Relevant
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic
	5. The simulated PHD sends the Measurement to the PHG under test.
	Check in PHG transcoder output the Pulsatile Quality Numeric Object – Handle attribute.
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Handle attribute is not present or, if it is present then its value is different than 0.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
	Handle attribute is not present, or if it is present then:
	☐ Object: Pulsatile Quality Numeric Object
	☐ Attribute-id: MDC_ATTR_ID_HANDLE (2337)
	☐ Attribute-type: INT-U16
	☐ Attribute-value: Any value different than 0
	b) WAN PCD-01 message
	PCD-01 message does not include segments with Handle attribute value

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-044		
TP label Whitepaper. Pulsatile Quality Numeric Object (Spot-Check Measurement) - Type		Measurement) - Type Attribute		
Coverage Spec [Bluetooth PHDT v1.6]				
	Testable items	PQ Numeric 2; M		
Test purpose		Check that:  PHG includes Pulsatile Quasing spot-check measure [AND]	uality Numeric Object – Type attril ement mode.	bute in transcoder output when

	Type is set to {MDC_PART_SCADA, MDC_SAT_O2_QUAL}		
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS	C_MAN_BLE_042		
Initial condition	The PHG under test and the simulated PHD are in the Standby state.		
Test procedure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>		
	The simulated PHD implements several BTLE characteristics. The characteristic of interest for this Test Case is:		
	a. PLX Features (0x2A60)		
	i. Field: Supported Features		
	Format: 16 bit		
	<ul> <li>Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field is supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>		
	ii. Field: Measurement Status Support		
	This field is not included		
	iii. Field: Device and Sensor Status Support		
	This field is not included		
	b. PLX Spot-Check Measurement (0x2A5E)		
	i. Field: Flags		
	Format: 8 bit		
	<ul> <li>Value: 0000 1001 (MSB → LSB). Timestamp and Pulse Amplitude Index fields are present. Measurement Status and Device and Sensor Status fields are not present. Device Clock is set.</li> </ul>		
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)		
	Format: SFLOAT		
	Value: Not Relevant		
	iii. Field: SpO2PR-Spot-Check – PR (bpm)		
	Format: SFLOAT		
	Value: Not Relevant		
	iv. Field: Time Stamp		
	Format: Date and Time		
	Value: Not Relevant		
	v. Field: Measurement Status		
	This field is not included		
	vi. Field: Device and Sensor Status		
	This field is not included		
	vii. Field: Pulse Amplitude Index (%)		
	Format: SFLOAT		
	Value: Not Relevant		
	<ol> <li>The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> </ol>		
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.		

	5. The simulated PHD sends the Measurement to the PHG under test.		
	6. Check in PHG transcoder output the Pulsatile Quality Numeric Object – Type attribute		
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN		
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test		
	b) Check in PHG transcoder output the Pulsatile Quality Numeric Object – Type attribute		
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Type attribute is present and its value is {MDC_PART_SCADA, MDC_SAT_O2_QUAL}		
	If the PHG supports RACP, the same criteria applies to Step 7.b.		
Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
, <b>g,</b>	Type attribute is present:		
	☐ Object: Pulsatile Quality Numeric Object		
	☐ Attribute-id: MDC_ATTR_ID_TYPE (2351)		
	☐ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)}		
	☐ Attribute-value:		
	<ul> <li>partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex)</li> </ul>		
	<ul> <li>code: MDC_SAT_O2_QUAL or 19248(dec) or 4B 30 (hex)</li> </ul>		
	b) WAN PCD-01 message		
	PCD-01 message includes a segment like this with Type attribute (check OBX-3):		
	OBX n NM  <b>150320^MDC_SAT_O2_QUAL^MDC</b>  m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC    R   [current_date_time]		

TP Id TP/LP-PAN/PHG/PHDTW/PLX/BV-045		TD/LD DAN/DLIC/DLIDT/W/DLY/DV CAF		
1 F IU		TP/LP-PAN/PHG/PHDTW/PLX/BV-045		
TP label		Whitepaper. Pulsatile Quality Numeric Object (Continuous Measurements) - Type Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	PQ Numeric 10; M		
Test purpos	se	Check that:		
		PHG includes Pulsatile Quality Numeric Object – Type attribute in transcoder output when using continuous measurements.		
		[AND]		
		Type is set to {MDC_PART_SCADA, MDC_SAT_O2_QUAL}		
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS				
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.		
Test procedure		<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>		
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:		
		a. PLX Features (0x2A60)		
		i. Field: Supported Features		
		Format: 16 bit		

- Value: 0000 0000 0111 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5). Pulse Amplitude Index is supported (bit 6).
- ii. Field: Measurement Status Support
  - This field is not included
- iii. Field: Device and Sensor Status Support
  - · This field is not included
- b. PLX Continuous Measurement (0x2A5F)
  - i. Field: Flags
    - Format: 8 bit
    - Value: 0001 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow and Pulse Amplitude Index fields are present. Measurement Status, and Device and Sensor Status fields are not present.
  - ii. Field: SpO2PR-Normal SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - iii. Field: SpO2PR-Normal PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - iv. Field: SpO2PR-Fast SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - v. Field: SpO2PR-Fast PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - vi. Field: SpO2PR-Slow SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - vii. Field: SpO2PR-Slow PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - viii. Field: Measurement Status
    - This field is not included
  - ix. Field: Device and Sensor Status
    - This field is not included
  - x. Field: Pulse Amplitude Index (%)
    - Format: SFLOAT
    - Value: Not Relevant
- 3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- When the pairing has been completed (Connection state), force the PHG under test to read the PLX Feature characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test.
- 6. Check in PHG transcoder output the Pulsatile Quality Numeric Object Type attribute.

## Pass/Fail criteria

In Step 6, the Pulsatile Quality Numeric Object – Type attribute is present and its value is {MDC\_PART\_SCADA, MDC\_SAT\_O2\_QUAL}

Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
	Type attribute is present:		
	□ Object: Pulsatile Quality Numeric Object		
	☐ Attribute-id: MDC_ATTR_ID_TYPE (2351)		
	☐ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)}		
	☐ Attribute-value:		
	<ul> <li>partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex)</li> </ul>		
	<ul><li>code: MDC_SAT_O2_QUAL or 19248(dec) or 4B 30 (hex)</li></ul>		
	b) WAN PCD-01 message		
	PCD-01 message includes three segments like this with Type attribute (check OBX-3):		
	OBX n NM  <b>150320^MDC_SAT_O2_QUAL^MDC</b>  m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]		

TP ld	TP/LP-PAN/PHG/PHDTW/PLX/BV-046				
TP label		Whitepaper. Pulsatile Quality Numeric Object (Spot-Check Measurement) - Metric-Spec- Small Attribute 1			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	PQ Numeric 3; M PQ Numeric 5; M			
Test purpos	se	Check that:			
		PHG includes Pulsatile Quality Numeric Object – Metric-Spec-Small attribute in transcoder output when using spot-check measurement mode.			
		[AND]			
		Metric-Spec-Small is set to {0x5040} when the sensor device supports measurement storage.			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS		C_MAN_BLE_042			
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.			
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.			
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:			
		a. PLX Spot-Check Measurement (0x2A5E)			
		b. PLX Features (0x2A60)			
		i. Field: Supported Features			
		Format: 16 bit			
		<ul> <li>Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field is supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>			
		ii. Field: Measurement Status Support			
		This field is not included			
		iii. Field: Device and Sensor Status Support			
		This field is not included			
		3. The PHG under test initiates a discovery process (Scanning state), it discovers the			

		simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4.	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5.	The simulated PHD sends the Measurement to the PHG under test with the following value:
		a. PLX Spot-Check Measurement (0x2A5E)
		i. Field: Flags
		Format: 8 bit
		<ul> <li>Value: 0000 1001 (MSB → LSB). Timestamp and Pulse Amplitude Index fields are present. Measurement Status, and Device and Sensor Status are not present. Device Clock is set.</li> </ul>
		ii. Field: SpO2PR-Spot-Check - SpO2 (%)
		Format: SFLOAT
		Value: Not Relevant
		iii. Field: SpO2PR-Spot-Check – PR (bpm)
		Format: SFLOAT
		Value: Not Relevant
		iv. Field: Time Stamp
		Format: Date and Time
		Value: Not Relevant
		v. Field: Measurement Status
		This field is not included
		vi. Field: Device and Sensor Status
		This field is not included
		vii. Field: Pulse Amplitude Index (%)
		Format: SFLOAT
		Value: Not Relevant
	6.	Check in PHG transcoder output the Pulsatile Quality Numeric Object – Metric-Spec-Small attribute
	7.	IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
		a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
		<ul> <li>b) Check in PHG transcoder output the Pulsatile Quality Numeric Object – Metric- Spec-Small attribute</li> </ul>
Pass/Fail criteria		Step 6, the Pulsatile Quality Numeric Object – Metric-Spec-Small attribute is present and value is {0x5040} (mss-avail-stored-data  mss-msmt-aperiodic  mss-acc-agent-initiated).
	If th	ne PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Pos	ssible values in typical points of observation after transcoder output are:
(To assist manual testing)	a)	IEEE 11073 Objects and Attributes
		Metric-Spec-Small attribute is present:
		☐ Object: Pulsatile Quality Numeric Object
		☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)
		☐ Attribute-type: BITS-16
		Attribute-value: 50 40 (hex) or BITS mss-avail-stored-data (1), mss- msmt - aperiodic(3), mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE

b) WAN PCD-01 message
PCD-01 message does not include segments with Metric-Spec-Small attribute value

TP ld	TP/LP-PAN/PHG/PHDTW/PLX/BV-047				
TP label		Whitepaper. Pulsatile Quality Numeric Object (Spot-Check Measurement) - Metric-Spec- Small Attribute 2			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	PQ Numeric 3; M PQ Numeric 4; M			
Test purpos	se	Check that:			
		PHG includes Pulsatile Quality Numeric Object – Metric-Spec-Small attribute in transcoder output when using spot-check measurement mode.  [AND]  Metric-Spec-Small is set to {0x1040} when the sensor device does not support			
		measurement storage.			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS					
Initial condi		The PHG under test and the simulated PHD are in the Standby state.			
Test proced	lure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>			
		<ol> <li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li> </ol>			
		a. PLX Spot-Check Measurement (0x2A5E)			
		b. PLX Features (0x2A60)			
		i. Field: Supported Features			
		Format: 16 bit			
		<ul> <li>Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field is supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>			
		ii. Field: Measurement Status Support			
		This field is not included			
		iii. Field: Device and Sensor Status Support			
		This field is not included			
		3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).			
		<ol> <li>When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.</li> </ol>			
		<ol><li>The simulated PHD sends the Measurement to the PHG under test with the following value:</li></ol>			
		a. PLX Spot-Check Measurement (0x2A5E)			
		i. Field: Flags			
		Format: 8 bit			
		<ul> <li>Value: 0000 1001 (MSB → LSB). Timestamp and Pulse Amplitude Index fields are present. Measurement Status and Device and Sensor Status fields are not present. Device Clock is set.</li> </ul>			
		ii. Field: SpO2PR-Spot-Check - SpO2 (%)			
		Format: SFLOAT			

	T
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	Format: SFLOAT
	Value: Not Relevant
	Check in PHG transcoder output the Pulsatile Quality Numeric Object – Metric-Spec- Small attribute
Pass/Fail criteria	In Step 6, the SpO2 Numeric Object – Metric-Spec-Small attribute is present and its value is {0x1040} (mss-msmt-aperiodic   mss-acc-agent-initiated).
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
toog/	Metric-Spec-Small attribute is present:
	☐ Object: Pulsatile Quality Numeric Object
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)
	☐ Attribute-type: BITS-16
	Attribute-value: 10 40 (hex) or BITS mss-msmt-aperiodic(3), mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE
	b) WAN PCD-01 message
	PCD-01 message does not include segments with Metric-Spec-Small attribute value

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-048		
TP label		Whitepaper. Pulsatile Quality Numeric Object (Continuous Measurements) - Metric-Spec-Small Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	PQ Numeric 11; M		
Test purpos	se	Check that:		
		PHG includes Pulsatile Quality Numeric Object – Metric-Spec-Small attribute in transcoder output when using continuous measurements.		
		[AND]		
		Metric-Spec-Small is set to {0x0040} (mss-acc-agent-initiated)		
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS				
Initial condition		The PHG under test and the simulated PHD are in the Standby state.		
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).		

- The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:
  - a. PLX Features (0x2A60)
    - i. Field: Supported Features
      - Format: 16 bit
      - Value: 0000 0000 0111 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5). Pulse Amplitude Index field is supported (bit 6)
    - ii. Field: Measurement Status Support
      - This field is not included
    - iii. Field: Device and Sensor Status Support
      - · This field is not included
  - b. PLX Continuous Measurement (0x2A5F)
    - i. Field: Flags
      - Format: 8 bit
      - Value: 0001 0011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow and Pulse Amplitude Index fields are present. Measurement Status and Device and Sensor Status fields are not present.
    - ii. Field: SpO2PR-Normal SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - iii. Field: SpO2PR-Normal PR (bpm)
      - Format: SFLOAT
      - · Value: Not Relevant
    - iv. Field: SpO2PR-Fast SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - v. Field: SpO2PR-Fast PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - vi. Field: SpO2PR-Slow SpO2 (%)
      - Format: SFLOAT
      - Value: Not Relevant
    - vii. Field: SpO2PR-Slow PR (bpm)
      - Format: SFLOAT
      - Value: Not Relevant
    - viii. Field: Measurement Status
      - This field is not included
    - ix. Field: Device and Sensor Status
      - This field is not included
    - x. Field: Pulse Amplitude Index (%)
      - Format: SFLOAT
      - Value: Not Relevant
- The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).

	<ol> <li>When the pairing has been completed (Connection state), force the PHG under test t read the PLX Features characteristic.</li> </ol>	
	5. The simulated PHD sends the Measurement to the PHG under test.	
	Check in PHG transcoder output the Pulsatile Quality Numeric Object – Metric-Spec- Small attribute	
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Metric-Spec-Small attribute is present and its value is {0x0040} (mss-acc-agent-initiated).	
Notes	Possible values in typical points of observation after transcoder output are:	
(To assist manual testing)	a) IEEE 11073 Objects and Attributes	
3,	Metric-Spec-Small attribute is present:	
	☐ Object: Pulsatile Quality Numeric Object	
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)	
	☐ Attribute-type: BITS-16	
	☐ Attribute-value: 00 40 (hex) or BITS mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE	
	b) WAN PCD-01 message	
	PCD-01 message does not include segments with Metric-Spec-Small attribute value	

		TRUE BANGUA (BURTA/BUY/BY 646		
TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-049		
TP label		Whitepaper. Pulsatile Quality Numeric Object (Spot-Check Measurement) – Unit-Code Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	PQ Numeric 6; M		
Test purpos	se	Check that:		
		PHG includes Pulsatile Quality Numeric Object – Unit-Code attribute in transcoder output when using spot-check measurement mode.		
		[AND]		
		Unit-Code is set to MDC_DIM_PERCENT		
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS		C_MAN_BLE_042		
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.		
Test procedure		1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.		
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:		
		a. PLX Features (0x2A60)		
		i. Field: Supported Features		
		Format: 16 bit		
		<ul> <li>Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field is supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>		
		ii. Field: Measurement Status Support		
		This field is not included		
		iii. Field: Device and Sensor Status Support		

	This field is not included
	This field is not included
	b. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 1001 (MSB → LSB). Timestamp and Pulse Amplitude Index fields are present. Measurement Status and Device and Sensor Status fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	This field is not included
	vii. Field: Pulse Amplitude Index (%)
	Format: SFLOAT
	Value: Not Relevant
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	Check in the PHG transcoder output the Pulsatile Quality Numeric Object – Unit-Code attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
	b) Check in PHG transcoder output the Pulsatile Quality Numeric Object – Unit-Code attribute
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Unit-Code attribute is present and its set to MDC_DIM_PERCENT.
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
<b>3</b> ,	Unit-Code attribute is present:
	☐ Object: Pulsatile Quality Numeric Object
	☐ Attribute-id: MDC_ATTR_UNIT_CODE (2454)
	☐ Attribute-type: INT-U16
	☐ Attribute-value: MDC_DIM_PERCENT or 544 (dec) or 02 20 (hex)

b) WAN PCD-01 message
PCD-01 message includes a segment like this with Unit-Code attribute value (check OBX-6):
OBX n NM 150320^MDC_SAT_O2_QUAL^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-050		
TP label		Whitepaper. Pulsatile Quality Numeric Object (Continuous Measurements) – Unit-Code Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
3	Testable items	PQ Numeric 12; M		
Test purpos	se	Check that:  PHG includes Pulsatile Quality Numeric Object – Unit-Code attribute in transcoder output when using continuous measurements.  [AND]  Unit-Code is set to MDC_DIM_PERCENT		
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS				
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.		
Test proced	lure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).</li> <li>The simulated PHD implements several BTLE characteristics. The characteristics of</li> </ol>		
		interest for this Test Case are:		
		a. PLX Features (0x2A60)		
		i. Field: Supported Features		
		Format: 16 bit		
		<ul> <li>Value: 0000 0000 0111 0000 (MSB → LSB). Fast and slow response modes are supported (bits 4 and 5). Pulse Amplitude Index field is supported (bit 6).</li> </ul>		
		ii. Field: Measurement Status Support		
		This field is not included		
		iii. Field: Device and Sensor Status Support		
		This field is not included		
		b. PLX Continuous Measurement (0x2A5F)		
		i. Field: Flags		
		Format: 8 bit		
		<ul> <li>Value: 0001 0011(MSB → LSB). SpO2PR–Fast, SpO2PR-Slow and Pulse Amplitude Index fields are present. Measurement Status, and Device and Sensor Status fields are not present.</li> </ul>		
		ii. Field: SpO2PR-Normal - SpO2 (%)		
		Format: SFLOAT		
		Value: Not Relevant		
		iii. Field: SpO2PR-Normal – PR (bpm)		
		Format: SFLOAT		
		Value: Not Relevant		

	iv. Field: SpO2PR-Fast - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	v. Field: SpO2PR-Fast - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	vi. Field: SpO2PR-Slow - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	vii. Field: SpO2PR-Slow - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	viii. Field: Measurement Status
	This field is not included
	ix. Field: Device and Sensor Status
	This field is not included
	x. Field: Pulse Amplitude Index (%)
	Format: SFLOAT
	Value: Not Relevant
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	Check in PHG transcoder output the Pulsatile Quality Numeric Object – Unit-Code attribute.
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Unit-Code attribute is present and it is set to MDC_DIM_PERCENT.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
G,	Unit-Code attribute is present:
	☐ Object: Pulsatile Quality Numeric Object
	☐ Attribute-id: MDC_ATTR_UNIT_CODE (2454)
	☐ Attribute-type: INT-U16
	☐ Attribute-value: MDC_DIM_PERCENT or 544 (dec) or 02 20 (hex)
	b) WAN PCD-01 message
	PCD-01 message includes a segment like this for each SpO2 object with Unit-Code attribute value (check OBX-6):
	OBX n NM 150320^MDC_SAT_O2_QUAL^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-051		
TP label		Whitepaper. Pulsatile Quality Numeric Object (Spot-Check Measurement) – Absolute-Time-Stamp Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable	PQ Numeric 7; M Date-Time Conv 2; M Date-Time Conv 3; M		Date-Time Conv 3; M

items	Date-Time Conv 4; M Date-Time Conv 5; M			
Test purpose	Check that:			
	PHG transcodes Time Stamp field of Spot-Check Measurement characteristic into Pulsatile Quality Numeric Object - Absolute-Time-Stamp attribute			
	[AND]			
	PHG transcodes the Bluetooth Time Stamp field format to Absolute Time format			
	[AND]			
	The fraction of seconds in Absolute Time at transcoder output is 0			
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040			
Other PICS	C_MAN_BLE_042			
Initial condition	The PHG under test and the simulated PHD are in the Standby state.			
Test procedure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a Spot-Check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>			
	The simulated PHD implements several BTLE characteristics. The characteristic of interest for this Test Case is:			
	a. PLX Features (0x2A60)			
	i. Field: Supported Features			
	Format: 16 bit			
	<ul> <li>Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field is supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>			
	ii. Field: Measurement Status Support			
	This field is not included			
	iii. Field: Device and Sensor Status Support			
	This field is not included			
	b. PLX Spot-Check Measurement (0x2A5E)			
	i. Field: Flags			
	Format: 8 bit			
	<ul> <li>Value: 0000 1001 (MSB → LSB). Pulse Amplitude Index and Timestamp fields are present. Measurement Status and Device and Sensor Status fields are not present. Device Clock is set.</li> </ul>			
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)			
	Format: SFLOAT			
	Value: Not Relevant			
	iii. Field: SpO2PR-Spot-Check – PR (bpm)			
	Format: SFLOAT			
	Value: Not Relevant			
	iv. Field: Time Stamp			
Format: Date and Time				
<ul> <li>Value: October 12nd, 2015, 10:39:27</li> </ul>				
	v. Field: Measurement Status			
	This field is not included			
	vi. Field: Device and Sensor Status			
	This field is not included			

	vii. Field: Pulse Amplitude Index (%)
	Format: SFLOAT
	Value: Not Relevant
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	Check in PHG transcoder output the Pulsatile Quality Numeric Object – Absolute-Time- Stamp attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
	b) Check in PHG transcoder output the Pulsatile Quality Numeric Object – Absolute- Time-Stamp attribute
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Absolute-Time-Stamp attribute is present, its value matches with Time Stamp field of Spot-Check Measurement characteristic and fraction of seconds is set to 0.
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
	Absolute-Time-Stamp attribute is present:
	☐ Object: Pulsatile Quality Numeric Object
	☐ Attribute-id: MDC_ATTR_TIME_STAMP_ABS (2448)
	Attribute-type: SEQUENCE {century (INT-U8), year (INT-U8), month (INT-U8), day (INT-U8), hour (INT-U8), minute (INT-U8), second (INT-U8), sec-fractions (INT-U8)} (BCD encoding)
	☐ Attribute-value:
	• century: 20 (hex) or 32 (dec)
	<ul> <li>year: 15 (hex) or 21 (dec)</li> </ul>
	• month: 10 (hex) or 16 (dec)
	• day: 12 (hex) or 18 (dec)
	• hour: 10 (hex) or 16 (dec)
	• minute: 39 (hex) or 57 (dec)
	• second: 27 (hex) or 39 (dec)
	sec-fractions: 00 (hex) or 0 (dec)
	b) WAN PCD-01 message
	PCD-01 message includes a segment like this with Absolute-Time-Stamp attribute value (check OBX-14):
	OBX n NM 150320^MDC_SAT_O2_QUAL^MDC m.0.0.x [value]  262688^MDC_DIM_PERCENT^MDC     R    <b>20151012103927+0000</b>

TP Id TP/LP-PAN/PHG/PHDTW/PLX/BV-052		TP/LP-PAN/PHG/PHDTW/PLX/BV-052
TP label Pulsatile Quality Numeric Object (Spot-Check Measurement) – Basic-Nu-Observed-Va		Pulsatile Quality Numeric Object (Spot-Check Measurement) – Basic-Nu-Observed-Value Attribute 1
Coverage Spec [Bluetooth PHDT v1.6]		[Bluetooth PHDT v1.6]

	Testable items	PQ Numeric 8; M Short Float Type 1; C		
Test purpose		Check that:		
		PHG transcodes Pulse Amplitude Index value of the PLX Spot-Check Measurement characteristic into Pulsatile Quality Numeric Object - Basic-Nu-Observed-Value attribute		
Applicability	1	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS		C_MAN_BLE_042		
Initial condit	ion	The PHG under test and the simulated PHD are in the Standby state.		
Test procedure		<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), has a Spot-Check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>		
		The simulated PHD implements several BTLE characteristics. The characteristic of interest for this Test Case is:		
		a. PLX Features (0x2A60)		
		i. Field: Supported Features		
		Format: 16 bit		
		<ul> <li>Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>		
		ii. Field: Measurement Status Support		
		This field is not included		
		iii. Field: Device and Sensor Status Support		
		This field is not included		
		b. PLX Spot-Check Measurement (0x2A5E)		
		i. Field: Flags		
		Format: 8 bit		
		<ul> <li>Value: 0000 1001 (MSB → LSB). Timestamp and Pulse Amplitude Index fields are present. Measurement Status and Device and Sensor Status fields are not present. Device Clock is set.</li> </ul>		
		ii. Field: SpO2PR-Spot-Check - SpO2 (%)		
		Format: SFLOAT		
		Value: Not Relevant		
		iii. Field: SpO2PR-Spot-Check – PR (bpm)		
		Format: SFLOAT		
		Value: Not Relevant		
		iv. Field: Time Stamp		
		Format: Date and Time		
		Value: Not Relevant		
		v. Field: Measurement Status		
		This field is not included		
		vi. Field: Device and Sensor Status		
		This field is not included		
		vii. Field: Pulse Amplitude Index (%)		
		Format: SFLOAT		
		• Value: 15.0 (%)		

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	The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).	
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.	
	5. The simulated PHD sends the Measurement to PHG under test.	
	Check in PHG transcoder output the Pulsatile Quality Numeric Object – Basic-Nu- Observed-Value attribute	
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN	
	<ul> <li>The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test</li> </ul>	
	<ul> <li>b) Check in PHG transcoder output the Pulsatile Quality Numeric Object – Basic-Nu- Observed-Value attribute</li> </ul>	
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Basic-Nu-Observed-Value attribute is present and its value matches with the value of the Pulse Amplitude Index of the PLX Spot-Check Measurement characteristic (15.0 %).	
	If the PHG supports RACP, the same criteria applies to Step 7.b.	
Notes	Possible values in typical points of observation after transcoder output are:	
(To assist manual testing)	a) IEEE 11073 Objects and Attributes	
<b>3</b> ,	Basic-Nu-Observed-Value attribute is present:	
	☐ Object: Pulsatile Quality Numeric Object	
☐ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)		
	☐ Attribute-type: SFLOAT	
	☐ Attribute-value: 00 0F (hex) or F0 96 (hex) or E5 DC (hex) or 15.0 (dec)	
	b) WAN PCD-01 message	
	PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribute value (check OBX-5):	
	OBX n NM 150320^MDC_SAT_O2_QUAL^MDC m.0.0.x  <b>15.0</b>   262688^MDC_DIM_PERCENT^MDC     R   [current_date_time]	

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-053				
TP label		Whitepaper. Pulsatile Quality Numeric Object (Spot-Check Measurement) – Basic-Nu-Observed-Value Attribute 2				
Coverage	Spec	[Bluetooth PHDT v1.6]	[Bluetooth PHDT v1.6]			
	Testable items	PQ Numeric 8; M	PQ Numeric 14; M	Short Float Type 2; M		
Test purpo	se	Check that:				
		PHG transcodes Pulse Amplitude Index value of the PLX Spot-Check Measurement characteristic into Pulsatile Quality Numeric Object - Basic-Nu-Observed-Value attribute				
		[AND]				
		PHG assigns special value NaN (0x07FF) when SpO2 value is unavailable.				
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040				
Other PICS	5	C_MAN_BLE_042				
Initial cond	lition	The PHG under test and the simulated PHD are in the Standby state.				
Test procedure		has a Spot-Check mea discoverable). The sim identical spot-check m	configured with a Pulse Oximeter I asurement ready to be sent and it in hulated PHD also supports the RAC easurement temporarily stored.	s in the Advertising state (it is CP characteristic and has an		
<u> </u>		2. The simulated PHD im	plements several BTLE characteri	stics. The characteristics of		

interest for this Test Case are:

- a. PLX Features (0x2A60)
  - i. Field: Supported Features
    - Format: 16 bit
    - Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field is supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).
  - ii. Field: Measurement Status Support
    - This field is not included
  - iii. Field: Device and Sensor Status Support
    - This field is not included
- b. PLX Spot-Check Measurement (0x2A5E)
  - Field: Flags
    - Format: 8 bit
    - Value: 0000 1001 (MSB → LSB). Timestamp and Pulse Amplitude Index fields are present. Measurement Status and Device and Sensor Status fields are not present. Device Clock is set.
  - ii. Field: SpO2PR-Spot-Check SpO2 (%)
    - Format: SFLOAT
    - Value: Not Relevant
  - iii. Field: SpO2PR-Spot-Check PR (bpm)
    - Format: SFLOAT
    - Value: Not Relevant
  - iv. Field: Time Stamp
    - Format: Date and Time
    - Value: Not Relevant
  - v. Field: Measurement Status
    - This field is not included
  - vi. Field: Device and Sensor Status
    - This field is not included
  - vii. Field: Pulse Amplitude Index (%)
    - Format: SFLOAT
    - Value: 07 FF (hex). Special value: NaN
- The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test.
- Check in PHG transcoder output the Pulsatile Quality Numeric Object Basic-Nu-Observed-Value attribute
- 7. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in PHG transcoder output the Pulsatile Quality Numeric Object Basic-Nu-Observed-Value attribute

Notes (To assist manual testing)  Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes Basic-Nu-Observed-Value attribute is present:	Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric Object – Basic-Nu-Observed-Value attribute is present and its value is 0x07FF (NaN).  If the PHG supports RACP, the same criteria applies to Step 7.b.		
<ul> <li>□ Object: Pulsatile Quality Numeric Object</li> <li>□ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)</li> <li>□ Attribute-type: SFLOAT</li> <li>□ Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)</li> <li>b) WAN PCD-01 message</li> <li>PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribut value (check OBX-5):</li> <li>OBX n NM 150320^MDC_SAT_O2_QUAL^MDC m.0.0.x           262688^MDC_DIM_PERCENT^MDC  NAN   X   [current_date_time]</li> </ul>	(To assist manual	Possible values in typical points of observation after transcoder output are:  a) IEEE 11073 Objects and Attributes Basic-Nu-Observed-Value attribute is present:  Object: Pulsatile Quality Numeric Object Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636) Attribute-type: SFLOAT Attribute-value: 07 FF (hex) or NaN (note that a decimal value is not allowed)  b) WAN PCD-01 message PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribute value (check OBX-5): OBX n NM 150320^MDC_SAT_O2_QUAL^MDC m.0.0.x		

TP ld		TP	/L P-F	PAN	/PHG/PHDT	W/PLX/BV-054					
TP label		Whitepaper. Pulsatile Quality Numeric Object (Continuous Measurements) – Basic-Nu-Observed-Value Attribute 1									
Coverage	Spec	[Bluetooth PHDT v1.6]			PHDT v1.6]						
	Testable items	PQ Numeric 13; M Short Float Type 1; C									
Test purpose		Ch	eck t	hat:							
		PHG transcodes Pulse Amplitude Index value of the PLX Continuous Measurement characteristic into Pulsatile Quality Numeric Object - Basic-Nu-Observed-Value attribute									
Applicabilit	у	C_	MAN	_BL	E_000 AND	C_MAN_BLE_002 AND C_MAN_E	BLE_040				
Other PICS											
Initial cond	ition	The	e PH	G ur	nder test and	d the simulated PHD are in the Stan	dby state.				
Test proced	dure	1.	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>								
		2.			simulated PHD implements several BTLE characteristics. The characteristic of est for this Test Case is:						
			a.	PL	X Features	(0x2A60)					
				i.	Field: Sup	ported Features					
					• Forma	at: 16 bit					
						: 0000 0000 0111 0000 (MSB $ ightarrow$ LS s and Pulse Amplitude Index fields a					
				ii.	Field: Mea	surement Status Support					
					• This f	ield is not included					
								iii.	Field: Dev	ice and Sensor Status Support	
					• This f	ield is not included					
			b.	PL	Χ Continuoι	is Measurement (0x2A5F)					
				i.	Field: Flag	S					
					• Forma	at: 8 bit					
					Ampli	: 0001 0011 (MSB → LSB). SpO2P tude Index fields are present. Measor or Status fields are not present.					

	" F' I O COPP N I O CO (%/)
	ii. Field: SpO2PR-Normal - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Normal - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: SpO2PR-Fast - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	v. Field: SpO2PR-Fast - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	vi. Field: SpO2PR-Slow - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	vii. Field: SpO2PR-Slow - PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	viii. Field: Measurement Status
	This field is not included
	ix. Field: Device and Sensor Status
	This field is not included
	x. Field: Pulse Amplitude Index (%)
	Format: SFLOAT
	• Value: 15.0 (%)
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the Measurement to the PHG under test.
	Check in PHG transcoder output the Pulsatile Quality Numeric Object – Basic-Nu- Observed-Value attribute.
Pass/Fail criteria	In Step 6, the Pulsatile Quality Numeric object – Basic-Nu-Observed-Value attribute is present and its value matches with the value of the Pulse Amplitude Index field of the PLX Continuous Measurement characteristic (15.0 %).
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
testing)	Basic-Nu-Observed-Value attribute is present:
	☐ Object: Pulsatile Quality Numeric Object
	☐ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)
	☐ Attribute-type: SFLOAT
	Attribute-value: 00 0F (hex) or F0 96 (hex) or E5 DC (hex) or 15.0 (dec)
	b) WAN PCD-01 message
	PCD-01 message includes a segment like this with Basic-Nu-Observed-Value attribute value (check OBX-5):

## OBX|n|NM|150320^MDC\_SAT\_O2\_QUAL^MDC|m.0.0.x|**15.0**| 262688^MDC\_DIM\_PERCENT^MDC||||R|||[current\_date\_time]

TP Id		TP/LP-PAN/PHG/PHDTW/PLX/BV-055						
TP label		Whitepaper. Pulsatile Quality Numeric Object (Continuous Measurements) – Basic-Nu-Observed-Value Attribute 2						
Coverage	Spec	[Bluetoo	th PHDT	Г v1.6]				
	Testable items	PQ Num	eric 13;	М	PQ Numeric 14; M	Short Float Type 2; M		
Test purpose		Check th	nat:					
					tude Index value of the PLX Cuality Numeric Object - Basic			
1		[AND]						
		PHG assigns special value NaN (0x07FF) when Pulsatile Quality value is unavailable.						
Applicabili	ty	C_MAN_	_BLE_00	00 AND C_M	AN_BLE_002 AND C_MAN_E	SLE_040		
Other PICS	)							
Initial cond	lition	The PHO	3 under	test and the	simulated PHD are in the Stan	dby state.		
Test proce	dure	has	a contin	luous measu		r Profile (device specialization), it v response measurement values) iscoverable).		
				ed PHD imple his Test Case	ements several BTLE characte e are:	eristics. The characteristics of		
		a.	PLX Fe	atures (0x2A	60)			
		i. Field: Supported Features						
		Format: 16 bit						
			•		0 0000 0111 0000 (MSB $\rightarrow$ LS supported (bits 4 and 5). Pulse (bit 6).			
			ii. Fie	eld: Measurer	nent Status Support			
			•	This field is	not included			
			iii. Fie	eld: Device ar	nd Sensor Status Support			
			•	This field is	not included			
		b.	PLX Co	ontinuous Me	asurement (0x2A5F)			
			i. Fie	eld: Flags				
			•	Format: 8 b	it			
			•	Pulse Ampl	1 0011 (MSB → LSB). SpO2P itude Index fields are present.  Status fields are not present.	R–Fast, SpO2PR-Slow and Measurement Status and Device		
			ii. Fie	eld: SpO2PR-	Normal - SpO2 (%)			
			•	Format: SF	LOAT			
			•	Value: Not	Relevant			
			iii. Fie	eld: SpO2PR-	Normal - PR (bpm)			
			•	Format: SF	LOAT			
			•	Value: Not	Relevant			
			iv. Fie	eld: SpO2PR-	Fast - SpO2 (%)			
			•	Format: SF	LOAT			
			•	Value: Not	Relevant			

e), it discovers the PHD (Initiating state).
the PHG under test to
est.
bject – Basic-Nu-
-Value attribute is
it are:
ue is not allowed)
served-Value attribute
€ )  -

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-056			
TP label		Whitepaper. Pulsatile Quality measurement value (Spot-Check Measurement)			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	Short Float Type 1; C PQ Numeric 8; M	Date-Time Conv 1; M	PQ Numeric 7; M	
Test purpose		Check that:			
		PHG processes correctly the F Stamp field of the PLX Spot-C	Pulse Amplitude Index value (%) heck characteristic	and the value of the Time	

Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040		
Other PICS	C_MAN_BLE_042		
Initial condition	The PHG under test and the simulated PHD are in the Standby state.		
Test procedure	The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a Spot-Check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.		
	2. The simulated PHD implements several BTLE characteristics. The characteristic of interest for this Test Case is:		
	a. PLX Features (0x2A60)		
	i. Field: Supported Features		
	Format: 16 bit		
	<ul> <li>Value: 0000 0000 0100 1100 (MSB → LSB). Pulse Amplitude Index field is supported (bit 6). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>		
	ii. Field: Measurement Status Support		
	This field is not included		
	iii. Field: Device and Sensor Status Support		
	This field is not included		
	b. PLX Spot-Check Measurement (0x2A5E)		
	i. Field: Flags		
	Format: 8 bit		
	<ul> <li>Value: 0000 1001 (MSB → LSB). Pulse Amplitude Index and Timestamp fields are present. Measurement Status and Device and Sensor Status fields are not present. Device Clock is set.</li> </ul>		
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)		
	Format: SFLOAT		
	Value: Not Relevant		
	iii. Field: SpO2PR-Spot-Check – PR (bpm)		
	Format: SFLOAT		
	Value: Not Relevant		
	iv. Field: Time Stamp		
	Format: Date and Time		
	Value: Not Relevant		
	v. Field: Measurement Status		
	This field is not included		
	vi. Field: Device and Sensor Status		
	This field is not included		
	vii. Field: Pulse Amplitude Index (%)		
	Format: SFLOAT		
	• Value: 15.0 (%)		
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).		
	4. When the pairing has been completed (Connection state), force the PHG under test to read PLX Features characteristic.		
	5. The simulated PHD sends the Measurement to the PHG under test.		

		Check that the PHG accepts the measurement and decodes its value properly (Pulse Amplitude Index value, units and time stamp).
	7.	IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
		a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
		<ul> <li>b) Check that PHG accepts the measurement and decodes its value properly (Pulse Amplitude Index value, units and time stamp)</li> </ul>
Pass/Fail criteria	In Step 6, the PHG under test shows the following measurement Pulsatile Quality = 15.0 (% with timestamp '2015-10-12 10:39:27'.	
	If the	e PHG supports RACP, the same criteria applies to Step 7.b
Notes		

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-057				
TP label		Whitepaper. Device and Sensor Status Enumeration Object (Spot-Check Measurement) - Handle Attribute				
Coverage	Spec	[Bluetooth PHDT v1.6]				
	Testable items	DSS Enumeration 1; O				
Test purpose		Check that:				
		PHG does not include Device and Sensor Status Enumeration Object – Handle Attribute in transcoder output when using spot-check measurement mode.				
		[OR]				
		If PHG includes Device and Sensor Status Enumeration Object – Handle attribute in transcoder output, then its value shall be different than 0				
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040 AND C_MAN_BLE_041				
Other PICS		C_MAN_BLE_042				
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.				
Test proced	dure	1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.				
		2. The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:				
		a. PLX Features (0x2A60)				
		i. Field: Supported Features				
		Format: 16 bit				
		<ul> <li>Value: 0000 0000 0000 1110 (MSB → LSB). Device and Sensor Status field is supported (bit 1). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>				
		ii. Field: Measurement Status Support				
		This field is not included				
		iii. Field: Device and Sensor Status Support				
		Format: 24 bit				
		Value: Not Relevant				
		b. PLX Spot-Check Measurement (0x2A5E)				
		i. Field: Flags				

	Format: 8 bit
	<ul> <li>Value: 0000 0101 (MSB → LSB). Timestamp and Device and Sensor Status fields are present. Pulse Amplitude Index and Measurement Status fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	Format: Date and Time
	Value: Not Relevant
	v. Field: Measurement Status
	This field is not included
	vi. Field: Device and Sensor Status
	Format: 24 bit
	Value: Not Relevant
	vii. Field: Pulse Amplitude Index (%)
	This field is not included.
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
	5. The simulated PHD sends the measurement to the PHG under test.
	6. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object  – Handle attribute
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	<ul> <li>The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test</li> </ul>
	b) Check in PHG transcoder output the Device and Sensor Status Enumeration Object – Handle attribute
Pass/Fail criteria	In Step 6, the Device and Sensor Status Enumeration Object – Handle attribute is not present or, if it is present then its value is different than 0
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
	Handle attribute is not present, or if it is present then:
	□ Object: Device and Sensor Status Enumeration Object
	☐ Attribute-id: MDC_ATTR_ID_HANDLE (2337)
	□ Attribute-type: INT-U16
	☐ Attribute-value: Any value different than 0
	b) WAN PCD-01 message
	PCD-01 message does not include segments with Handle attribute value

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-058					
TP label		Whitepaper. Device and Sensor Status Enumeration Object (Continuous Measurements) - Handle Attribute					
Coverage	Spec	[Bluetooth PHDT v1.6]					
	Testable items	DSS Enumeration 5; O					
Test purpos	se	Check that:					
		PHG does not include Device and Sensor Status Enumeration Object – Handle Attribute in transcoder output when using continuous measurements					
		[OR]					
		If PHG includes Device and Sensor Status Enumeration Object – Handle attribute in transcoder output, then its value shall be different than 0					
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040 AND C_MAN_BLE_041					
Other PICS							
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.					
Test proced	lure	1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).					
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:					
		a. PLX Features (0x2A60)					
		i. Field: Supported Features					
		Format: 16 bit					
		<ul> <li>Value: 0000 0000 0000 0010 (MSB → LSB). Device and Sensor Status field is supported (bit 1).</li> </ul>					
		ii. Field: Measurement Status Support					
		This field is not included					
		iii. Field: Device and Sensor Status Support					
		Format: 24 bit					
		Value: Not Relevant					
		b. PLX Continuous Measurement (0x2A5F)					
		i. Field: Flags					
		Format: 8 bit					
		<ul> <li>Value: 0000 1011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow and Device and Sensor Status fields are present. Measurement Status and Pulse Amplitude Index fields are not present.</li> </ul>					
		ii. Field: SpO2PR-Normal - SpO2 (%)					
		Format: SFLOAT					
		Value: Not Relevant					
		iii. Field: SpO2PR-Normal – PR (bpm)					
		Format: SFLOAT					
		Value: Not Relevant					
		iv. Field: SpO2PR-Fast - SpO2 (%)					
		Format: SFLOAT					
		Value: Not Relevant					
		v. Field: SpO2PR-Fast - PR (bpm)					
		Format: SFLOAT					

	Value: Not Relevant			
	vi. Field: SpO2PR-Slow - SpO2 (%)			
	Format: SFLOAT			
	Value: Not Relevant			
	vii. Field: SpO2PR-Slow - PR (bpm)			
	Format: SFLOAT			
	Value: Not Relevant			
	viii. Field: Measurement Status			
	This field is not included			
	ix. Field: Device and Sensor Status			
	Format: 24 bit			
	Value: Not Relevant.			
	x. Field: Pulse Amplitude Index (%)			
	This field is not included			
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).			
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.			
	5. The simulated PHD sends the Measurement to the PHG under test.			
	Check in PHG transcoder output the Device and Sensor Status Enumeration Object –     Handle attribute.			
Pass/Fail criteria	In Step 6, the Device and Sensor Status Enumeration Object – Handle attribute is not present or, if it is present then its value is different than 0			
Notes	Possible values in typical points of observation after transcoder output are:			
(To assist manual testing)	a) IEEE 11073 Objects and Attributes			
3,	Handle attribute is not present, or if it is present then:			
	☐ Object: Device and Sensor Status Enumeration Object			
	☐ Attribute-id: MDC_ATTR_ID_HANDLE (2337)			
	☐ Attribute-type: INT-U16			
	☐ Attribute-value: Any value different than 0			
	b) WAN PCD-01 message			
	PCD-01 message does not include segments with Handle attribute value			

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-059		
TP label	TP label  Whitepaper. Device and Sensor Status Enumeration Object (Spot-Check Measurement Type Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	DSS Enumeration 2; M		
Test purpose		Check that:		
		PHG includes Device and Sensor Status Enumeration Object – Type attribute in transcoder output when using spot-check measurement mode.		
		[AND]		
Type is set to {MDC_PART_SCADA, MDC_PULS_OXIM_DEV_STATUS}				
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040 AND C_MAN_BLE_041		
Other PICS C_MAN_BLE_042				

Initial condition	The PHG under test and the simulated PHD are in the Standby state.			
Test procedure	1.	The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.		
	2.		mulated PHD implements several BTLE characteristics. The characteristics of t for this Test Case are:	
		a. Pl	X Features (0x2A60)	
		i.	Field: Supported Features	
			Format: 16 bit	
			<ul> <li>Value: 0000 0000 0000 1110 (MSB → LSB). Device and Sensor Status field is supported (bit 1). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>	
		ii.	Field: Measurement Status Support	
			This field is not included	
		iii.	Field: Device and Sensor Status Support	
			Format: 24 bit	
			Value: Not Relevant	
		b. Pl	_X Spot-Check Measurement (0x2A5E)	
		i.	Field: Flags	
			Format: 8 bit	
			<ul> <li>Value: 0000 0101 (MSB → LSB). Timestamp and Device and Sensor Status fields are present. Pulse Amplitude Index and Measurement Status fields are not present. Device Clock is set.</li> </ul>	
		ii.	Field: SpO2PR-Spot-Check - SpO2 (%)	
			Format: SFLOAT	
			Value: Not Relevant	
		iii.	Field: SpO2PR-Spot-Check – PR (bpm)	
			Format: SFLOAT	
		Value: Not Relevant		
		iv. Field: Time Stamp		
			Format: Date and Time	
			Value: Not Relevant	
		٧.	Field: Measurement Status	
			This field is not included	
		vi.	Field: Device and Sensor Status	
			Format: 24 bit	
			Value: Not Relevant	
		vii	. Field: Pulse Amplitude Index (%)	
			This field is not included	
	3.		HG under test initiates a discovery process (Scanning state), it discovers the ted PHD and it starts a pairing process with the simulated PHD (Initiating state).	
	4.		the pairing has been completed (Connection state), force the PHG under test to be PLX Features characteristics.	
	5.	The sir	mulated PHD sends the Measurement to the PHG under test.	
	6.		in the PHG transcoder output the Device and Sensor Status Enumeration Object	
		– Туре	attribute	

	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN
	The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
	<ul> <li>b) Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Type attribute</li> </ul>
Pass/Fail criteria	In Step 6, the Device and Sensor Status Enumeration Object – Type attribute
	is present and its value is {MDC_PART_SCADA, MDC_PULS_OXIM_DEV_STATUS}
	If the PHG supports RACP, the same criteria applies to Step 7.b.
Notes	Possible values in typical points of observation after transcoder output are:
(To assist manual testing)	a) IEEE 11073 Objects and Attributes
1009)	Type attribute is present:
	☐ Object: Device and Sensor Status Enumeration Object
	☐ Attribute-id: MDC_ATTR_ID_TYPE (2351)
	☐ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)}
	☐ Attribute-value:
	<ul> <li>partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex)</li> </ul>
	<ul> <li>code: MDC_PULS_OXIM_DEV_STATUS or 19532 (dec) or 4C 4C (hex)</li> </ul>
	b) WAN PCD-01 message
	PCD-01 message includes a segment like this with Type attribute (check OBX-3):
	OBX n CWE  <b>150604^MDC_PULS_OXIM_DEV_STATUS^MDC</b>   m.0.0.x[[value]]     R

TP ld	TP Id TP/LP-PAN/PHG/PHDTW/PLX/BV-060			
TP label		Whitepaper. Device and Sensor Status Enumeration Object (Continuous Measurements) - Type Attribute		
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	DSS Enumeration 6; M		
Test purpo	se	Check that:		
		PHG includes Device and Sensor Status Enumeration Object – Type attribute in transcoder output when using continuous measurements.		
		[AND]		
	Type is set to {MDC_PART_SCADA, MDC_PULS_OXIM_DEV_STATUS}			
Applicabili	ty	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040 AND C_MAN_BLE_041		
Other PICS				
Initial condition Th		The PHG under test and the simulated PHD are in the Standby state.		
Test procedure		The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).		
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:		
		a. PLX Features (0x2A60)		
		i. Field: Supported Features		
		Format: 16 bit		
		<ul> <li>Value: 0000 0000 0011 0010 (MSB → LSB). Device and Sensor Status is supported (bit 1). Fast and slow response modes are supported (bits 4</li> </ul>		

and 5).

- ii. Field: Measurement Status Support
  - This field is not included
- iii. Field: Device and Sensor Status Support

Format: 24 bit

Value: Not Relevant

- b. PLX Continuous Measurement (0x2A5F)
  - i. Field: Flags
    - Format: 8 bit
    - Value: 0000 1011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow and Device and Sensor Status fields are present. Measurement Status and Pulse Amplitude Index fields are not present.
  - ii. Field: SpO2PR-Normal SpO2 (%)

Format: SFLOAT

Value: Not Relevant

- iii. Field: SpO2PR-Normal PR (bpm)
  - Format: SFLOAT

• Value: Not Relevant

iv. Field: SpO2PR-Fast - SpO2 (%)

Format: SFLOAT

Value: Not Relevant

- v. Field: SpO2PR-Fast PR (bpm)
  - Format: SFLOAT

Value: Not Relevant

- vi. Field: SpO2PR-Slow SpO2 (%)
  - Format: SFLOAT

Value: Not Relevant

- vii. Field: SpO2PR-Slow PR (bpm)
  - Format: SFLOAT

Value: Not Relevant

- viii. Field: Measurement Status
  - This field is not included
- ix. Field: Device and Sensor Status
  - Or Format: 24 bit
  - Value: Not Relevant.
- x. Field: Pulse Amplitude Index (%)
  - This field is not included
- The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).
- When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.
- 5. The simulated PHD sends the Measurement to the PHG under test.
- Check in PHG transcoder output the Device and Sensor Status Enumeration Object Type attribute.

## Pass/Fail criteria

In Step 6, the Pulsatile Quality Numeric Object – Type attribute is present and its value is {MDC\_PART\_SCADA, MDC\_PULS\_OXIM\_DEV\_STATUS}

Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
	Type attribute is present:		
	☐ Object: Device and Sensor Status Enumeration Object		
	☐ Attribute-id: MDC_ATTR_ID_TYPE (2351)		
	☐ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)}		
	☐ Attribute-value:		
	<ul> <li>partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex)</li> </ul>		
	<ul> <li>code: MDC_PULS_OXIM_DEV_STATUS or 19532 (dec) or 4C 4C (hex)</li> </ul>		
	o) WAN PCD-01 message		
	PCD-01 message includes a segment like this with Type attribute (check OBX-3):  OBX n CWE 150604^MDC_PULS_OXIM_DEV_STATUS^MDC  m.0.0.x [value]     R		

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-061			
TP label		Whitepaper. Device and Sensor Status Enumeration Object (Spot-Check Measurement) - Metric-Spec-Small Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	DSS Enumeration 3; M			
Test purpos	se	Check that:			
		PHG includes Device and Sensor Status Enumeration Object – Metric-Spec-Small attribute in transcoder output when using spot-check measurement mode.			
		[AND]			
		Metric-Spec-Small is set to {0x0040} (mss-acc-agent-initiated)			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040 AND C_MAN_BLE_041			
Other PICS		C_MAN_BLE_042			
Initial cond	ition	The PHG under test and the simulated PHD are in the Standby state.			
Test procedure		1. The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The Simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.			
		The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:			
		a. PLX Features (0x2A60)			
		i. Field: Supported Features			
		Format: 16 bit			
		<ul> <li>Value: 0000 0000 0000 1110 (MSB → LSB). Device and Sensor Status field is supported (bit 1). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>			
		ii. Field: Measurement Status Support			
		This field is not included			
		iii. Field: Device and Sensor Status Support			
		Format: 24 bit			
		Value: Not Relevant			
		b. PLX Spot-Check Measurement (0x2A5E)			

	i. Field: Flags		
	• Format: 8 bit		
	Value: 0000 0101 (MSB → LSB). Timestamp and Device and Sensor		
	Status fields are present. Pulse Amplitude Index and Measurement Status fields are not present. Device Clock is set.		
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)		
	Format: SFLOAT		
	Value: Not Relevant		
	iii. Field: SpO2PR-Spot-Check – PR (bpm)		
	Format: SFLOAT		
	Value: Not Relevant		
	iv. Field: Time Stamp		
	Format: Date and Time		
	Value: Not Relevant		
	v. Field: Measurement Status		
	This field is not included		
	vi. Field: Device and Sensor Status		
	Format: 24 bit		
	Value: Not Relevant		
	vii. Field: Pulse Amplitude Index (%)		
	This field is not included		
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).		
	When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristics.		
	5. The simulated PHD sends the Measurement to the PHG under test.		
	6. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Metric-Spec-Small attribute		
	7. IF C_MAN_BLE_042 = TRUE (PHG supports RACP) THEN		
	<ul> <li>The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test</li> </ul>		
	b) Check in PHG transcoder output the Device and Sensor Status Enumeration Object – Metric-Spec-Small attribute		
Pass/Fail criteria	In Step 6, the Device and Sensor Status Enumeration Object – Metric-Spec-Small attribute is present and its value is {0x0040} (mss-acc-agent-initiated).		
	If the PHG supports RACP, the same criteria applies to Step 7.b.		
Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
	Metric-Spec-Small attribute is present:		
	□ Object: Device and Sensor Status Enumeration Object		
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)		
	☐ Attribute-type: BITS-16		
	☐ Attribute-value: 00 40 (hex) or BITS mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE		
	b) WAN PCD-01 message		

PCD-01 message does not include segments with Metric-Spec-Small attribute value

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-062			
TP label		Whitepaper. Device and Sensor Status Enumeration Object (Continuous Measurements) - Metric-Spec-Small Attribute			
Coverage	Spec	[Bluetooth PHDT v1.6]			
	Testable items	DSS Enumeration 7; M			
Test purpos	se	Check that:			
		PHG includes Device and Sensor Status Enumeration Object – Metric-Spec-Small attribute in transcoder output when using continuous measurements.  [AND]			
		Metric-Spec-Small is set to {0x0040} (mss-acc-agent-initiated)			
Applicabilit	у	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040 AND C_MAN_BLE_041			
Other PICS					
Initial condi	ition	The PHG under test and the simulated PHD are in the Standby state.			
Test proced	lure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a continuous measurement (including fast and slow response measurement values) ready to be sent and it is in the Advertising state (it is discoverable).</li> </ol>			
		2. The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:			
		a. PLX Features (0x2A60)			
		i. Field: Supported Features			
		Format: 16 bit			
		<ul> <li>Value: 0000 0000 0011 0010 (MSB → LSB). Device and Sensor Status is supported. Fast and slow response modes are supported (bits 4 and 5).</li> </ul>			
		ii. Field: Measurement Status Support			
		This field is not included			
		iii. Field: Device and Sensor Status Support			
		Format: 24 bit			
		Value: Not Relevant			
		b. PLX Continuous Measurement (0x2A5F)			
		i. Field: Flags			
		Format: 8 bit			
		<ul> <li>Value: 0000 1011 (MSB → LSB). SpO2PR-Fast, SpO2PR-Slow and Device and Sensor Status fields are present. Measurement Status and Pulse Amplitude Index fields are not present.</li> </ul>			
		ii. Field: SpO2PR-Normal - SpO2 (%)			
		Format: SFLOAT			
		Value: Not Relevant			
		iii. Field: SpO2PR-Normal – PR (bpm)			
		Format: SFLOAT			
		Value: Not Relevant			
		iv. Field: SpO2PR-Fast - SpO2 (%)			
		Format: SFLOAT			
		Value: Not Relevant			

	v. Field: SpO2PR-Fast - PR (bpm)		
	Format: SFLOAT		
	Value: Not Relevant		
	vi. Field: SpO2PR-Slow - SpO2 (%)		
	Format: SFLOAT		
	Value: Not Relevant		
	vii. Field: SpO2PR-Slow - PR (bpm)		
	Format: SFLOAT		
	Value: Not Relevant		
	viii. Field: Measurement Status		
	This field is not included		
	ix. Field: Device and Sensor Status		
	Or Format: 24 bit		
	Value: Not Relevant.		
	x. Field: Pulse Amplitude Index (%)		
	This field is not included		
	3. The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).		
	4. When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.		
	5. The simulated PHD sends the Measurement to the PHG under test.		
	Check in the PHG transcoder output the Device and Sensor Status Enumeration Object     – Metric-Spec-Small attribute		
Pass/Fail criteria	In Step 6, the Device and Sensor Status Enumeration Object – Metric-Spec-Small attribute is present and its value is {0x0040} (mss-acc-agent-initiated).		
Notes	Possible values in typical points of observation after transcoder output are:		
(To assist manual testing)	a) IEEE 11073 Objects and Attributes		
3,	Metric-Spec-Small attribute is present:		
	☐ Object: Device and Sensor Status Enumeration Object		
	☐ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630)		
	☐ Attribute-type: BITS-16		
	Attribute-value: 00 40 (hex) or BITS mss-acc-agent-initiated(9) set to TRUE and remaining BITS set to FALSE		
	b) WAN PCD-01 message		
	PCD-01 message does not include segments with Metric-Spec-Small attribute value		

TP ld		TP/LP-PAN/PHG/PHDTW/PLX/BV-063		
TP label  Whitepaper. Device and Sensor Status Enumeration Object (Spot-Check Enum-Observed-Value-Bit-Str Attribute			Spot-Check Measurement) –	
Coverage	Spec	[Bluetooth PHDT v1.6]		
	Testable items	DSS Enumeration 4; M		
Test purpose		Check that:		
		PHG transcodes Device and Sensor Status field of the PLX Spot-Check Measurement characteristic into Device and Sensor Status Enumeration Object - Enum-Observed-Value-Basic-Bit-Str attribute		

	IANDI
	[AND]
	PHG transcodes the Bluetooth Device and Sensor Status field of the PLX Spot-Check characteristic to 11073 Enum-Observed-Value-Basic-Bit-Str attribute properly
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040 AND C_MAN_BLE_041
Other PICS	C_MAN_BLE_042
Initial condition	The PHG under test and the simulated PHD are in the Standby state.
Test procedure	<ol> <li>The simulated PHD is configured with a Pulse Oximeter Profile (device specialization), it has a spot-check measurement ready to be sent and it is in the Advertising state (it is discoverable). The simulated PHD also supports the RACP characteristic and has an identical spot-check measurement temporarily stored.</li> </ol>
	<ol><li>The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are:</li></ol>
	a. PLX Spot-Check Measurement (0x2A5E)
	b. PLX Features (0x2A60)
	i. Field: Supported Features
	Format: 16 bit
	<ul> <li>Value: 0000 0000 0000 1110 (MSB → LSB). Device and Sensor Status support is present (bit 1). Measurement Storage for spot-check measurements is supported (bit 2). Timestamp for Spot-Check measurements is supported (bit 3).</li> </ul>
	ii. Field: Measurement Status Support
	This field is not included
	iii. Field: Device and Sensor Status Support
	Format: 24 bit
	<ul> <li>Value: 0000 0000 1111 1111 1111 (MSB → LSB). All Device and Sensor Status bits are supported</li> </ul>
	<ol> <li>The PHG under test initiates a discovery process (Scanning state), it discovers the simulated PHD and it starts a pairing process with the simulated PHD (Initiating state).</li> </ol>
	<ol> <li>When the pairing has been completed (Connection state), force the PHG under test to read the PLX Features characteristic.</li> </ol>
	5. The simulated PHD sends the Measurement to the PHG under test with the following value:
	a. PLX Spot-Check Measurement (0x2A5E)
	i. Field: Flags
	Format: 8 bit
	<ul> <li>Value: 0000 0101 (MSB → LSB). Device and Sensor Status and Timestamp field are present. Measurement Status and Pulse Amplitude Index fields are not present. Device Clock is set.</li> </ul>
	ii. Field: SpO2PR-Spot-Check - SpO2 (%)
	Format: SFLOAT
	Value: Not Relevant
	iii. Field: SpO2PR-Spot-Check – PR (bpm)
	Format: SFLOAT
	Value: Not Relevant
	iv. Field: Time Stamp
	This field is not included
	v. Field: Measurement Status
	This field is not included

- vi. Field: Device and Sensor Status
  - Format: 24 bit
  - Value: 0000 0000 0000 0000 0001 (MSB → LSB). Extended Display Update Ongoing (bit 0).
- vii. Field: Pulse Amplitude Index (%)
  - · This field is not included
- Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

   Enum-Observed-Value-Basic-Bit-Str attribute
- 7. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 8. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0000 0010 (MSB → LSB). Equipment Malfunction (bit 1). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

   Enum-Observed-Value-Basic-Bit-Str attribute
- 10. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - b) Check in PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 11. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0000 0100 (MSB → LSB). Signal Processing Irregularity Detected (bit 2). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 12. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 13. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - b) Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 14. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 1000 (MSB → LSB). Inadequate Signal Detected (bit 3). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

   Enum-Observed-Value-Basic-Bit-Str attribute
- 16. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute

- 17. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0001 0000 (MSB → LSB). Poor Signal Detected (bit 4). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

   Enum-Observed-Value-Basic-Bit-Str attribute
- 19. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 20. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0010 0000 (MSB → LSB). Low Perfusion Detected (bit 5). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 21. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 22. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - b) Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 23. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0100 0000 (MSB → LSB). Erratic Signal Detected (bit 6). All remaining fields remain equal to those in step 5. Simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 24. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 25. IF C MAN BLE 042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 26. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 1000 0000 (MSB → LSB). Non-Pulsatile Signal Detected (bit 7). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 27. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 28. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - b) Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 29. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0001 0000 0000 (MSB → LSB). Questionable Signal Detected (bit 8). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 30. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

- Enum-Observed-Value-Basic-Bit-Str attribute
- 31. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the Simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the Simulated PHD sends the temporarily stored spot-check measurement to PHG under test
  - Check in PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 32. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0010 0000 0000 (MSB → LSB). Signal Analysis Ongoing (bit 9). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 33. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 34. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - b) Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 35. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0100 0000 0000 (MSB → LSB). Sensor Interference Detected (bit 10). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 37. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 38. The simulated PHD sends a Measurement to PHG under test with Measurement Status field set to 0000 0000 0000 1000 0000 0000 (MSB → LSB). Sensor Unconnected to User (bit 11). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

   Enum-Observed-Value-Basic-Bit-Str attribute
- 40. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - b) Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 41. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0001 0000 0000 0000 (MSB → LSB). Unknown Sensor Connected (bit 12). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 42. Check in PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 43. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG

under test

- b) Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 44. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0010 0000 0000 0000 (MSB → LSB). Sensor Displaced (bit 13). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 45. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 46. IF C MAN BLE 042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - Check in PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 47. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0100 0000 0000 0000 (MSB → LSB). Sensor Malfunctioning (bit 14). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement.
- 48. Check in PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 49. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute
- 50. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 1000 0000 0000 0000 (MSB → LSB). Sensor Disconnected (bit 15). All remaining fields remain equal to those in step 5. The simulated PHD also deletes all stored records in RACP and stores an identical measurement
- Check in PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute
- 52. IF C\_MAN\_BLE\_042 = TRUE (PHG supports RACP) THEN
  - a) The PHG under test requests the simulated PHD to report stored records by performing a writing operation in the Record Access Control Point (RACP) and the simulated PHD sends the temporarily stored spot-check measurement to the PHG under test
  - Check in the PHG transcoder output the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute

### Pass/Fail criteria

In Step 6, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "device-extended-update" (0x8000). If PHG supports RACP, same criteria applies to 7.b.

In Step 9, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "device-equipment-malfunction" (0x4000). If PHG supports RACP, same criteria applies to 10.b.

In Step 12, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-processing-irregularity" (0x2000). If PHG supports RACP, same criteria applies to 13.b.

In Step 15, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-inadequate" (0x1000). If PHG supports RACP, same criteria applies to 16.b.

In Step 18, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-poor" (0x0800). If PHG supports

RACP, same criteria applies to 19.b.

In Step 21, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-low-perfusion" (0x0400). If PHG supports RACP, same criteria applies to 22.b.

In Step 24, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-erratic" (0x0200). If PHG supports RACP, same criteria applies to 25.b.

In Step 27, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-non-pulsatile" (0x0100). If PHG supports RACP, same criteria applies to 28.b.

In Step 30, Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-pulse-questionable" (0x0080). If PHG supports RACP, same criteria applies to 31.b.

In Step 33, Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-searching" (0x0040). If PHG supports RACP, same criteria applies to 34.b.

In Step 36, Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-interference" (0x0020). If PHG supports RACP, same criteria applies to 37.b.

In Step 39, Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-off" (0x0010). If PHG supports RACP, same criteria applies to 40.b.

In Step 42, Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-unsupported" (0x0008). If PHG supports RACP, same criteria applies to 43.b.

In Step 45, Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-displaced" (0x0004). If PHG supports RACP, same criteria applies to 46.b.

In Step 48, Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-malfunction" (0x0002). If PHG supports RACP, same criteria applies to 49.b.

In Step 51, Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-disconnected" (0x0001). If PHG supports RACP, same criteria applies to 52.b.

#### Notes (To assist manual testing)

In step 6 (and step 7.b if applicable), possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- Object: Device and Sensor Status Enumeration Object
- ☐ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- ☐ Attribute-type: BITS16
- ☐ Attribute-value: 80 00 (hex)
- b) WAN PCD-01 message

PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5):

 $OBX[n]CWE[150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC]m.0.0.x| \mbox{\bf 1^^device-extended-update(15)}||||||R$ 

In step 9 (and step 10.b if applicable), possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- Object: Device and Sensor Status Enumeration Object
- Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- ☐ Attribute-type: BITS16

		Attribute-value: 40 00 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Stribute value (check OBX-5):
		OBX n CWE 150604^MDC_PULS_OXIM_DEV_STATUS^MDC m.0.0.x  <b>1^device-equipment-malfunction(14)</b>       R
		12 (and step 13.b if applicable), possible values in typical points of observation nscoder output are:
a)		E 11073 Objects and Attributes
,		ım-Observed-Value-Basic-Bit-Str attribute is present:
		Object: Device and Sensor Status Enumeration Object
		Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
		Attribute-type: BITS16
		Attribute-value: 20 00 (hex)
b)	WA	N PCD-01 message
ŕ	PC	D-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Stribute value (check OBX-5):
		$OBX n CWE 150604^{A}MDC\_PULS\_OXIM\_DEV\_STATUS^{A}MDC m.0.0.x  \mbox{\bf 1^*signal-processing-irregularity(13)}     R$
		15 (and step 16.b if applicable), possible values in typical points of observation nscoder output are:
a)	IEE	E 11073 Objects and Attributes
	Enι	ım-Observed-Value-Basic-Bit-Str attribute is present:
		Object: Device and Sensor Status Enumeration Object
		Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
		Attribute-type: BITS16
		Attribute-value: 10 00 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Stribute value (check OBX-5):
		$OBX n CWE 150604^{A}MDC\_PULS\_OXIM\_DEV\_STATUS^{A}MDC m.0.0.x  \textbf{1^signal-inadequate(12)}      R$
		18 (and step 19.b if applicable), possible values in typical points of observation after der output are:
a)	IEE	E 11073 Objects and Attributes
	Enu	ım-Observed-Value-Basic-Bit-Str attribute is present:
		Object: Device and Sensor Status Enumeration Object
		Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
		Attribute-type: BITS16
		Attribute-value: 08 00 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Stribute value (check OBX-5):
		$OBX n CWE 150604^{M}DC\_PULS\_OXIM\_DEV\_STATUS^{M}DC m.0.0.x  \textbf{1^signal-poor(11)}     R$
		21 (and step 22.b if applicable), possible values in typical points of observation nscoder output are:
a)	IEE	E 11073 Objects and Attributes

	Enum-Observed-Value-Basic-Bit-Str attribute is present:
	□ Object: Device and Sensor Status Enumeration Object
	☐ Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>04 00</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5):
	OBX n CWE 150604^MDC_PULS_OXIM_DEV_STATUS^MDC m.0.0.x  <b>1^signal-low-perfusion(10)</b>       R
	step 24 (and step 25.b if applicable), possible values in typical points of observation after nscoder output are:
a)	IEEE 11073 Objects and Attributes
	Enum-Observed-Value-Basic-Bit-Str attribute is present:
	□ Object: Device and Sensor Status Enumeration Object
	☐ Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>02 00</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5):
	$OBX n CWE 150604^{MDC}\_PULS\_OXIM\_DEV\_STATUS^{MDC} m.0.0.x  \textbf{1^signal-erratic(9)}     R$
	step 27 (and step 28.b if applicable), possible values in typical points of observation after nscoder output are:
a)	IEEE 11073 Objects and Attributes
	Enum-Observed-Value-Basic-Bit-Str attribute is present:
	□ Object: Device and Sensor Status Enumeration Object
	☐ Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>01 00</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5):
	$OBX n CWE 150604^{M}DC\_PULS\_OXIM\_DEV\_STATUS^{M}DC m.0.0.x  \textbf{1^signal-non-pulsatile(8)}     R$
	step 30 (and step 31.b if applicable), possible values in typical points of observation er transcoder output are:
a)	IEEE 11073 Objects and Attributes
	Enum-Observed-Value-Basic-Bit-Str attribute is present:
	□ Object: Device and Sensor Status Enumeration Object
	☐ Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
	☐ Attribute-type: BITS16
	☐ Attribute-value: <b>00 80</b> (hex)
b)	WAN PCD-01 message
	PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):
	ORYINGWEI1506040MDC PHILS OYIM DEV STATUSAMDCIM 0.0 vI14signal-

		pulse-questionable(7)      R
		33 (and step 34.b if applicable), possible values in typical points of observation inscoder output are:
a)	IEE	EE 11073 Objects and Attributes
l	Enu	um-Observed-Value-Basic-Bit-Str attribute is present:
I		Object: Device and Sensor Status Enumeration Object
I		Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
I		Attribute-type: BITS16
I		Attribute-value: 00 40 (hex)
b)	WA	N PCD-01 message
		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-5):
		OBX n CWE 150604^MDC_PULS_OXIM_DEV_STATUS^MDC m.0.0.x  <b>1^signal-searching(6)</b>       R
		36 (and step 37.b if applicable), possible values in typical points of observation inscoder output are:
a)	IEE	EE 11073 Objects and Attributes
l	Enι	um-Observed-Value-Basic-Bit-Str attribute is present:
I		Object: Device and Sensor Status Enumeration Object
I		Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
I		Attribute-type: BITS16
l		Attribute-value: 00 20 (hex)
b)	WA	AN PCD-01 message
		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-5):
		$OBX n CWE 150604^{M}DC\_PULS\_OXIM\_DEV\_STATUS^{M}DC m.0.0.x  \textbf{1^sensor-interference(5)}      R$
		39 (and step 40.b if applicable), possible values in typical points of observation inscoder output are:
a)	IEE	EE 11073 Objects and Attributes
I	Enι	um-Observed-Value-Basic-Bit-Str attribute is present:
I		Object: Device and Sensor Status Enumeration Object
l		Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
I		Attribute-type: BITS16
I		Attribute-value: 00 10 (hex)
b)	WA	NN PCD-01 message
		D-01 message includes a segment like this with Measurement-Status attribute value eck OBX-5):
		$OBX n CWE 150604^{MDC}\_PULS\_OXIM\_DEV\_STATUS^{MDC} m.0.0.x  \mbox{\bf 1^{^s}sensor-off(4)}     R$
		42 (and step 43.b if applicable), possible values in typical points of observation inscoder output are:
a)	IEE	EE 11073 Objects and Attributes
I	Enι	um-Observed-Value-Basic-Bit-Str attribute is present:
I		Object: Device and Sensor Status Enumeration Object
I		Attribute-id: MDC_ATTR_ENUM_OBS_VAL_BASIC_BIT_STR (2662)
I		Attribute-type: BITS16
ı		Attribute-value: 00 08 (hev)

b) WAN PCD-01 message

PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):

OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^sensorunsupported(3)|||||R

In step 45 (and step 46.b if applicable), possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- Object: Device and Sensor Status Enumeration Object
- ☐ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- ☐ Attribute-type: BITS16
- ☐ Attribute-value: 00 04 (hex)
- b) WAN PCD-01 message

PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):

OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^sensor-displaced(2)|||||R

In step 48 (and step 49.b if applicable), possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- □ Object: Device and Sensor Status Enumeration Object
- ☐ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- ☐ Attribute-type: BITS16
- ☐ Attribute-value: **00 02** (hex)
- b) WAN PCD-01 message

PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):

OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^sensor-malfunction(1)|||||R

In step 51 (and step 52.b if applicable), possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- □ Object: Device and Sensor Status Enumeration Object
- ☐ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- ☐ Attribute-type: BITS16
- ☐ Attribute-value: **00 01** (hex)
- b) WAN PCD-01 message

PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):

OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^sensor-disconnected(0)||||||R

TP ld	TP/LP-PAN/PHG/PHDTW/PLX/BV-064
TP label	Whitepaper. Device and Sensor Status Enumeration Object (Continuous Measurements) – Enum-Observed-Value-Bit-Str Attribute

	Testable items	Check PHG tr		tion 8; M					
Applicability	9	PHG tr	that:						
				Check that:					
				nto Device and		LX Continuous Measurement n Object - Enum-Observed-Value-			
		[AND]	[AND]						
		PHG transcodes the Bluetooth Device and Sensor Status field of the PLX Continuo characteristic to 11073 Enum-Observed-Value-Basic-Bit-Str attribute properly							
Other PICS		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_040 AND C_MAN_BLE_041							
Initial conditi	ion	The Ph	HG unde	er test and the s	simulated PHD are in the St	andby state.			
Test procedu	ure	it h	nas a co	ntinuous meas		eter Profile (device specialization), slow response measurement tate (it is discoverable).			
				ated PHD imple r this Test Case		cteristics. The characteristics of			
		a.	PLX (	Continuous Mea	asurement (0x2A5F)				
		b.	PLX F	Features (0x2A	60)				
			i. F	ield: Supported	l Features				
			•	Format: 16	bit				
			•		resent (bit 1). Fast and slow	LSB). Device and Sensor Status v response modes are supported			
			ii. F	ield: Measuren	nent Status Support				
			•	This field is	not included				
			iii. F	ield: Device an	d Sensor Status Support				
			•	Format: 24	bit				
			•		0 0000 <b>1111 1111 1111 111</b> rus bits are supported	1 (MSB → LSB). All Device and			
						canning state), it discovers the e simulated PHD (Initiating state).			
				pairing has bee		state), force the PHG under test to			
			e simula lue:	ated PHD send	s the Measurement to the F	PHG under test with the following			
		a.	PLX (	Continuous Mea	asurement (0x2A5F)				
			i. F	ield: Flags					
			•	Format: 8 b	it				
			•	Fast and Sp		ce and Sensor Status, SpO2PR- ent. Measurement Status and esent.			
			ii. F	ield: SpO2PR-	Normal - SpO2 (%)				
			•	Format: SF	LOAT				
			•	Value: Not	Relevant				
			iii. F	ield: SpO2PR-	Normal - PR (bpm)				
			•	Format: SF					

Value: Not Relevant

iv. Field: SpO2PR-Fast - SpO2 (%)

Format: SFLOAT

Value: Not Relevant

v. Field: SpO2PR-Fast - PR (bpm)

Format: SFLOAT

Value: Not Relevant

vi. Field: SpO2PR-Slow - SpO2 (%)

Format: SFLOAT

Value: Not Relevant

vii. Field: SpO2PR-Slow - PR (bpm)

Format: SFLOAT

Value: Not Relevant

viii. Field: Measurement Status

This field is not included

ix. Field: Device and Sensor Status

Format: 24 bit

 Value: 0000 0000 0000 0000 0001 (MSB → LSB). Extended Display Update Ongoing (bit 0).

x. Field: Pulse Amplitude Index (%)

· This field is not included

- 6. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0010 (MSB → LSB). Equipment Malfunction (bit 1). All remaining fields remain equal to those in step 5.
- 8. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 9. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0100 (MSB → LSB). Signal Processing Irregularity Detected (bit 2). All remaining fields remain equal to those in step 5.
- Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

   Enum-Observed-Value-Basic-Bit-Str attribute.
- 11. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 1000 (MSB → LSB). Inadequate Signal Detected (bit 3). All remaining fields remain equal to those in step 5.
- 12. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 13. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0001 0000 (MSB → LSB). Poor Signal Detected (bit 4). All remaining fields remain equal to those in step 5.
- Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

   Enum-Observed-Value-Basic-Bit-Str attribute.
- 15. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0010 0000 (MSB → LSB). Low Perfusion Detected (bit 5). All remaining fields remain equal to those in step 5.
- 16. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 17. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0100 0000 (MSB → LSB). Erratic Signal

- Detected (bit 6). All remaining fields remain equal to those in step 5.
- 18. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 19. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 1000 0000 (MSB → LSB). Non-Pulsatile Signal Detected (bit 7). All remaining fields remain equal to those in step 5.
- 20. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 21. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0000 0000 (MSB → LSB). Questionable Signal Detected (bit 8). All remaining fields remain equal to those in step 5.
- 22. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 23. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0010 0000 0000 (MSB → LSB). Signal Analysis Ongoing (bit 9). All remaining fields remain equal to those in step 5.
- 24. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 25. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 0100 0000 0000 (MSB → LSB). Sensor Interference Detected (bit 10). All remaining fields remain equal to those in step 5.
- 26. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 27. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0000 1000 0000 0000 (MSB → LSB). Sensor Unconnected to User (bit 11). All remaining fields remain equal to those in step 5.
- 28. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 29. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0001 0000 0000 (MSB → LSB). Unknown Sensor Connected (bit 12). All remaining fields remain equal to those in step 5.
- 30. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 31. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0010 0000 0000 (MSB → LSB). Sensor Displaced (bit 13). All remaining fields remain equal to those in step 5.
- 32. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 33. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 0100 0000 0000 (MSB → LSB). Sensor Malfunctioning (bit 14). All remaining fields remain equal to those in step 5.
- 34. Check in the PHG transcoder output the Device and Sensor Status Enumeration Object Enum-Observed-Value-Basic-Bit-Str attribute.
- 35. The simulated PHD sends a Measurement to the PHG under test with Measurement Status field set to 0000 0000 1000 0000 0000 0000 (MSB → LSB). Sensor Disconnected (bit 15). All remaining fields remain equal to those in step 5.
- Check in the PHG transcoder output the Device and Sensor Status Enumeration Object

   Enum-Observed-Value-Basic-Bit-Str attribute.

#### Pass/Fail criteria

In Step 6, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "device-extended-update" (0x8000).

In Step 8, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "device-equipment-malfunction" (0x4000).

In Step 10, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-processing-irregularity" (0x2000).

In Step 12, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-inadequate" (0x1000).

In Step 14, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-poor" (0x0800).

In Step 16, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-low-perfusion" (0x0400).

In Step 18, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-erratic" (0x0200).

In Step 20, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-non-pulsatile" (0x0100).

In Step 22, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-pulse-questionable" (0x0080).

In Step 24, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-searching" (0x0040).

In Step 26, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "signal-interference" (0x0020).

In Step 28, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-off" (0x0010).

In Step 30, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-unsupported" (0x0008).

In Step 32, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-displaced" (0x0004).

In Step 34, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-malfunction" (0x0002).

In Step 36, the Device and Sensor Status Enumeration Object – Enum-Observed-Value-Basic-Bit-Str attribute is present and it is set to "sensor-disconnected" (0x0001).

#### Notes (To assist manual testing)

In step 6, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- Object: Device and Sensor Status Enumeration Object
- Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- □ Attribute-type: BITS16
- ☐ Attribute-value: 80 00 (hex)
- b) WAN PCD-01 message

PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5):

 $OBX[n]CWE[150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC]m.0.0.x| \mbox{\bf 1^^device-extended-update(15)}||||||R$ 

In step 8, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- Object: Device and Sensor Status Enumeration Object
- Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- ☐ Attribute-type: BITS16
- ☐ Attribute-value: 40 00 (hex)
- b) WAN PCD-01 message

PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5):

OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^device-equipment-malfunction(14)|||||R

In step 10, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present: Object: Device and Sensor Status Enumeration Object Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662) ☐ Attribute-type: BITS16 Attribute-value: **20 00** (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5): OBX|n|CWE|150604^MDC PULS OXIM DEV STATUS^MDC|m.0.0.x|1^signalprocessing-irregularity(13)|||||R In step 12, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Enum-Observed-Value-Basic-Bit-Str attribute is present: Object: Device and Sensor Status Enumeration Object ☐ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662) ☐ Attribute-type: BITS16 □ Attribute-value: 10 00 (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5): OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^signalinadequate(12)|||||R In step 14, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Enum-Observed-Value-Basic-Bit-Str attribute is present: Object: Device and Sensor Status Enumeration Object □ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662) □ Attribute-type: BITS16 ☐ Attribute-value: **08 00** (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5): OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^signalpoor(11)|||||R In step 16, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Enum-Observed-Value-Basic-Bit-Str attribute is present: Object: Device and Sensor Status Enumeration Object ☐ Attribute-id: MDC ATTR ENUM OBS VAL BASIC BIT STR (2662) ☐ Attribute-type: BITS16 ☐ Attribute-value: **04 00** (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5): OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^signallow-perfusion(10)|||||R

In step 18, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes
 Enum-Observed-Value-Basic-Bit-Str attribute is present:

Object: Device and Sensor Status Enumeration Object

☐ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)

☐ Attribute-type: BITS16

☐ Attribute-value: **02 00** (hex)

b) WAN PCD-01 message

PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5):

 $OBX|n|CWE|150604^{M}DC\_PULS\_OXIM\_DEV\_STATUS^{M}DC|m.0.0.x| \textbf{1^signal-erratic(9)}|||||R$ 

In step 20, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

□ Object: Device and Sensor Status Enumeration Object

□ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)

□ Attribute-type: BITS16

☐ Attribute-value: **01 00** (hex)

b) WAN PCD-01 message

PCD-01 message includes a segment like this with Enum-Observed-Value-Basic-Bit-Str attribute value (check OBX-5):

 $OBX[n]CWE[150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC]m.0.0.x| \textbf{1^signal-non-pulsatile(8)}|||||R$ 

In step 22, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

Object: Device and Sensor Status Enumeration Object

□ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)

□ Attribute-type: BITS16

☐ Attribute-value: 00 80 (hex)

b) WAN PCD-01 message

PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):

 $OBX|n|CWE|150604^{M}DC\_PULS\_OXIM\_DEV\_STATUS^{M}DC|m.0.0.x| \mbox{\bf 1^^signal-pulse-questionable(7)}|||||R$ 

In step 24, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

□ Object: Device and Sensor Status Enumeration Object

□ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)

☐ Attribute-type: BITS16

☐ Attribute-value: 00 40 (hex)

b) WAN PCD-01 message

PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):

 $OBX|n|CWE|150604^{M}DC\_PULS\_OXIM\_DEV\_STATUS^{M}DC|m.0.0.x| \mbox{\bf 1^signal-searching (6)}|||||R$ 

In step 26, possible values in typical points of observation after transcoder output are: IEEE 11073 Objects and Attributes Enum-Observed-Value-Basic-Bit-Str attribute is present: Object: Device and Sensor Status Enumeration Object □ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662) ☐ Attribute-type: BITS16 ☐ Attribute-value: 00 20 (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5): OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^sensorinterference(5)|||||R In step 28, possible values in typical points of observation after transcoder output are: IEEE 11073 Objects and Attributes Enum-Observed-Value-Basic-Bit-Str attribute is present: Object: Device and Sensor Status Enumeration Object □ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662) □ Attribute-type: BITS16 ☐ Attribute-value: 00 10 (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5): OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^sensoroff(4)|||||R In step 30, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Enum-Observed-Value-Basic-Bit-Str attribute is present: Object: Device and Sensor Status Enumeration Object ☐ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662) ☐ Attribute-type: BITS16 ☐ Attribute-value: **00 08** (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5): OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^sensorunsupported(3)|||||R In step 32, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Enum-Observed-Value-Basic-Bit-Str attribute is present: Object: Device and Sensor Status Enumeration Object □ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662) ☐ Attribute-type: BITS16 Attribute-value: 00 04 (hex) WAN PCD-01 message PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5): OBX|n|CWE|150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC|m.0.0.x|1^sensor-

#### displaced(2)|||||R

In step 34, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- □ Object: Device and Sensor Status Enumeration Object
- □ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- □ Attribute-type: BITS16
- ☐ Attribute-value: **00 02** (hex)
- b) WAN PCD-01 message

PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):

 $OBX[n]CWE[150604^MDC\_PULS\_OXIM\_DEV\_STATUS^MDC]m.0.0.x| \textbf{1^sensor-malfunction(1)}|||||R$ 

In step 36, possible values in typical points of observation after transcoder output are:

a) IEEE 11073 Objects and Attributes

Enum-Observed-Value-Basic-Bit-Str attribute is present:

- □ Object: Device and Sensor Status Enumeration Object
- ☐ Attribute-id: MDC\_ATTR\_ENUM\_OBS\_VAL\_BASIC\_BIT\_STR (2662)
- □ Attribute-type: BITS16
- ☐ Attribute-value: **00 01** (hex)
- b) WAN PCD-01 message

PCD-01 message includes a segment like this with Measurement-Status attribute value (check OBX-5):

 $OBX|n|CWE|150604^{M}DC\_PULS\_OXIM\_DEV\_STATUS^{M}DC|m.0.0.x| \textbf{1^sensor-disconnected(0)}||||||R$ 

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