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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

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

Recommendation ITU-T H.850.2

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Recommendation ITU-T H.850.2

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

Summary

Recommendation ITU-T H.850.2 provides a test suite structure (TSS) and the test purposes (TP) for the transcoding of blood pressure 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.850.2 is a transposition of clause 3.4 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.

This Recommendation is part of ITU-T H.850 that was originally approved in 04/2017 as a single part, but which was split at publication time into eight sub-parts for easier use, maintenance and expandability:

– ITU-T H.850 with the general requirements;
– ITU-T H.850.1 with thermometer PHD requirements;
– ITU-T H.850.2 with blood pressure PHD requirements;
– ITU-T H.850.3 with heart rate PHD requirements;
– ITU-T H.850.4 with glucose meter PHD requirements;
– ITU-T H.850.5 with weighing scales PHD requirements;
– ITU-T H.850.6 with pulse oximeter PHD requirements;
– ITU-T H.850.7 with continuous glucose monitoring PHD requirements.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.850.2	2017-04-29	16	11.1002/1000/13355

Keywords

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

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

FOREWORD

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

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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 3.4 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.

Recommendation ITU-T H.850.2

Conformance of ITU-T H.810 personal health devices: Personal Health Devices interface Part 10B: Transcoding for Bluetooth Low Energy: Personal Health Gateway – Blood pressure

1 Scope

The scope of this Recommendation[1] is to provide a test suite structure (TSS) and the test purposes (TP) for the Personal Health Devices interface based on the requirements defined in the Continua Design Guidelines (CDG) [ITU-T H.810 (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 10B.

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

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

– Part 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), *Interoperability design guidelines for personal health systems*.

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

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

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

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

[ISO/IEEE 11073-20601-2015A] ISO/IEEE 11073-20601:2010, *Health informatics – Personal health device communication – Part 20601: Application profile – Optimized exchange protocol*, including ISO/IEEE 11073-20601:2010 Amd 1:2015.
https://www.iso.org/standard/54331.html with
https://www.iso.org/standard/63972.html

[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 2.4.3 (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)
  - Subgroup 2.3.2: Glucose meter (GL)
  - Subgroup 2.3.3: Pulse oximeter (PO)
  - Subgroup 2.3.4: Blood pressure monitor (BPM)
  - Subgroup 2.3.5: Thermometer (TH)
  - Subgroup 2.3.6: Cardiovascular (CV)
  - Subgroup 2.3.7: Strength (ST)
  - Subgroup 2.3.8: Activity hub (HUB)
  - Subgroup 2.3.9: Adherence monitor (AM)
  - Subgroup 2.3.10: Insulin pump (IP)
  - Subgroup 2.3.11: Peak flow (PF)
  - Subgroup 2.3.12: Body composition analyser (BCA)
  - Subgroup 2.3.13: Basic electrocardiograph (ECG)
  - Subgroup 2.3.14: International normalized ratio (INR)
  - Subgroup 2.3.15: Sleep apnoea breathing therapy equipment (SABTE)
  - Subgroup 2.3.16: Continuous glucose monitor (CGM)
- Group 2.4: Personal health device transcoding whitepaper (PHDTW)
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  - Subgroup 2.4.2: Whitepaper thermometer requirements (TH)
  - **Subgroup 2.4.3**: **Whitepaper blood pressure requirements (BPM)**
  - Subgroup 2.4.4: Whitepaper heart rate requirements (HR)
  - Subgroup 2.4.5: Whitepaper glucose meter requirements (GL)
  - Subgroup 2.4.6: Whitepaper weight scale requirements (WS)

- Subgroup 2.4.7: Whitepaper pulse oximeter requirements (PLX)
- Subgroup 2.4.8: Whitepaper continuous glucose monitoring requirements (CGM)

7 Electronic attachment

The protocol implementation conformance statements (PICS) and the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A can be downloaded from http://handle.itu.int/11.1002/2000/12067.

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.
  - 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 2.4.3 – Whitepaper Blood pressure requirements (BP)

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-000		
TP label		Whitepaper. Blood Pressure MDS Object - System-Type Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BPM Specific MDS 1; M		
Test purpose		Check that: PHG does not include MDS Object – System-Type attribute in transcoder output.		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 Blood pressure 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 for the MDS object – System-Type attribute.		
Pass/Fail criteria		In step 4, the MDS object – System-Type attribute is not present.		
Notes		Possible values in typical points of observation after transcoder output are: 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> b) WAN PCD-01 message PCD-01 message does not include segments with a System-Type attribute value (67974^MDC_ATTR_SYS_TYPE^MDC).		

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-001		
TP label		Whitepaper. Blood Pressure MDS Object - Dev-Configuration-Id Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BPM Specific MDS 2; M		
Test purpose		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_002 AND C_MAN_BLE_003		
Other PICS				
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 Blood pressure 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 for the MDS object – Dev-Configuration-Id attribute.
Pass/Fail criteria	In step 4, the MDS object – Dev-Configuration-Id attribute is present and its value is inside the range 0x4000 - 0x7FFF.
Notes	Possible values in typical points of observation after transcoder output are: 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 ❑ Attribute-value: Any value inside the range 16384 - 32767 (dec) or 0x4000 – 0x7FFF (hex) b) WAN PCD-01 message According to [b-ITU-T H.810 (2013)], the Dev-Configuration-Id shall not be transmitted in the PCD-01 message; therefore it is not possible to check this attribute.

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-002		
TP label		Whitepaper. Blood Pressure MDS Object - System-Type-Spec-List Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	Common MDS 15; M	BPM Specific MDS 3; M	
Test purpose		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_BP, Version 1)		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 Blood pressure 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 for the MDS object – System-Type-Spec-List attribute.		
Pass/Fail criteria		In step 4, the MDS object – System-Type-Spec-List attribute is present and its value is (MDC_DEV_SPEC_PROFILE_BP, Version 1).		
Notes		Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes 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:		

	• type: MDC_DEV_SPEC_PROFILE_BP or 4103 (dec) or 10 07 (hex) • version: 1 (dec) or 00 01 (hex) 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| 528391^MDC_DEV_SPEC_PROFILE_BP ^MDC|||||R

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-003		
TP label		Whitepaper. Blood Pressure MDS Object - Reg-Cert-Data-List Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	Common MDS 14; M	Regulatory Conv 1; M	
Test purpose		Check that: PHG transcodes IEEE 11073-20601 Regulatory Certification Data List characteristic into MDS Object – Reg-Cert-Data-List attribute		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 Blood pressure profile (device specialization) supported by the PHG under test; it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE 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 06 01 00 01 00 02 80 07 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: 06 (hex) - minor-IG-version: 01 (hex) - certified-devices: 80 07 (hex). BLE Blood Pressure 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 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. 4. When the pairing has been completed (Connection state), force the PHG under test to read the IEEE 11073-20601 Regulatory Certification Data List characteristic. 5. The simulated PHD sends the measurement to the PHG under test.		

	6. Check in PHG transcoder output for the MDS object – Reg-Cert-Data-List attribute.
Pass/Fail criteria	In step 6, the MDS object – Reg-Cert-Data-List attribute is present and its value matches with the IEEE 11073-20601 Regulatory Certification Data List characteristic value.
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes 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 06 01 00 01 00 02 80 07 02 02 00 02 80 00 (hex) [Note that 0x00 0x02 is the number of elements in the sequence and 0x00 12 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: 06 (hex) - minor-IG-version: 01 (hex) - certified-devices: 80 07 (hex). BLE Blood Pressure 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^MDC|1.0.0.a.y|32775|||||R 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 Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-004		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Handle Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 1; O		
Test purpose		Check that: PHG does not include Systolic/Diastolic/Map Compound Numeric Object – Handle Attribute in transcoder output		

	[OR] If PHG includes Systolic/Diastolic/Map Compound 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_003
Other PICS	
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement 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), the simulated PHD sends the measurement to the PHG under test. 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object

	– Handle attribute.
Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object – Handle attribute is not present; however, if it is present then its value is different to 0.
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Handle attribute is not present, or if it is present then: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_ID_HANDLE (2337) ❑ Attribute-type: INT-U16 ❑ Attribute-value: Any value other than 0 b) WAN PCD-01 message PCD-01 message does not include segments with a Handle attribute value.

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-005		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Type Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 2; M		
Test purpose		Check that: PHG includes Systolic/Diastolic/Map Compound Numeric Object – Type attribute in transcoder output. [AND] Type is set to {MDC_PART_SCADA, MDC_PRESS_BLD_NONINV}		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa)		

	• This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement 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), the simulated PHD sends the measurement to the PHG under test. 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object – Type attribute.
Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object – Type attribute is present and its value is {MDC_PART_SCADA, MDC_PRESS_BLD_NONINV}.
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Type attribute is present: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_ID_TYPE (2351) ❑ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)} ❑ Attribute-value: • partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex) • code: MDC_PRESS_BLD_NONINV or 18948 (dec) or 4A 04 (hex) b) WAN PCD-01 message PCD-01 message includes a segment like this with a Type attribute (check OBX-3): OBX|?||150020^MDC_PRESS_BLD_NONINV^MDC|1.0.a||||||X||| [current_date_time].

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-006		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Metric-Spec-Small Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 3; M		
Test purpose		Check that: PHG includes Systolic/Diastolic/Map Compound Numeric Object – Metric-Spec-Small attribute in transcoder output. [AND]		

	Metric-Spec-Small is set to {0xF040} (mss-avail-intermittent | mss-avail-stored-data | mss-upd-aperiodic | mss-msmt-aperiodic | mss-acc-agent-initiated).
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003
Other PICS	
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement 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), the simulated PHD sends the measurement to the PHG under test. 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object, Metric-Spec-Small attribute.

Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object – Metric-Spec-Small attribute is present and its value is {0xF040} (mss-avail-intermittent | mss-avail-stored-data | mss-upd-aperiodic | mss-msmt-aperiodic | mss-acc-agent-initiated).
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Metric-Spec-Small attribute is present: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630) ❑ Attribute-type: BITS-16 ❑ Attribute-value: F0 40 (hex) or BITS mss-avail-intermittent(0), mss-avail-stored-data(1), mss-upd-aperiodic(2), 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 a Metric-Spec-Small attribute value.

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-007		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Metric-Structure-Small Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 4; M		
Test purpose		Check that: PHG includes Systolic/Diastolic/Map Compound Numeric Object – Metric-Structure-Small attribute in transcoder output. [AND] Metric-Structure-Small is set to {0x03, 0x03} (ms-struct-compound-fix, 3).		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT		

	• Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement 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), the simulated PHD sends the measurement to the PHG under test. 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object – Metric-Structure-Small attribute.
Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object – Metric-Structure-Small attribute is present and its value is {0x03, 0x03} (ms-struct-compound-fix, 3).
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Metric-Spec-Small attribute is present: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_METRIC_STRUCT_SMALL (2675) ❑ Attribute-type: SEQUENCE {ms-struct (INT-U8), ms-comp-no (INT-U8)} ❑ Attribute-value: • ms-struct Element: 03 (hex), ms-struct-compound-fix(3) • ms-comp-no Element: 03 (hex) b) WAN PCD-01 message PCD-01 message does not include segments with a Metric-Structure-Small attribute value.

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-008		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Metric-Id-List Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 5; M		
Test purpose		Check that: PHG includes Systolic/Diastolic/Map Compound Numeric Object – Metric-Id-List attribute in transcoder output.		

	[AND] Metric-Id-List is set to {MDC_PRESS_BLD_NONINV_SYS, MDC_PRESS_BLD_NONINV_DIA, MDC_PRESS_BLD_NONINV_MEAN}.
Applicability	C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003
Other PICS	
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement 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), the simulated PHD sends the measurement to the PHG under test. 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object

	– Metric-Id-List attribute.
Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object – Metric-Id-List attribute is present and its value is {MDC_PRESS_BLD_NONINV_SYS, MDC_PRESS_BLD_NONINV_DIA, MDC_PRESS_BLD_NONINV_MEAN}.
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Metric-Id-List attribute is present: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_ID_PHYSIO_LIST (2678) ❑ Attribute-type: SEQUENCE OF [{OID-Type(INT-U16)}] ❑ Attribute-value: 00 03 00 06 4A 05 4A 06 4A 07 (hex) [Note that 0x00 0x03 is the number of elements in the sequence and 0x00 06 is the length of the sequence] i. First Element: 4A 05 (hex) or 18949 (dec) ii. Second Element: 4A 06 (hex) or 18950 (dec) iii. Third Element: 4A 07 (hex) or 18951 (dec) b) WAN PCD-01 message PCD-01 message includes three segments like these with a Metric-Id-List attribute values (check OBX-3 in three segments): OBX|?|NM|150021^MDC_PRESS_BLD_NONINV_SYS^MDC| 1.0.a.x|100|266016^MDC_DIM_MMHG^MDC||||R OBX|?|NM|150022^MDC_PRESS_BLD_NONINV_DIA^MDC| 1.0.a.y|70|266016^MDC_DIM_MMHG^MDC||||R OBX|?|NM|150023^MDC_PRESS_BLD_NONINV_MEAN^MDC| 1.0.a.z|80|266016^MDC_DIM_MMHG^MDC||||R

TP Id		TP/LP-PAN/PHG/PHDTW/BP/BV-009		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Unit-Code Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 6; M	BP Numeric 7; M	
Test purpose		Check that: PHG includes Systolic/Diastolic/Map Compound Numeric Object – Unit-Code attribute in transcoder output. [AND] IF Blood Pressure Measurement Compound Value - Systolic (mmHg), Diastolic (mmHg) and Mean Arterial Pressure (mmHg) fields of Blood Pressure Measurement characteristic are present THEN Systolic/Diastolic/Map Compound Numeric Object – Unit-Code attribute is set to MDC_DIM_MMHG [AND] IF Blood Pressure Measurement Compound Value - Systolic (kPa), Diastolic (kPa) and Mean Arterial Pressure (kPa) fields of Blood Pressure Measurement characteristic are present THEN Systolic/Diastolic/Map Compound Numeric Object – Unit-Code attribute is set to MDC_DIM_KILO_PASCAL		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 profile (device specialization) supported by the PHG under test; it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: 100.0 iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: 70.0 iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: 80.0 v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object – Unit-Code attribute. 6. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags

	• Format: 8 bit • Value: 0000 0011 (MSB → LSB). Blood pressure measurement value in units of kPa and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • This field is not included iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • This field is not included iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • This field is not included v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • Format: SFLOAT • Value: 13.33 vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • Format: SFLOAT • Value: 9.33 vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • Format: SFLOAT • Value: 10.67 viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 7. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object – Unit-Code attribute.
Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object – Unit-Code attribute is present and its value is MDC_DIM_MMHG. In step 7, the Systolic/Diastolic/Map compound numeric object – Unit-Code attribute is present and its value is MDC_DIM_KILO_PASCAL.
Notes	In step 5, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Unit-Code attribute is present: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_UNIT_CODE (2454) ❑ Attribute-type: INT-U16 ❑ Attribute-value: MDC_DIM_MMHG or 3872 (dec) or 0F 20 (hex) b) WAN PCD-01 message PCD-01 message includes three segments like these with Unit-Code attribute value (check

	OBX-6 in three segments): OBX|?|NM|150021^MDC_PRESS_BLD_NONINV_SYS^MDC| 1.0.a.x|100|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] OBX|?|NM|150022^MDC_PRESS_BLD_NONINV_DIA^MDC| 1.0.a.y|70|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] OBX|?|NM|150023^MDC_PRESS_BLD_NONINV_MEAN^MDC| 1.0.a.z|80|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] Note that "|||[current_date_time]" is optional at the end of each segment because the date and time can be specified in the parent segment (OBX|?|| 150020^MDC_PRESS_BLD_NONINV^MDC|1.0.a||||||X|||[current_date_time]) In step 7, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Unit-Code attribute is present: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_UNIT_CODE (2454) ❑ Attribute-type: INT-U16 ❑ Attribute-value: MDC_DIM_KILO_PASCAL or 3843 (dec) or 0F 03 (hex) b) WAN PCD-01 message PCD-01 message includes three segments like these with Unit-Code attribute value (check OBX-6 in three segments): OBX|?|NM|150021^MDC_PRESS_BLD_NONINV_SYS^MDC| 1.0.a.x|13.33|265987^MDC_DIM_KILO_PASCAL^MDC||||R|||[current_date_time] OBX|?|NM|150022^MDC_PRESS_BLD_NONINV_DIA^MDC| 1.0.a.y|9.33|265987^MDC_DIM_KILO_PASCAL^MDC||||R|||[current_date_time] OBX|?|NM|150023^MDC_PRESS_BLD_NONINV_MEAN^MDC| 1.0.a.z|10.67|265987^MDC_DIM_KILO_PASCAL^MDC||||R|||[current_date_time] Note that "|||[current_date_time]" is optional at the end of each segment because the date and time can be specified in the parent segment (OBX|?|| 150020^MDC_PRESS_BLD_NONINV^MDC|1.0.a||||||X|||[current_date_time])

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-010		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Absolute-Time-Stamp Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 9; M	Date-Time Conv 2; M	Date-Time Conv 3; M
		Date-Time Conv 4; M	Date-Time Conv 5; M	
Test purpose		Check that: PHG transcodes Time Stamp field of Blood Pressure Measurement characteristic into Systolic/Diastolic/Map Compound 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_003		
Other PICS				
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 profile (device specialization) supported by the PHG under test; it has a measurement ready to be sent and it is in the Advertising state (it is discoverable).		

	2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: 100.0 iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: 70.0 iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: 80.0 v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: August 2nd, 2012, 10:39:27 ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object – Absolute-Time-Stamp attribute
Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object – Absolute-Time-Stamp attribute is present, its value matches with the Time Stamp field of the Blood pressure measurement characteristic and the fraction of seconds is set to 0.
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Absolute-Time-Stamp attribute is present:

	❑ Object: Systolic/Diastolic/Map compound 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: 12 (hex) or 18 (dec) • month: 08 (hex) or 8 (dec) • day: 02 (hex) or 2 (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|?||150020^MDC_PRESS_BLD_NONINV^MDC|1.0.a||||||X||| 20120802103927+0000

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-011		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Compound-Basic-Nu-Observed-Value Attribute 1		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 10; M	Short Float Type 1; C	
Test purpose		Check that: PHG transcodes Blood Pressure Systolic, Diastolic and Map Value fields of Blood Pressure Measurement characteristic into Systolic/Diastolic/Map Compound Numeric Object - Compound-Basic-Nu-Observed-Value attribute		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 profile (device specialization) supported by the PHG under test; it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included		

	ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: 100.0 iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: 70.0 iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: 80.0 v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute. 6. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0011 (MSB → LSB). Blood pressure measurement value in units of kPa, Time Stamp field is included and Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • This field is not included iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • This field is not included iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • This field is not included v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • Format: SFLOAT • Value: 13.33

	vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • Format: SFLOAT • Value: 9.33 vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) viii. Format: SFLOAT • Value: 10.67 ix. Field: Time Stamp • Format: Date and Time • Value: Not relevant x. Field: Pulse Rate • This field is not included xi. Field: User ID • This field is not included xii. Field: Measurement Status • This field is not included 7. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute.
Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object – Compound-Basic-Nu-Observed-Value attribute is present and its value matches with the blood pressure measurement value (mmHg) fields of the Blood pressure measurement characteristic (Systolic: 100.0, Diastolic:70.0, MAP: 80.0). In step 7, the Systolic/Diastolic/Map compound numeric object – Compound-Basic-Nu-Observed-Value attribute is present and its value matches with the blood pressure measurement value (kPa) fields of the Blood pressure measurement characteristic (Systolic: 13.33, Diastolic:9.33, MAP: 10.67).
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Compound-Basic-Nu-Observed-Value attribute is present: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_NU_CMPD_VAL_OBS_BASIC (2677) ❑ Attribute-type: SEQUENCE OF [{SFLOAT}] ❑ Attribute-value: 00 03 00 06 xx xx yy yy zz zz (hex), where 'xx xx' is the Systolic value, 'yy yy' is the Diastolic value and 'zz zz' is the MAP value [Note that 0x00 0x03 is the number of elements in the sequence and 0x00 06 is the length of the sequence] • Systolic: F3 E8 (hex) or 00 64 (hex) or 10 0A (hex) or 20 01 (hex) or 100.0 (dec) • Diastolic: F2 BC (hex) or 00 46 (hex) or 10 07 (hex) or 70.0 (dec) • MAP: F3 20 (hex) or 00 50 (hex) or 10 08 (hex) or 80.0 (dec) b) WAN PCD-01 message PCD-01 message includes three segments like these with a Simple-Nu-Observed-Value attribute value (check OBX-5): OBX|?|NM|150021^MDC_PRESS_BLD_NONINV_SYS^MDC| 1.0.a.x|100|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] OBX|?|NM|150022^MDC_PRESS_BLD_NONINV_DIA^MDC| 1.0.a.y|70|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] OBX|?|NM|150023^MDC_PRESS_BLD_NONINV_MEAN^MDC| 1.0.a.z|80|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] Note that "|||[current_date_time]" is optional at the end of each segment because the date

	and time can be specified in the parent segment (OBX|?|| 150020^MDC_PRESS_BLD_NONINV^MDC|1.0.a||||||X|||[current_date_time]) In step 7, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Simple-Nu-Observed-Value attribute is present: ❑ Object: Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_NU_CMPD_VAL_OBS_BASIC (2677) ❑ Attribute-type: SEQUENCE OF [{SFLOAT}] ❑ Attribute-value: 00 03 00 06 E5 35 E3 A5 E4 2B (hex) [Note that 0x00 0x03 is the number of elements in the sequence and 0x00 06 is the length of the sequence] • Systolic: E5 35 (hex) or 13.33 (dec) • Diastolic: E3 A5 (hex) 9.33 (dec) • MAP: E4 2B (hex) 10.67 (dec) b) WAN PCD-01 message PCD-01 message includes three segments like these with a Simple-Nu-Observed-Value attribute value (check OBX-5): OBX|?|NM|150021^MDC_PRESS_BLD_NONINV_SYS^MDC| 1.0.a.x|13.33|265987^MDC_DIM_KILO_PASCAL^MDC||||R|||[current_date_time] OBX|?|NM|150022^MDC_PRESS_BLD_NONINV_DIA^MDC| 1.0.a.y|9.33|265987^MDC_DIM_KILO_PASCAL^MDC||||R|||[current_date_time] OBX|?|NM|150023^MDC_PRESS_BLD_NONINV_MEAN^MDC| 1.0.a.z|10.67|265987^MDC_DIM_KILO_PASCAL^MDC||||R|||[current_date_time] Note that "|||[current_date_time]" is optional at the end of each segment because the date and time can be specified in the parent segment (OBX|?|| 150020^MDC_PRESS_BLD_NONINV^MDC|1.0.a||||||X|||[current_date_time])

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-012		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Compound-Basic-Nu-Observed-Value Attribute 2		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	BP Numeric 10; M	Short Float Type 1; C	Short Float Type 2; M
Test purpose		Check that: PHG transcodes Blood Pressure Systolic, Diastolic and Map Value fields of Blood Pressure Measurement characteristic into Systolic/Diastolic/Map Compound Numeric Object - Compound-Basic-Nu-Observed-Value attribute [AND] PHG assigns the following special values: NaN (0x07FF), NRes (0x0800), +INFINITY (0x07FE) and -INFINITY (0x0802)		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 profile (device specialization) supported by the PHG under test; it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: 100.0 iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: 70.0 iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: 80.0 v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object – Compound-Basic-Nu-Observed-Value attribute. 6. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT

	• Value: 07 FF (hex). Special value: NaN iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: 07 FF (hex). Special value: NaN iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: 07 FF (hex). Special value: NaN v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 7. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object – Compound-Basic-Nu-Observed-Value attribute. 8. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: 08 00 (hex). Special value: NRes iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: 08 00 (hex). Special value: NRes iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: 08 00 (hex). Special value: NRes v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included

vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa)

- This field is not included

vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa)

- This field is not included

viii. Field: Time Stamp

- Format: Date and Time
- Value: Not relevant

ix. Field: Pulse Rate

- This field is not included

x. Field: User ID

- This field is not included

xi. Field: Measurement Status

- This field is not included

9. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute.
10. The simulated PHD sends the measurement to the PHG under test with the following value:
    a. Blood pressure measurement (0x2A35)
        i. Field: Flags
            - Format: 8 bit
            - Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included
        ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg)
            - Format: SFLOAT
            - Value: 07 FE (hex). Special value: +INFINITY
        iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg)
            - Format: SFLOAT
            - Value: 07 FE (hex). Special value: +INFINITY
        iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg)
            - Format: SFLOAT
            - Value: 07 FE (hex). Special value: +INFINITY
        v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa)
            - This field is not included
        vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa)
            - This field is not included
        vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa)
            - This field is not included
        viii. Field: Time Stamp
            - Format: Date and Time
            - Value: Not relevant
        ix. Field: Pulse Rate
            - This field is not included

	x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 11. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute. 12. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: 08 02 (hex). Special value: -INFINITY iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: 08 02 (hex). Special value: -INFINITY iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: 08 02 (hex). Special value: -INFINITY v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 13. Check in PHG transcoder output for the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute.
Pass/Fail criteria	In step 5, the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute is present and its value is 100.0 for Systolic, 70.0 for Diastolic and 80.0 for MAP. In step 7, the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute is present and its value is 0x07FF for Systolic, Diastolic and MAP.

	In step 9, the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute is present and its value is 0x0800 for Systolic, Diastolic and MAP. In step 11, the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute is present and its value is 0x07FE for Systolic, Diastolic and MAP. In step 13, the Systolic/Diastolic/Map compound numeric object, Compound-Basic-Nu-Observed-Value attribute is present and its value is 0x0802 for Systolic, Diastolic and MAP.
Notes	In step 5, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Compound-Basic-Nu-Observed-Value attribute is present: ❑ Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_NU_CMPD_VAL_OBS_BASIC (2677) ❑ Attribute-type: SEQUENCE OF [{SFLOAT}] ❑ Attribute-value: 00 03 00 06 xx xx yy yy zz zz (hex), where 'xx xx' is the Systolic value, 'yy yy' is the Diastolic value and 'zz zz' is the MAP value [Note that 0x00 0x03 is the number of elements in the sequence and 0x00 06 is the length of the sequence] • Systolic: F3 E8 (hex) or 00 64 (hex) or 10 0A (hex) or 20 01 (hex) or 100.0 (dec) • Diastolic: F2 BC (hex) or 00 46 (hex) or 10 07 (hex) or 70.0 (dec) • MAP: F3 20 (hex) or 00 50 (hex) or 10 08 (hex) or 80.0 (dec) b) WAN PCD-01 message PCD-01 message includes a segment like this with a Simple-Nu-Observed-Value attribute value (check OBX-5): OBX|?|NM|150021^MDC_PRESS_BLD_NONINV_SYS^MDC| 1.0.a.x|100|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] OBX|?|NM|150022^MDC_PRESS_BLD_NONINV_DIA^MDC| 1.0.a.y|70|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] OBX|?|NM|150023^MDC_PRESS_BLD_NONINV_MEAN^MDC| 1.0.a.z|80|266016^MDC_DIM_MMHG^MDC||||R|||[current_date_time] Note that "|||[current_date_time]" is optional at the end of each segment because the date and time can be specified in the parent segment (OBX|?|| 150020^MDC_PRESS_BLD_NONINV^MDC|1.0.a||||||X|||[current_date_time]) In step 7, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Compound-Basic-Nu-Observed-Value attribute is present: ❑ Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_NU_CMPD_VAL_OBS_BASIC (2677) ❑ Attribute-type: SEQUENCE OF [{SFLOAT}] ❑ Attribute-value: 00 03 00 06 07 FF 07 FF 07 FF (hex) [Note that 0x00 0x03 is the number of elements in the sequence and 0x00 06 is the length of the sequence] • Systolic: 07 FF (hex) or NaN (note that a decimal value is not allowed) • Diastolic: 07 FF (hex) or NaN (note that a decimal value is not allowed) • MAP: 07 FF (hex) or NaN (note that a decimal value is not allowed) b) WAN PCD-01 message PCD-01 message does not include segments with a Simple-Nu-Observed-Value attribute value (150021^MDC_PRESS_BLD_NONINV_SYS^MDC, 150022^MDC_PRESS_BLD_NONINV_DIA^MDC and 150023^MDC_PRESS_BLD_NONINV_MEAN) because they have a special value and these values are not included in the PCD-01 message. In step 9, possible values in typical points of observation after transcoder output are:

	a) IEEE 11073 Objects and Attributes Compound-Basic-Nu-Observed-Value attribute is present: ❑ Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_NU_CMPD_VAL_OBS_BASIC (2677) ❑ Attribute-type: SEQUENCE OF [{SFLOAT}] ❑ Attribute-value: 00 03 00 06 08 00 08 00 08 00(hex) [Note that 0x00 0x03 is the number of elements in the sequence and 0x00 06 is the length of the sequence] • Systolic: 08 00 (hex) or NRes (note that a decimal value is not allowed) • Diastolic: 08 00 (hex) or NRes (note that a decimal value is not allowed) • MAP: 08 00 (hex) or NRes (note that a decimal value is not allowed) b) WAN PCD-01 message PCD-01 message does not include segments with a Simple-Nu-Observed-Value attribute value (150021^MDC_PRESS_BLD_NONINV_SYS^MDC, 150022^MDC_PRESS_BLD_NONINV_DIA^MDC and 150023^MDC_PRESS_BLD_NONINV_MEAN) because they have a special value and these values are not included in the PCD-01 message. In step 11, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Compound-Basic-Nu-Observed-Value attribute is present: ❑ Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_NU_CMPD_VAL_OBS_BASIC (2677) ❑ Attribute-type: SEQUENCE OF [{SFLOAT}] ❑ Attribute-value: 00 03 00 06 07 FE 07 FE 07 FE (hex) [Note that 0x00 0x03 is the number of elements in the sequence and 0x00 06 is the length of the sequence] • Systolic: 07 FE (hex) or +INFINITY (note that a decimal value is not allowed) • Diastolic: 07 FE (hex) or +INFINITY (note that a decimal value is not allowed) • MAP: 07 FE (hex) or +INFINITY (note that a decimal value is not allowed) b) WAN PCD-01 message PCD-01 message does not include segments with a Simple-Nu-Observed-Value attribute value (150021^MDC_PRESS_BLD_NONINV_SYS^MDC, 150022^MDC_PRESS_BLD_NONINV_DIA^MDC and 150023^MDC_PRESS_BLD_NONINV_MEAN) because they have a special value and these values are not included in the PCD-01 message. In step 13, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Compound-Basic-Nu-Observed-Value attribute is present: ❑ Systolic/Diastolic/Map compound numeric object ❑ Attribute-id: MDC_ATTR_NU_CMPD_VAL_OBS_BASIC (2677) ❑ Attribute-type: SEQUENCE OF [{SFLOAT}] ❑ Attribute-value: 00 03 00 06 08 02 08 02 08 02 (hex) [Note that 0x00 0x03 is the number of elements in the sequence and 0x00 06 is the length of the sequence] • Systolic: 08 02 (hex) or -INFINITY (note that a decimal value is not allowed) • Diastolic: 08 02 (hex) or -INFINITY (note that a decimal value is not allowed) • MAP: 08 02 (hex) or -INFINITY (note that a decimal value is not allowed) b) WAN PCD-01 message PCD-01 message does not include segments with a Simple-Nu-Observed-Value attribute value (150021^MDC_PRESS_BLD_NONINV_SYS^MDC, 150022^MDC_PRESS_BLD_NONINV_DIA^MDC and

	150023^MDC_PRESS_BLD_NONINV_MEAN) because they have a special value and these values are not included in the PCD-01 message.

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-013		
TP label		Whitepaper. Systolic/Diastolic/Map Compound Numeric Object - Blood Pressure measurement value		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	Short Float Type 1; C	Date-Time Conv 1; M	BP Numeric 9; M
		BP Numeric 10; M		
Test purpose		Check that: PHG processes correctly the Blood Pressure Measurement Compound Value (mmHg), Blood Pressure Measurement Compound Value (kPa) and Time Stamp fields of Blood Pressure Measurement		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_003		
Other PICS				
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 profile (device specialization) supported by the PHG under test; it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0010 (MSB → LSB). Blood pressure measurement value in units of mmHg and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: 100.0 iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: 70.0 iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: 80.0 v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa)		

	• This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: August 2nd, 2012, 11:08:25 ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check that the PHG accepts the measurement and decodes its value properly (measurement values, units and time stamp). 6. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0011 (MSB → LSB). Blood pressure measurement value in units of kPa and Time Stamp fields are included, Pulse Rate, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • This field is not included iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • This field is not included iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • This field is not included v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • Format: SFLOAT • Value: 13.33 vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • Format: SFLOAT • Value: 9.33 vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • Format: SFLOAT • Value: 10.67 viii. Field: Time Stamp • Format: Date and Time • Value: August 2nd, 2012, 11:09:05 ix. Field: Pulse Rate • This field is not included x. Field: User ID • This field is not included xi. Field: Measurement Status

	• This field is not included 7. Check that the PHG under test accepts the measurement and decodes its value properly (measurement values, units and time stamp)
Pass/Fail criteria	In step 5, the PHG under test shows the following measurement: 100.0 mmHg for Systolic, 70.0 mmHg for Diastolic and 80.0 mmHg for MAP, with the time stamp '2012-08-02 11:08:25'. In step 7, the PHG under test shows the following measurement 13.33 kPa for Systolic, 9.33 kPa for Diastolic and 10.67 kPa for MAP, with the time stamp '2012-08-02 11:09:05'.
Notes	

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-014		
TP label		Whitepaper. Pulse Rate Object - Handle Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	PR Numeric 1; O		
Test purpose		Check that: PHG does not include Pulse Rate object, Handle Attribute in transcoder output [OR] If PHG includes Pulse Rate 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_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure		

	(kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: Not relevant x. Field: User ID • This field is not included xi. Field: Measurement 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), the simulated PHD sends the measurement to the PHG under test. 5. Check in PHG transcoder output for the Pulse rate object, Handle attribute.
Pass/Fail criteria	In step 5, the Pulse rate object, Handle attribute is not present; however, if it is present then its value is different to 0.
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Handle attribute is not present, or if it is present then: ❑ Object: Pulse rate object ❑ Attribute-id: MDC_ATTR_ID_HANDLE (2337) ❑ Attribute-type: INT-U16 ❑ Attribute-value: Any value other than 0 b) WAN PCD-01 message PCD-01 message does not include segments with a Handle attribute value.

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-015		
TP label		Whitepaper. Pulse Rate Object - Type Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	PR Numeric 2; M		
Test purpose		Check that: PHG includes Systolic Pulse Rate object, Type attribute in transcoder output. [AND] Type is set to {MDC_PART_SCADA, MDC_PULS_RATE_NON_INV}		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35)		

	i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: Not relevant x. Field: User ID • This field is not included xi. Field: Measurement 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), the simulated PHD sends the measurement to the PHG under test. 4. Check in PHG transcoder output for the Pulse rate object, Type attribute.
Pass/Fail criteria	In step 5, the Pulse rate object, Type attribute is present and its value is {MDC_PART_SCADA, MDC_PULS_RATE_NON_INV}
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Type attribute is present: ❑ Object: Pulse rate object ❑ Attribute-id: MDC_ATTR_ID_TYPE (2351) ❑ Attribute-type: SEQUENCE {partition (INT-U16), code (INT-U16)} ❑ Attribute-value:

	• partition: MDC_PART_SCADA or 2 (dec) or 00 02 (hex) • code: MDC_PULS_RATE_NON_INV or 18474 (dec) or 48 2A (hex) b) WAN PCD-01 message PCD-01 message includes a segment like this with a Type attribute value (check OBX-3): OBX|?|NM|49546^MDC_PULS_RATE_NON_INV^MDC|1.0.0.a| 10|264864^MDC_DIM_BEAT_PER_MIN^MDC||||R|||[current_date_time]

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-016		
TP label		Whitepaper. Pulse Rate Object - Metric-Spec-Small Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	PR Numeric 3; M		
Test purpose		Check that: PHG includes Pulse Rate object, Metric-Spec-Small attribute in transcoder output. [AND] Metric-Spec-Small is set to {0xF040} (mss-avail-intermittent | mss-avail-stored-data | mss-upd-aperiodic | mss-msmt-aperiodic | mss-acc-agent-initiated).		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa)		

	• This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: Not relevant x. Field: User ID • This field is not included xi. Field: Measurement 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), the simulated PHD sends the measurement to the PHG under test. 5. Check in PHG transcoder output for the Pulse rate object, Metric-Spec-Small attribute.
Pass/Fail criteria	In step 4, the Pulse rate object, Metric-Spec-Small attribute is present and its value is {0xF040} (mss-avail-intermittent | mss-avail-stored-data | mss-upd-aperiodic | mss-msmt-aperiodic | mss-acc-agent-initiated).
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Metric-Spec-Small attribute is present: ❑ Object: Pulse rate object ❑ Attribute-id: MDC_ATTR_METRIC_SPEC_SMALL (2630) ❑ Attribute-type: BITS-16 ❑ Attribute-value: F0 40 (hex) or BITS mss-avail-intermittent(0), mss-avail-stored-data(1), mss-upd-aperiodic(2), 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 a Metric-Spec-Small attribute value.

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-017		
TP label		Whitepaper. Pulse Rate Object - Unit-Code Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	PR Numeric 4; M		
Test purpose		Check that: PHG includes Pulse Rate object, Unit-Code attribute in transcoder output. [AND] IF Blood Pressure Measurement – Pulse Rate field of Blood Pressure Measurement characteristic is present THEN Pulse Rate object, Unit-Code attribute is set to MDC_DIM_BEAT_PER_MIN		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable).		

	2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp field and Pulse Rate field are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: 110.0 x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check in PHG transcoder output for the Pulse rate object, Unit-Code attribute.
Pass/Fail criteria	In step 5, the Pulse rate object, Unit-Code attribute is present and its value is MDC_DIM_BEAT_PER_MIN.
Notes	In step 5, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Unit-Code attribute is present:

	❑ Object: Pulse rate 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|?|NM|149546^ MDC_PULS_RATE_NON_INV ^MDC|1.0.0.a| 10|264864^MDC_DIM_BEAT_PER_MIN^MDC||||R|||[current_date_time]

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-018		
TP label		Whitepaper. Pulse Rate Object - Absolute-Time-Stamp Attribute		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	PR Numeric 6; M	Date-Time Conv 2; M	Date-Time Conv 3; M
		Date-Time Conv 4; M	Date-Time Conv 5; M	
Test purpose		Check that: PHG transcodes Time Stamp field of Blood Pressure Measurement characteristic into Pulse Rate 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_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure		

	(mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: August 2nd, 2012, 10:39:27 ix. Field: Pulse Rate • Format: SFLOAT • Value: 110.0 x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check in PHG transcoder output for the SystolicPulse rate object, Absolute-Time-Stamp attribute.
Pass/Fail criteria	In step 5, the Pulse rate object, Absolute-Time-Stamp attribute is present, its value matches with the Time Stamp field of the Blood pressure measurement characteristic and the fraction of seconds is set to 0.
Notes	Possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes Absolute-Time-Stamp attribute is present: ❑ Object: Pulse rate 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: 12 (hex) or 18 (dec) • month: 08 (hex) or 8 (dec) • day: 02 (hex) or 2 (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|?|NM|149546^MDC_PULS_RATE_NON_INV^MDC|1.0.0.a| 10|264864^MDC_DIM_BEAT_PER_MIN^MDC||||R|||20120802103927+0000

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-019		
TP label		Whitepaper. Pulse Rate Object - Basic-Nu-Observed-Value Attribute 1		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	PR Numeric 7; M	Short Float Type 1; C	
Test purpose		Check that: PHG transcodes Blood Pressure Measurement – Heart Rate field of Blood Pressure Measurement characteristic into Pulse Rate Object - Simple-Nu-Observed-Value attribute		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood Pressure Measurment (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant		

	ix. Field: Pulse Rate • Format: SFLOAT • Value: 110.0 x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check the output of the PHG transcoder for the Pulse rate object, Basic-Nu-Observed-Value attribute.
Pass/Fail criteria	In step 5, the Heart rate object, Basic-Nu-Observed-Value attribute is present and its value matches with the Blood Pressure Measurement – Heart Rate Value (bpm) field of the Blood pressure measurement characteristic (110).
Notes	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: Pulse rate object ❑ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636) ❑ Attribute-type: SFLOAT ❑ Attribute-value: F4 4C (hex) or 00 6E (hex) or 01 0B (hex) or 110 (dec) b) WAN PCD-01 message PCD-01 message includes a segment like this with a Basic-Nu-Observed-Value attribute value (check OBX-5): OBX|?|NM|149546^MDC_PULS_RATE_NON_INV^MDC|1.0.0.a|10|264864^MDC_DIM_BEAT_PER_MIN^MDC||||R|||[current_date_time]

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-020		
TP label		Whitepaper. Pulse Rate Object - Basic-Nu-Observed-Value Attribute 2		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	PR Numeric 7; M	Short Float Type 1; C	Short Float Type 2; M
Test purpose		Check that: PHG transcodes Blood Pressure Measurement- Heart rate field of Blood Pressure Measurement characteristic into Heart Rate Object - Basic-Nu-Observed-Value attribute [AND] PHG assigns the following special values: NaN (0x07FF), NRes (0x0800), +INFINITY (0x07FE) and -INFINITY (0x0802)		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value:		

	a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: 110.0 x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check in PHG transcoder output for the Pulse rate object, Basic-Nu-Observed-Value attribute. 6. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant

	iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: 07 FF (hex). Special value: NaN x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 7. Check in PHG transcoder output for the Pulse rate object, Basic-Nu-Observed-Value attribute. 8. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included

vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa)
- This field is not included

vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa)
- This field is not included

viii. Field: Time Stamp
- Format: Date and Time
- Value: Not relevant

ix. Field: Pulse Rate
- Format: SFLOAT
- Value: 08 00 (hex). Special value: NRes

x. Field: User ID
- This field is not included

xi. Field: Measurement Status
- This field is not included

9. Check in PHG transcoder output for the Pulse rate object, Basic-Nu-Observed-Value attribute.

10. The simulated PHD sends the measurement to the PHG under test with the following value:

a. Blood pressure measurement (0x2A35)

i. Field: Flags
- Format: 8 bit
- Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included

ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg)
- Format: SFLOAT
- Value: Not relevant

iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg)
- Format: SFLOAT
- Value: Not relevant

iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg)
- Format: SFLOAT
- Value: Not relevant

v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa)
- This field is not included

vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa)
- This field is not included

vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa)
- This field is not included

viii. Field: Time Stamp
- Format: Date and Time
- Value: Not relevant

ix. Field: Pulse Rate

	• Format: SFLOAT • Value: 07 FE (hex). Special value: +INFINITY x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 11. Check in PHG transcoder output for the Pulse rate object, Basic-Nu-Observed-Value attribute. 12. The simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: 08 02 (hex). Special value: -INFINITY x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 13. Check in PHG transcoder output for the Pulse rate object, Basic-Nu-Observed-Value attribute.
Pass/Fail criteria	In step 5, the Pulse rate object, Basic-Nu-Observed-Value attribute is present and its value is

	110. In step 7, the Pulse rate object, Basic-Nu-Observed-Value attribute is present and its value is 0x07FF. In step 9, the Pulse rate object, Basic -Nu-Observed-Value attribute is present and its value is 0x0800. In step 11, the Pulse rate object, Basic -Nu-Observed-Value attribute is present and its value is 0x07FE. In step 13, the Pulse rate object, Basic -Nu-Observed-Value attribute is present and its value is 0x0802.
Notes	In step 5, 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: Pulse rate object ❑ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636) ❑ Attribute-type: SFLOAT ❑ Attribute-value: F4 4C (hex) or 00 6E (hex) or 01 0B (hex) or 110 (dec) b) WAN PCD-01 message PCD-01 message includes a segment like this with a Simple-Nu-Observed-Value attribute value (check OBX-5): OBX|?|NM|149546^MDC_PULS_RATE_NON_INV^MDC|1.0.0.a|10| 264864^MDC_DIM_BEAT_PER_MIN^MDC||||R|||[current_date_time] In step 7, 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: Pulse rate 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 does not include segments with a Simple-Nu-Observed-Value attribute value (149546^ MDC_PULS_RATE_NON_INV ^MDC) because it has a special value and these values are not included in the PCD-01 message. In step 9, 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: Pulse rate object ❑ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636) ❑ Attribute-type: SFLOAT ❑ Attribute-value: 08 00 (hex) or NRes (note that a decimal value is not allowed) b) WAN PCD-01 message PCD-01 message does not include segments with a Simple-Nu-Observed-Value attribute value (149546^MDC_PULS_RATE_NON_INV^MDC) because it has a special value and these values are not included in the PCD-01 message. In step 11, 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: Pulse rate object ❑ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636)

	❑ Attribute-type: SFLOAT ❑ Attribute-value: 07 FF (hex) or +INFINITY (note that a decimal value is not allowed) b) WAN PCD-01 message PCD-01 message does not include segments with a Simple-Nu-Observed-Value attribute value (149546^MDC_PULS_RATE_NON_INV^MDC) because it has a special value and these values are not included in the PCD-01 message. In step 13, 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: Pulse rate object ❑ Attribute-id: MDC_ATTR_NU_VAL_OBS_BASIC (2636) ❑ Attribute-type: SFLOAT ❑ Attribute-value: 08 02 (hex) or -INFINITY (note that a decimal value is not allowed) b) WAN PCD-01 message PCD-01 message does not include segments with a Simple-Nu-Observed-Value attribute value (149546^MDC_PULS_RATE_NON_INV^MDC) because it has a special value and these values are not included in the PCD-01 message.

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-021		
TP label		Whitepaper. Pulse Rate measurement value		
Coverage	**Spec**	[b-Bluetooth PHDT v1.3]		
	Testable items	Short Float Type 1; C	Date-Time Conv 1; M	PR Numeric 6; M
		PR Numeric 7; M		
Test purpose		Check that: PHG processes correctly the Pulse Rate Value (bpm) and Time Stamp fields of Blood Pressure Measurement		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood pressure profile (device specialization); it has a measurement ready to be sent and it is in the Advertising state (it is discoverable). 2. The simulated PHD implements several BLE characteristics. The characteristic of interest for this test case is: a. Blood pressure measurement (0x2A35) 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), the simulated PHD sends the measurement to the PHG under test with the following value: a. Blood pressure measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0000 0110 (MSB → LSB). Blood pressure measurement value in units of mmHg, Time Stamp and Pulse Rate fields are included, User ID and measurement Status fields are not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg)		

	• Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: August 2nd, 2012, 10:39:27 ix. Field: Pulse Rate • Format: SFLOAT • Value: 110.0 x. Field: User ID • This field is not included xi. Field: Measurement Status • This field is not included 5. Check that the PHG accepts the measurement and decodes its value properly (pulse rate measurement value, pulse rate units and time stamp.
Pass/Fail criteria	In step 5, the PHG under test shows the following measurement Pulse Rate = 110 beats per minute (bpm) with the time stamp '2012-08-02 10:39:27'.
Notes	

TP Id		TP/LP-PAN/PHG/PHDTW/BPM/BV-022		
TP label		Whitepaper. Systolic/Diastolic/Map Numeric object, Measurement-Status Attribute		
Coverage	**Spec**	[Bluetooth PHDT v1.5]		
	Testable items	BP Numeric 11; M		
Test purpose		Check that: PHG transcodes Blood Pressure Measurement – Measurement Status field of Blood Pressure Measurement characteristic into Systolic/Diastolic/Map Numeric object, Measurement-Status attribute		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003		
Other PICS				
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 Blood Pressure Profile (device specialization), it has a measurement 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. Blood Pressure Feature (0x2A49) b. Blood Pressure Measurement (0x2A35) 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) the simulated PHD sends the Measurement to the PHG under test with the following value: a. Blood Pressure Feature (0x2A49) • Format: 16 bit • Value: 0000 0000 0000 0000 (MSB → LSB). b. Blood Pressure Measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0001 0010 (MSB → LSB). Blood Pressure Measurement Value in units of mmHg, Time Stamp and Measurement Status fields are included, Pulse Rate and User ID fields are not included. ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included. x. Field: User ID • This field is not included xi. Field: Measurement Status • Format: 16 bit • Value: 0000 0000 0000 0000 5. Check in the PHG transcoder output the Systolic/Diastolic/Map Numeric object, Measurement-Status attribute

	6. The simulated PHD sends a Measurement to the PHG under test with the following value: a. Blood Pressure Feature (0x2A49) • Format: 16 bit • Value: 0000 0000 0000 0100 (MSB → LSB). Irregular Pulse Detection supported. b. Blood Pressure Measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0001 0010 (MSB → LSB). Blood Pressure Measurement Value in units of mmHg, Time Stamp and Measurement Status fields are included, Pulse Rate and User ID fields are not included. ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • This field is not included. x. Field: User ID • This field is not included xi. Field: Measurement Status • Format: 16 bit • Value: 0000 0000 0000 0100 7. Check in the PHG transcoder output the Systolic/Diastolic/Map Numeric object, Measurement-Status attribute
Pass/Fail criteria	In Step 5, the Systolic/Diastolic/Map object, Measurement-Status attribute is not present. In Step 7, the Systolic/Diastolic/Map object, Measurement-Status attribute is present and set to "questionable" (0x4000).
Notes	In Step 7, possible values in typical points of observation after transcoder output are: a) IEEE 11073 Objects and Attributes

	Measurement-Status attribute is present: ❑ Object: Systolic/Diastolic/Map Object ❑ Attribute-id: MDC_ATTR_MSMT_STAT (2375) ❑ Attribute-type: BITS16 ❑ Attribute-value: 40 00 (hex) 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/BPM/BV-023		
TP label		Whitepaper. Pulse Rate object, Measurement-Status Attribute		
Coverage	**Spec**	[Bluetooth PHDT v1.5]		
	Testable items	PR Numeric 8; M		
Test purpose		Check that: PHG transcodes Blood Pressure Measurement – Measurement Status field of Blood Pressure Measurement characteristic into Pulse Rate object, Measurement-Status attribute		
Applicability		C_MAN_BLE_000 AND C_MAN_BLE_002 AND C_MAN_BLE_003 AND C_MAN_BLE_005		
Other PICS				
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 Blood Pressure Profile (device specialization), it has a measurement ready to be sent and it is in Advertising state (it is discoverable). 2. The simulated PHD implements several BTLE characteristics. The characteristics of interest for this Test Case are: a. Blood Pressure Feature (0x2A49) b. Blood Pressure Measurment (0x2A35) 3. The PHG under test initiates a discovery process (Scanning state), it discovers the Simulated PHD and it starts a pairing process with simulated PHD (Initiating state). 4. When the pairing has been completed (Connection state) the simulated PHD sends the Measurement to the PHG under test with the following value: a. Blood Pressure Feature (0x2A49) • Format: 16 bit • Value: 0000 0000 0000 0000 (MSB → LSB). b. Blood Pressure Measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0001 0110 (MSB → LSB). Blood Pressure Measurement Value in units of mmHg, Time Stamp, Pulse Rate and Measurement Status fields are included, User ID field is not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT		

	• Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa) • This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: 110.0 x. Field: User ID • This field is not included xi. Field: Measurement Status • Format: 16 bit • Value: 0000 0000 0000 0000 5. Check in the PHG transcoder output the Pulse Rate object, Measurement-Status attribute 6. The simulated PHD sends a Measurement to the PHG under test with the following value: a. Blood Pressure Feature (0x2A49) • Format: 16 bit • Value: 0000 0000 0000 0100 (MSB → LSB). Irregular Pulse Detection supported. b. Blood Pressure Measurement (0x2A35) i. Field: Flags • Format: 8 bit • Value: 0001 0110 (MSB → LSB). Blood Pressure Measurement Value in units of mmHg, Time Stamp, Pulse Rate and Measurement Status fields are included, User ID field is not included ii. Field: Blood Pressure Measurement Compound Value – Systolic (mmHg) • Format: SFLOAT • Value: Not relevant iii. Field: Blood Pressure Measurement Compound Value – Diastolic (mmHg) • Format: SFLOAT • Value: Not relevant iv. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (mmHg) • Format: SFLOAT • Value: Not relevant v. Field: Blood Pressure Measurement Compound Value – Systolic (kPa)

	• This field is not included vi. Field: Blood Pressure Measurement Compound Value – Diastolic (kPa) • This field is not included vii. Field: Blood Pressure Measurement Compound Value – Mean Arterial Pressure (kPa) • This field is not included viii. Field: Time Stamp • Format: Date and Time • Value: Not relevant ix. Field: Pulse Rate • Format: SFLOAT • Value: 110.0 x. Field: User ID • This field is not included xi. Field: Measurement Status • Format: 16 bit • Value: 0000 0000 0000 0100 7. Check in the PHG transcoder output the Pulse Rate object, Measurement-Status attribute
Pass/Fail criteria	In Step 5, the Pulse Rate object, Measurement-Status attribute is not present. In Step 7, the Pulse Rate object, Measurement-Status attribute is present and set to "questionable" (0x4000).
Notes	In Step 7, 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 Object ❑ Attribute-id: MDC_ATTR_MSMT_STAT (2375) ❑ Attribute-type: BITS16 ❑ Attribute-value: 40 00 (hex) b) WAN PCD-01 message PCD-01 message does not include segments with Metric-Spec-Small attribute value.

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