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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

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

Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5D: Blood pressure monitor

Recommendation ITU-T H.845.4

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Recommendation ITU-T H.845.4

Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5D: Blood pressure monitor

Summary

Recommendation ITU-T H.845.4 provides a test suite structure (TSS) and the test purposes (TP) for blood pressure monitors in the Personal Health Devices (PHD) interface, based on the requirements defined in the Recommendations of the ITU-T H.810 sub-series, 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.845.4 is a transposition of Continua Test Tool DG2016, Test Suite Structure & Test Purposes, Personal Health Devices Interface; Part 5D: Device Specializations. Personal Health Device (Blood Pressure Monitor) (Version 1.7, 2016-09-20), that was developed by the Personal Connected Health Alliance. A number of versions of this specification existed before transposition.

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

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.845.4	2015-01-13	16	11.1002/1000/12265
2.0	ITU-T H.845.4	2016-07-14	16	11.1002/1000/12941
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Keywords

Conformance testing, Continua Design Guidelines, e-health, ITU-T H.810, Personal Health Devices interface, personal area network, personal connected health devices, touch area network, IEEE 11073 device specialization, blood pressure monitor.

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

FOREWORD

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

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

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

NOTE

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

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

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

Introduction

This Recommendation is a transposition of Continua Test Tool DG2016, Test Suite Structure & Test Purposes, Personal Health Devices Interface; Part 5D: Device Specializations. Personal Health Device (Blood Pressure Monitor) (Version 1.7, 2016-09-20), that was developed by the Personal Connected Health Alliance. The table below shows the revision history of this test specification; it may contain versions that existed before transposition.

Version	Date	Revision history
1.2	2012-10-05	Initial release for Test Tool DG2011. This is the same version as "TSS&TP_1.5_PAN-LAN_PART_5D_v1.2.doc" because new features included in [b-CDG 2011] do not affect the test procedures specified in this document.
1.3	2013-05-24	Initial release for Test Tool DG2012. This uses "TSS&TP_DG2011_PAN-LAN_PART_5D_v1.2.doc" as a baseline and adds new features included in [b-CDG 2012]: • max APDU size for GM, BCA and ECG
1.4	2014-01-24	Initial release for Test Tool DG2013. This uses "TSS&TP_DG2012_ PAN-LAN_PART_5D_v1.3.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
1.5	2014-04-24	TM Lite & Doc Enhancements (Test Tool v4.0 Maintenance Release 1). It uses "TSS&TP_DG2013_PLT_PART_5D_v1.4.doc" as a baseline and adds new features included in Documentation Enhancements: • Other PICS" row added
1.6	2015-07-01	Initial release for Test Tool DG2015. It uses "TSS&TP_DG2013_PLT_ PART_5D_v1.5.doc" as a baseline and adds new features included in [b-ITU-T H.810 (2015)]/[b-CDG 2015]
1.7	2016-09-20	Initial release for Test Tool DG2016. It uses "TSS&TP_DG2015_PLT_ PART_5D_v1.6.doc" as baseline and it adds new features included in [ITU-T H.810 (2016)]/[b-CDG 2016]

Recommendation ITU-T H.845.4

Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5D: Blood pressure monitor

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 5, subpart 5D.

– 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
– 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

[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 10: Personal Health Devices Transcoding Whitepaper. Personal Health Gateway

2 References

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

[ITU-T H.810 (2016)] Recommendation ITU-T H.810 (2016), *Interoperability design guidelines for personal health systems*.

[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

[ISO/IEEE 11073-10407] ISO/IEEE 11073-10407-2010, *Health informatics – Personal health device communication – Device specialization – Blood pressure monitor*.
https://www.iso.org/standard/54573.html

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

MDS Medical Device System

NaN Not a Number

NFC Near Field Communication

PAN Personal Area Network

PCT Protocol Conformance Testing

PCO Point of Control and Observation

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

SABTE Sleep Apnoea Breathing Therapy Equipment

SCR Static Conformance Review

SDP Service Discovery Protocol

SOAP Simple Object Access Protocol

TCRL Test Case Reference List

TCWG Test and Certification Working Group

TP Test Purpose

TSS Test Suite Structure

USB Universal Serial Bus

WDM Windows Driver Model

5 Conventions

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

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

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

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

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

– MAY is equivalent to 'is permitted'.

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

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

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 H.810 is split into eight parts in the H.810-series.	–
2015	–	5.0	Release 2015 of the CDG including maintenance updates of the CDG 2013 and additional guidelines that cover new functionalities.	Genome
2013 plus errata	[b-ITU-T H.810 (2013)]	4.1	Release 2013 plus errata noting all ratified bugs [b-CDG 2013].	–
2013	–	4.0	Release 2013 of the CDG including maintenance updates of the CDG 2012 and additional guidelines that cover new functionalities.	Endorphin
2012 plus errata	–	3.1	Release 2012 plus errata noting all ratified bugs [b-CDG 2012].	–
2012	–	3.0	Release 2012 of the CDG including maintenance updates of the CDG 2011 and additional guidelines that cover new functionalities.	Catalyst
2011 plus errata	–	2.1	CDG 2011 integrated with identified errata.	–
2011	–	2.0	Release 2011 of the CDG including 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 (TSS)

The test purposes (TPs) for the Personal Health Devices interface have been divided into the main subgroups specified below. Annex A describes the TPs for subgroup 1.3.4 (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)
  - Subgroup 2.4.1: Whitepaper general requirements (GEN)
  - Subgroup 2.4.2: Whitepaper thermometer requirements (TH)
  - Subgroup 2.4.3: Whitepaper blood pressure measurement 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 the 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 1.3.4: Blood pressure monitor (BPM)

<table>
<tr><td colspan="2">TP Id</td><td colspan="3">TP/PLT/PHD/CLASS/BPM/BV-000</td></tr>
<tr><td colspan="2">TP label</td><td colspan="3">Get MDS Object: Mandatory, Conditional and Optional Attributes1</td></tr>
<tr><td rowspan="4">Coverage</td><td>Spec</td><td colspan="3">[ISO/IEEE 11073-10407]</td></tr>
<tr><td rowspan="3">Testable items</td><td>MDSBPAttr 1; M</td><td>MDSBPAttr 2; M</td><td>MDSBPAttr 3; M</td></tr>
<tr><td>MDSBPAttr 4; M</td><td>MDSBPAttr 5; R</td><td>MDSBPAttr 6; R</td></tr>
<tr><td>MDSBPAttr 7; R</td><td>BldExt 2; M</td><td></td></tr>
<tr><td colspan="2">Test purpose</td><td colspan="3">Check that:
The Personal Health Device (PHD) supports a Get command that requests all attributes
[AND]
The MDS Object contains the attributes specified for a Blood Pressure Monitor PHD.</td></tr>
<tr><td colspan="2">Applicability</td><td colspan="3">C_AG_OXP_000 AND C_AG_OXP_177</td></tr>
<tr><td colspan="2">Other PICS</td><td colspan="3">C_AG_OXP_181</td></tr>
<tr><td colspan="2">Initial condition</td><td colspan="3">The simulated Personal Health Gateway (PHG) and the PHD under test are in the Operating state.</td></tr>
<tr><td colspan="2">Test procedure</td><td colspan="3">1. The simulated PHG issues "roiv-cmip-get" command with the handle set to 0 (to request the MDS object) and the attribute-id-list set to 0 to indicate all attributes.
2. The PHD responds with a "rors-cmip-get" service message in which the attribute-list contains a list of all implemented attributes of the MDS object:
MDS Attributes:
a Mandatory attribute Dev-Configuration-Id
❑ IF NOT C_AG_OXP_181 then attribute-value = 0x02BC (700)
❑ IF C_AG_OXP_181 then attribute-value = < between 0x4000 and 0x7FFF >
b Attribute System-Type not present
c Mandatory attribute System-Type-Spec-List
❑ attribute-id = MDC_ATTR_SYS_TYPE_SPEC_LIST
❑ attribute-type = TypeVerList
❑ attribute-value.length = 4 bytes for each specialization supported
❑ attribute-value = {MDC_DEV_SPEC_PROFILE_BP , 1} must be found on the list
d Mandatory attribute System-model
❑ attribute-id = MDC_ATTR_ID_MODEL (0x09 0x28)
❑ attribute-type = SystemModel
❑ attribute-value.length = <Variable>
❑ attribute-value ={Manufacturer, Model}
e IF Recommended Power-Status attribute is present:
❑ attribute-id = MDC_ATTR_POWER_STAT
❑ attribute-type = PowerStatus</td></tr>
</table>

	❑ attribute-value.length = 2 bytes ❑ attribute-value = ON_MAINS (0x8000) or ON_BATTERY(0x4000), but both bits cannot be active at the same time Only one of the following may be active: • chargingFull(8), • chargingTrickle(9), • chargingOff(10), • The rest of the bits must not be set. f IF Recommended Battery-Level attribute is present ❑ attribute-id = MDC_ATTR_VAL_BATT_CHARGE ❑ attribute-type = INT-U16 ❑ attribute-value.length = 2 bytes ❑ attribute-value = <value between 0 and 100> If value >100, the meaning of the value is "undefined" g IF Recommended Remaining-Battery-Time attribute is present: ❑ attribute-id = MDC_ATTR_TIME_BATT_REMAIN ❑ attribute-type = BatMeasure ❑ attribute-value.length = 6 bytes ❑ attribute-value = <4 bytes to define the value. 2 remaining bytes to define the units, which shall be set to one of: MDC_DIM_MIN (0x08 0xA0), MDC_DIM_HR (0x08 0xC0), MDC_DIM_DAY (0x08 0xE0)>.
Pass/Fail criteria	All checked values are as specified in the test procedure.
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-003		
TP label		Systolic, Diastolic, MAP Object for Standard Configuration		
Coverage	**Spec**	[ISO/IEEE 11073-10407]		
	Testable items	SystDiast 3; M	SystDiast 5; M	SystDiast 7; R
		SystDiast 9; M	SystDiast 11; M	SystDiast 15; R
		SystDiast 17; M	SystDiast 19; R	SystDiast 21; M
		SystDiast 23; M	SystDiast 25; R	SystDiast 31; C
		SystDiast 37; R	SystDiast 39; R	SystDiast 41; R
		SystDiast 43; R	SystDiast 45; C	SystDiast 47; R
		SystDiast 49; R	SystDiast 51; R	SystDiast 54; M
		SystDiast 1; M		
Test purpose		Check that: Systolic, Diastolic, MAP Object contains the attributes specified for Standard Configuration		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177 AND (NOT C_AG_OXP_181)		
Other PICS				

Initial condition	The simulated PHG and the PHD under test have been associated, but the PHD configuration is unknown to the simulated PHG, so the PHD and the simulated PHG will be in the Configuring state.
Test procedure	1. The simulated PHG receives an association request from the PHD under test. 2. The simulated PHG responds with a result = accepted-unknown-config. 3. The PHD responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the PHG. 4. Check that the field Dev-Config-Id is set to 0x02BC (700). If it is not the PHG responds with a "unsupported-config" and waits for a new configuration. Repeat this step until a Dev-config-Id equal to 0x02BC is received. 5. Wait until the PHD under test has sent a standard configuration. 6. The Systolic, Diastolic, Mean Arterial Pressure object must be defined in the configuration event report and its attributes must be: a. Mandatory attribute Handle ❑ attribute-id = MDC_ATTR_ID_HANDLE ❑ attribute-type = HANDLE ❑ attribute-value = 1 b. Mandatory attribute Type ❑ attribute-id = MDC_ATTR_ID_TYPE ❑ attribute-type = TYPE ❑ attribute-value = 0x00 0x02(MDC_PART_SCADA) , 0x4A 0x04 (MDC_PRESS_BLD_NONINV 18948) c. Mandatory attribute Metric-Spec-Small ❑ attribute-id = MDC_ATTR_METRIC_SPEC_SMALL ❑ attribute-type = MetricSpecSmall (BITS-16) ❑ attribute-value ≠ 0x00 0x00 • Bit 0 (mss-avail-intermittentt(0)) must be set. • Bit 1 (mss-avail-stored-data(1)) must be set. • Bit 2 (mss-upd-aperiodic(2)) must be set. • Bit 3 (mss-msmt-aperiodic(3)) must be set. • Bit 9 (mss-acc-agent-initiated(9)) must be set. • Bits 6, 7, 10, 11 and 15 must not be set d. Mandatory attribute Metric-Structure-Small ❑ attribute-id = MDC_ATTR_METRIC_STRUCTURE_SMALL ❑ attribute-type = MetricStructureSmall ❑ attribute-value.length = 2 bytes ❑ attribute-value = • ms-struct = ms-struct-compound-fix (0x03) • ms-compound-no = 3 e. Mandatory attribute Attribute-Value-Map ❑ attribute-id = MDC_ATTR_ATRIBUTE_VAL_MAP ❑ attribute-type = AttrValMap (sequence of attribute-id(OID-Type) ❑ attribute-length= 12 bytes ❑ attribute-value map.length = 8 bytes ❑ attribute-value = 0x0A 0x4C 0x00 0x02 (MDC_ATTR_NU_CMPD_VAL_OBS_BASIC, 10 MDC_ATTR_TIME_STAMP_ABS, 8)

	❑ attribute-id is the identifier for the attribute that are to be reported in fixed format (that are "described" in Attribute-Value-Map) and the length is the length for this attribute, for example: MDC_ATTR_TIME_STAMP_ABS (AbsoluteTime data type)will be composed by 8 fields INT-U8 , this length is 8 bytes(0x00 0x08). f. Mandatory attribute Metric-Id-List ❑ attribute-id = MDC_ATTR_ID_PHYSIO_LIS ❑ attribute-type = MetricIdList ❑ attribute-value.length= <variable>SEQUENCE OF OID-Type (INT-U16) ❑ attribute-value = MDC_PRESS_BLD_NONINV_SYS, MDC_PRESS_BLD_NONINV_DIA, then MDC_PRESS_BLD_NONINV_MEAN. The [Metric-Id-List] attribute shall be used if a compound observed value is used, which does not incorporate the Metric-Id directly. The order of the Metric-Id-List shall correspond to the order of the elements in the compound observed value. g. Mandatory attribute Unit-Code ❑ attribute-id = MDC_ATTR_UNIT_CODE ❑ attribute-type = OID-Type(INT-U16) ❑ attribute-value.length = 2 bytes ❑ attribute-value = MDC_DIM_MMHG h. Conditional attribute Absolute-Time-Stamp ❑ attribute-id = MDC_ATTR_TIME_STAMP_ABS ❑ attribute-type = AbsoluteTime ❑ attribute-value.length = 8 bytes ❑ If the standard configuration is not adjusted and the fixed format is used → This attribute is Mandatory. 7. Check that no other attributes are present in the initial configuration.
Pass/Fail criteria	All checked values are as specified in the test procedure.
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-003_A		
TP label		Systolic, Diastolic, MAP Object format for Standard Configuration		
Coverage	**Spec**	[ISO/IEEE 11073-10407]		
	Testable items	SystDiast 53; M		
Test purpose		Check that: Systolic, Diastolic, MAP measurement values are in the right order in event report		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177 AND (NOT C_AG_OXP_181) AND C_AG_OXP_182		
Other PICS		C_AG_OXP_009, C_AG_OXP_014, C_AG_OXP_293		
Initial condition		The simulated PHG and the PHD under test are in the Unassociated state.		
Test procedure		1. The simulated PHG receives an association request from the PHD under test. 2. The simulated PHG responds with a result = accepted-unknown-config. 3. The PHD responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the PHG.		

	4. Check that the field Dev-Config-Id is set to 0x02BC (700), if it is not, PHG responds with a "unsupported-config" and waits for a new configuration. 5. Once the PHD under test has sent a standard configuration and the simulated PHG has sent a "roiv-cmip-get" to get all the attributes of the MDS, record the value of Date-and-Time. 6. IF C_AG_OXP_293 AND the mds-time-mgr-set-time bit is set: a. The PHG moves to Configuring/Sending Set Time substate and: ❑ IF C_AG_OXP_009 it issues the Set-Time action command. ❑ IF C_AG_OXP_014 it issues the Set-Base-Offset-Time action command. b. Once its internal time setting operation is completed, the PHD responds to the PHG. 7. Once the PHD under test is in the Operating state, take a measurement and record the value of the measurement. 8. Wait until the PHD under test sends an Event Report to the simulated PHG, the relevant fields are: a. event-type = MDC_NOTI_SCAN_REPORT_FIXED b. ScanReportInfoFixed ❑ obj-handle = 1 ❑ Cmpound Object Count = 3 ❑ obs-val-data.value = • Systolic (2 bytes) • Dyastolic (2 bytes) • MAP (2 bytes) • Time Stamp (8 bytes).
Pass/Fail criteria	• The received data must be coherent with that previously recorded. • The Time Stamp must be coherent with the one received in the MDS attribute. • The data must be received in this exact order.
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-004		
TP label		Systolic, Diastolic, MAP Object for Extended Configuration		
Coverage	**Spec**	[ISO/IEEE 11073-10407]		
	Testable items	SystDiast 1; M	SystDiast 6; M	SystDiast 8; R
		SystDiast 12; R	SystDiast 14; R	SystDiast 16; R
		SystDiast 18; R	SystDiast 20; R	SystDiast 22; M
		SystDiast 26; R	SystDiast 38; R	SystDiast 52; R
Test purpose		Check that: Systolic, Diastolic, MAP Object contains the attributes specified for Extended Configuration		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177 AND C_AG_OXP_181		
Other PICS		C_AG_OXP_182		
Initial condition		The simulated PHG and the PHD under test have been associated, but the PHD configuration is unknown to the simulated PHG, so the PHD and the simulated PHG will be in the		

	Configuring state.
Test procedure	1. The simulated PHG receives an association request from the PHD under test. 2. The simulated PHG responds with a result = accepted-unknown-config. 3. The PHD responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the PHG. 4. Check that the field Dev-Config-Id is in the extended range. If it is not, the PHG responds with a "unsupported-config" and waits for a new configuration. Repeat this step until a Dev-config-Id in the extended range is received. 5. Wait until the PHD under test has sent an extended configuration. 6. The Systolic, Diastolic, Mean Arterial Pressure object must be defined in the configuration event report and its attributes must be: a. Mandatory attribute Type ❑ attribute-id = MDC_ATTR_ID_TYPE ❑ attribute-type = TYPE ❑ attribute-value=0x00 0x02(MDC_PART_SCADA) , 0x4A 0x04 (MDC_PRESS_BLD_NONINV 18948) b. Mandatory attribute Unit-Code ❑ attribute-id = MDC_ATTR_UNIT_CODE ❑ attribute-type = OID-Type ❑ attribute-value.length = INT-U16 ❑ attribute-value = MDC_DIM_MMHG OR MDC_DIM_KILO_PASCAL c. IF Not Recommended attribute Supplemental-Types ❑ attribute-id = MDC_ATTR_SUPPLEMENTAL_TYPES ❑ attribute-type = SupplementalTypeList ❑ attribute-value.length =Sequence of TYPE (TYPE.length= 4 bytes) ❑ attribute-value = <Not relevant for this test> d. IF Recommended attribute Metric-Structure-Small ❑ attribute-id = MDC_ATTR_METRIC_STRUCTURE_SMALL ❑ attribute-type = MetricStructureSmall ❑ attribute-value.length = 2 bytes ❑ attribute-value = <Not relevant for this test> e. IF Recommended attribute Measurement-Status is present ❑ attribute-id = MDC_ATTR_MSMT_STAT ❑ attribute-type = MeasurementStatus ❑ attribute-value.length = 2 bytes ❑ attribute-value = <Not relevant for this test> f. IF Not Recommended attribute Metric-Id is present ❑ attribute-id = MDC_ATTR_ID_PHYSIO ❑ attribute-type = OID-Type ❑ attribute-value.length =INT-U16 ❑ attribute-value = <Not relevant for this test> g. IF Recommended attribute Metric-Id-List is present ❑ attribute-id = MDC_ATTR_ID_PHYSIO_LIS ❑ attribute-type = MetricIdList ❑ attribute-value.length= SEQUENCE OF OID-Type (INT-U16) ❑ attribute-value = <Not relevant for this test>

	h. IF Not Recommended attribute Metric-Id-Partition is present ❑ attribute-id = MDC_ATTR_METRIC_ID_PART ❑ attribute-type = NomPartition ❑ attribute-value.length = INT-U16 ❑ attribute-value = <Not relevant for this test> i. IF Not Recommended attribute Measure-Active-Period is present ❑ attribute-id = MDC_ATTR_TIME_PD_MSMT_ACTIVE ❑ attribute-type = FLOAT-Type ❑ attribute-value.length = INT-U32 ❑ attribute-value = <Not relevant for this test> j. IF Not Recommended attribute Source-Handle-Reference ❑ attribute-id = MDC_ATTR_SOURCE_HANDLE_REF ❑ attribute-type = HANDLE ❑ attribute-value.length = INT-U16 ❑ attribute-value = <Not relevant for this test> k. IF Recommended attribute Accuracy is present ❑ attribute-id = MDC_ATTR_NU_ACCUR_MSMT ❑ attribute-type = FLOAT-Type (INT-U32) ❑ attribute-value.length = FLOAT-Type (INT-U32) ❑ attribute-value = <Not Relevant for this test>.
Pass/Fail criteria	• All checked values are as specified in the test procedure. • IF C_AG_OXP_182 THEN check that the attribute *-Nu-Obs-Value received was the one specified in the Attribute-Value-Map.
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-005		
TP label		Pulse Object for Standard Configuration		
Coverage	**Spec**	[ISO/IEEE 11073-10407]		
	Testable items	PulsRat 1; R	PulsRat 2; M	PulsRat 4; M
		PulsRat 6; R	PulsRat 8; M	PulsRat 10; R
		PulsRat 14; R	PulsRat 16; R	PulsRat 18; R
		PulsRat 20; M	PulsRat 22; M	PulsRat 24; R
		PulsRat 30; C	PulsRat 32; R	PulsRat 34; R
		PulsRat 36; R	PulsRat 42; M	PulsRat 46; R
		PulsRat 48; R	PulsRat 50; R	PulsRat 52; M
		BPConcepts 4; O		
Test purpose		Check that: Pulse Object contains the attributes specified for Standard Configuration		

Applicability	C_AG_OXP_000 AND C_AG_OXP_177 AND (NOT C_AG_OXP_181)
Other PICS	
Initial condition	The simulated PHG and the PHD under test are in the Unassociated state.
Test procedure	1. The simulated PHG receives an association request from the PHD under test. 2. The simulated PHG responds with a result = accepted-unknown-config. 3. The PHD responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the PHG. 4. Check that the field Dev-Config-Id is set to 0x02BC (700). If it is not, the PHG responds with a "unsupported-config" and waits for a new configuration. Repeat this step until a Dev-config-Id equal to 0x02BC is received. 5. Wait until the PHD under test sends a standard configuration. 6. The Pulse Object must be defined in the configuration event report, and its attributes must be: a. Mandatory attribute Handle ❑ attribute-id = MDC_ATTR_ID_HANDLE ❑ attribute-type = HANDLE ❑ attribute-value = 2 b. Mandatory attribute Type ❑ attribute-id = MDC_ATTR_ID_TYPE ❑ attribute-type = TYPE ❑ attribute-value = 0x00 0x02(MDC_PART_SCADA) , 0x48 0x2A(MDC_PULS_RATE_NON_INV 18474) c. Mandatory attribute Metric-Spec-Small (for standard and extended configuration) ❑ attribute-id = MDC_ATTR_METRIC_SPEC_SMALL ❑ attribute-type = MetricSpecSmall (BITS-16) ❑ attribute-value ≠ 0x00 0x00 • Bit 0 (mss-avail-intermittent(0)) must be set • Bit 1 (mss-avail-stored-data(1)) must be set • Bit 2 (mss-upd-aperiodic(2)) must be set • Bit 3 (mss-msmt-aperiodic(3)) must be set • Bit 9 (mss-acc-agent-initiated(9)) must be set • Bits 6, 7, 10, 11 and 15 must not be set d. Mandatory attribute Unit-Code ❑ attribute-id = MDC_ATTR_UNIT_CODE ❑ attribute-type = OID-Type(INT-U16) ❑ attribute-value.length = 2 bytes ❑ attribute-value = MDC_DIM_BEAT_PER_MIN e. Mandatory attribute Attribute-Value-Map is present ❑ attribute-id = MDC_ATTR_ATRIBUTE_VAL_MAP ❑ attribute-type = AttrValMap (sequence of attribute-id(OID-Type) and (INT-U16)) ❑ attribute-length = 12 bytes ❑ attribute-value = MDC_ATTR_NU_VAL_OBS_BASIC OR MDC_ATTR_TIME_STAMP_ABS. 7. Check that no other attributes are present.

Pass/Fail criteria	All checked values are as specified in the test procedure in order to indicate that the event report is confirmed.
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-006		
TP label		Pulse Object for Extended Configuration		
Coverage	**Spec**	[ISO/IEEE 11073-10407]		
	Testable items	PulsRat 5; M	PulsRat 7; R	PulsRat 11; R
		PulsRat 13; R	PulsRat 15; R	PulsRat 17; R
		PulsRat 19; R	PulsRat 21; M	PulsRat 25; R
		PulsRat 37; C	PulsRat 51; R	PulsRat_1; R
		BPConcepts 4; O		
Test purpose		Check that: Pulse Object contains the attributes specified for Extended Configuration		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177 AND C_AG_OXP_181 AND C_AG_BPM_003		
Other PICS				
Initial condition		The simulated PHG and the PHD under test are in the Unassociated state.		
Test procedure		1. The simulated PHG receives an association request from the PHD under test. 2. The simulated PHG responds with a result = accepted-unknown-config. 3. The PHD responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the PHG. 4. Check that the field Dev-Config-Id is in the extended range. If it is not, the PHG responds with a "unsupported-config" and waits for a new configuration. Repeat this step until a Dev-config-Id in the extended range is received. 5. Wait until the PHD under test sends an extended configuration. 6. Pulse Rate Object attributes must be: a. Mandatory attribute Type ❑ attribute-id = MDC_ATTR_ID_TYPE ❑ attribute-type = TYPE ❑ attribute-value = 0x00 0x02(MDC_PART_SCADA) , 0x48 0x2A(MDC_PULS_RATE_NON_INV 18474) b. Mandatory attribute Unit-Code ❑ attribute-id = MDC_ATTR_UNIT_CODE ❑ attribute-type = OID-Type(INT-U16) ❑ attribute-value.length = 2 bytes ❑ attribute-value = MDC_DIM_BEAT_PER_MIN c. IF Recommended attribute Measurement-Status is present ❑ attribute-id = MDC_ATTR_MSMT_STAT ❑ attribute-type = MeasurementStatus ❑ attribute-value.length = 2 bytes		

	❑ attribute-value = <Not relevant for this test> d. Not Recommended attribute Supplemental-Types ❑ attribute-id = MDC_ATTR_SPPLEMENTAL_TYPES ❑ attribute-type = SupplementalTypeList ❑ attribute-value.length = <variable>Sequence of TYPE (TYPE.length= 4 bytes) ❑ attribute-value = <Not relevant for this test> e. IF Not recommended attribute Metric-Structure-Small is present ❑ attribute-id = MDC_ATTR_METRIC_STRUCTURE_SMALL ❑ attribute-type = MetricStructureSmall ❑ attribute-length = 2 bytes ❑ attribute-value = <Not relevant for this test> f. IF Not recommended attribute Metric-Id is present ❑ attribute-id = MDC_ATTR_ID_PHYSIO ❑ attribute-type = OID-Type(INT-U16) ❑ attribute-value.length =2 bytes ❑ attribute-value = <Not relevant for this test> g. IF Not Recommended attribute Metric-Id-List is present ❑ attribute-id = MDC_ATTR_ID_PHYSIO_LIS ❑ attribute-type = MetricIdList ❑ attribute-value = <Not relevant for this test> h. IF Not recommended attribute Metric-Id-Partition is present ❑ attribute-id = MDC_ATTR_METRIC_ID_PART ❑ attribute-type = NomPartition(INT-U16) ❑ attribute-value.length = 2 bytes ❑ attribute-value = <Not relevant for this test> i. IF Not recommended attribute Source-Handle-Reference is present ❑ attribute-id = MDC_ATTR_SOURCE_HANDLE_REF ❑ attribute-type = HANDLE(INT-U16) ❑ attribute-value.length = 2 bytes ❑ attribute-value = <Not relevant for this test> j. IF Recommended attribute Accuracy is present ❑ attribute-id = MDC_ATTR_NU_ACCUR_MSMT ❑ attribute-type = FLOAT-Type (INT-U32) ❑ attribute-value.length = 4 bytes ❑ attribute-value = <Not relevant for this test>.
Pass/Fail criteria	All checked values are as specified in the test procedure in order to indicate that the event report is confirmed.
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-007
TP label		Communication Model: Association Procedure
Coverage	**Spec**	[ISO/IEEE 11073-10407]

<table>
<tr><td></td><td rowspan="5">Testable items</td><td>MDSEvents 2; M</td><td>MDSEvents 4; M</td><td>MDSEvents 5; M</td></tr>
<tr><td>AsProc 2; M</td><td>AsProc 3; M</td><td>AsProc 4; M</td></tr>
<tr><td>AsProc 5; M</td><td>AsProc 6; M</td><td>AsProc 7; M</td></tr>
<tr><td>AsProc 8; M</td><td>AsProc 9; M</td><td>AsProc 10; M</td></tr>
<tr><td>AsProc 12; M</td><td>AsProc 13; M</td><td></td></tr>
<tr><td colspan="2">Test purpose</td><td colspan="3">Check that:
The association procedure data exchange is correct</td></tr>
<tr><td colspan="2">Applicability</td><td colspan="3">C_AG_OXP_000 AND C_AG_OXP_177</td></tr>
<tr><td colspan="2">Other PICS</td><td colspan="3">C_AG_OXP_002, C_AG_OXP_017, C_AG_OXP_179</td></tr>
<tr><td colspan="2">Initial condition</td><td colspan="3">The simulated PHG and the PHD under test are in the Unassociated state.</td></tr>
<tr><td colspan="2">Test procedure</td><td colspan="3">1. The PHD sends a message to associate with the simulated PHG, the expected fields sent by that PHD are:
a. APDU Type
❑ field- type = AarqApdu
❑ field-length =2 bytes
❑ field-value =0xE2 0x00.
b. assoc-version
❑ field- type = AssociationVersion
❑ field-length =BITS-32
❑ field- value=0x80 0x00 0x00 0x00
c. data-proto-id
❑ field- type = DataProtoId(INT-U16)
❑ field-length =2 bytes
❑ field- value=0x50 0x79 (20601)
d. protocol-version
❑ field- type = Protocol Version
❑ field-length = 4 bytes
❑ field- value=0x80 0x00 0x00 0x00
e. encoding rules
❑ field- type = EncodingRules
❑ field-length = 2 bytes
❑ field- value= 0x80 0x00 , at least pulse oximeter will support MDER
f. nomenclature version
❑ field- type = NomenclatureVersion
❑ field-length = 4 bytes
❑ field- value=0x80 0x00 0x00 0x00
❑ This value indicates version1 is supported (nom-version1(0) is set)
g. functional – units
❑ field- type = FunctionalUnits
❑ field-length = 4 bytes
❑ If NOT C_AG_OXP_179 THEN: field-value = 0x00 0x00 0x00 0x00</td></tr>
</table>

	❑ If C_AG_OXP_179 THEN: field- value= 0x40 0x00 0x00 0x00 ❑ If C_AG_OXP_179 AND requires that the PHG stablish a Test Association: field-value= 0x60 0x00 0x00 0x00 h. System type ❑ field- type = SystemType ❑ field-length = 4 bytes ❑ field- value = 0x00 0x80 0x00 0x00 (sys-type-agent) i. System-Id ❑ field- type = OCTET STRING ❑ field-length = 8 bytes ❑ field- value = 0xXX 0xXX 0xXX 0xXX 0xXX 0xXX 0xXX 0xXX (octet string length = 8 |UI-64 manufacturer and device) ❑ This value will be System Id attribute of MDS Object j. dev-config-id ❑ field- type = ConfigId(INT-U16) ❑ field-length = 2 bytes ❑ field- value = • 0x02 0xBC for standard configuration • <between 0x40 0x00 and 0x7F 0xFF > for extended configuration k. data-req-mode-flags (DataReqModeCapab) ❑ field- type = DataReqModeFlags ❑ field-length = 2 bytes ❑ If the PHD supports agent-initiated measurement transfer → Bit 15 is set (data-req-supp-init-agent(15)) ❑ If the PHD supports requesting objects based on object handle →Bit 6 will be set (data-req-supp-scope-handle(6)) ❑ If the PHD supports single response →Bit 8 will be set (data-req-supp-mode-single-rsp(8)) ❑ If the PHD supports time unlimited data request →Bit 10 will be set (data-req-supp-mode-time-no-limit(10)) l. data-req-init-agent-count (DataReqModeCapab) ❑ field- type = INT-U8 ❑ field-length = 2 bytes ❑ field.value = 0x01 m. data-req-init-manager-count (DataReqModeCapab) ❑ field- type = INT-U8 ❑ field-length = 2 bytes ❑ field.value = 0x00.
Pass/Fail criteria	All checked attributes have proper values.
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-010
TP label		Not a Number (NaN)
Coverage	**Spec**	[ISO/IEEE 11073-10407]

	Testable items	SysDiast 2; M		
Test purpose		Check that: If a PHD does not measure one or more systolic, diastolic, MAP values, then the special value NaN is reported instead.		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177 AND C_AG_BPM_005		
Other PICS				
Initial condition		The simulated PHG and the PHD under test are in the Operating state.		
Test procedure		1. Take a measurement with the PHD under test without measuring any value. 2. Wait for the simulated PHG to receive the event report with the measurement.		
Pass/Fail criteria		The value of the systolic, diastolic or MAP measurements must be NaN.		
Notes				

TP Id		TP/PLT/PHD/CLASS/BPM/BV-011		
TP label		Reporting systolic and diastolic blood pressures		
Coverage	**Spec**	[ISO/IEEE 11073-10407]		
	Testable items	BPConcepts 2; M	BPConcepts 3; M	SystDiast_55; M
Test purpose		Check that: Both systolic, diastolic blood pressures and MAP are always reported together		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177		
Other PICS		C_AG_OXP_009, C_AG_OXP_014, C_AG_OXP_293		
Initial condition		The simulated PHG and the PHD under test are in the Unassociated state.		
Test procedure		1. The simulated PHG receives an association request from the PHD under test. 2. The simulated PHG responds with a result = accepted-unknown-config. 3. The PHD responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the PHG. Record ConfigObject for every Sys/Dias/MAP object. 4. IF C_AG_OXP_293: a. Once in Configuring/Sending GetMDS substate simulated PHG issues roiv-cmip-get command with handle set to 0 (to request for MDS object) and attribute-id-list set to 0 to indicate all attributes. b. The PHD responds with a rors-cmip-get service message in which the attribute-list contains a list of all implemented attributes of the MDS object. c. IF the mds-time-mgr-set-time bit is set: ❑ The PHG moves to Configuring/Sending Set Time substate and: • IF C_AG_OXP_009 it issues the Set-Time action command. • IF C_AG_OXP_014 it issues the Set-Base-Offset-Time action command. ❑ Once its internal time setting operation is completed, the PHD responds to the PHG.		

	5. Take some measurements with the PHD under test. 6. Wait for the PHG to receive the event reports of the measurements.
Pass/Fail criteria	The values of the systolic, diastolic and mean arterial pressure must be sent always in the same object in the event report, and using the same units.
Notes	http://continua.plugfests.com/show_bug.cgi?id=62

TP Id		TP/PLT/PHD/CLASS/BPM/BV-012		
TP label		MDS Configuration objects events for Blood Pressure Monitor PHD.		
Coverage	**Spec**	[ISO/IEEE 11073-10407]		
	Testable items	MDSEvents 7; M		
Test purpose		Check that: A Blood Pressure Monitor sends the MDS-Configuration-Event using a Confirmed event report and the MDS-Configuration-Event includes the event-info ConfigReport		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177		
Other PICS		C_AG_OXP_010, C_AG_OXP_181, C_AG_BPM_003		
Initial condition		The simulated PHG and the PHD under test are in the Unassociated state.		
Test procedure		1. The simulated PHG receives an association request from the PHD under test. 2. The simulated PHG responds with a result = accepted-unknown-config. 3. The PHD responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the PHG. 4. Check ConfigObject (ConfigReport → ConfigObjectList (ConfigObject)). ❑ IF C_AG_BPM_003 THEN Pulse Object numeric Object is present, ELSE it is not present.		
Pass/Fail criteria		The configuration event report must be confirmed.		
Notes				

TP Id		TP/PLT/PHD/CLASS/BPM/BV-013		
TP label		MDS objects events for Blood Pressure PHD		
Coverage	**Spec**	[ISO/IEEE 11073-10407]		
	Testable items	MDSEvents 9; M	MDSEvents 10; M	MDSEvents 11; M
		MDSEvents 12; M	MDSEvents 13; M	MDSEvents 14; M
		MDSEvents 15; M	MDSEvents 16; M	BldServ_2; M
Test purpose		Check that: Agent-initiated mode is supported for measurement data transmission and all types of event reports are used in confirmed mode [AND] The PHD sends the MDS-Dynamic-Data-Update-Fixed using a confirmed event report and it includes the event-info ScanReportInfoFixed		

	[OR] The PHD sends the MDS-Dynamic-Data-Update-Var using a confirmed event report and it includes the event-info ScanReportInfoVar [OR] The PHD sends the MDS-Dynamic-Data-Update-MP-Fixed using a confirmed event report and it includes the event-info ScanReportInfoMPFixed [OR] The PHD sends the MDS-Dynamic-Data-Update-MP-Var using a confirmed event report and it includes the event-info ScanReportInfoMPVar
Applicability	C_AG_OXP_000 AND C_AG_OXP_177 AND (C_AG_OXP_182 OR C_AG_OXP_183 OR C_AG_OXP_184 OR C_AG_OXP_189)
Other PICS	
Initial condition	The simulated PHG and the PHD under test are in the Operating state.
Test procedure	1. Take measurements for every supported object in the PHD under test. 2. Wait to receive every event report and check: a. message ❑ field- type = Event Report ❑ field-length = 2 bytes ❑ field- value=0x01 0x01 (EventReportArgumentSimple, confirmed). This field identifies the type of message sent by the PHD, for the confirmed event configuration, roiv-cmip-confirmed-event-report.
Pass/Fail criteria	Check that every received report is a one of the following Data APDU and that it is confirmed: • MDC_NOTI_SCAN_REPORT_FIXED • MDC_NOTI_SCAN_REPORT_MP_FIXED • MDC_NOTI_SCAN_REPORT_VAR • MDC_NOTI_SCAN_REPORT_MP_VAR
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-014		
TP label		Config Changes Service. Contextual Attribute.		
Coverage	**Spec**	[b-ITU-T H.810 (2015)]		
	Testable items	Communication 8; M		
Test purpose		Check that: Service component reports configuration changes to future measurements only		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177 AND C_AG_BPM_004		
Other PICS				
Initial condition		The simulated PHG and the PHD under test are in the Operating state.		
Test procedure		1. Take some measurements with the PHD under test. 2. Make a change to the contextual attribute Unit-Code for the Sys/Dias/MAP object.		

	3. The PHD shall send an MDS event report indicating the new contextual attribute value. 4. Take some more measurements. 5. Wait for the PHG to receive new event reports from the PHD which report the measurements from step 4.
Pass/Fail criteria	• The PHD sends an MDS event report to inform about the contextual attribute that has been changed. • Data has changed accordingly to a new contextual attribute.
Notes	

TP Id		TP/PLT/PHD/CLASS/BPM/BV-015		
TP label		Operating State. PHG to PHD Maximum APDU Size		
Coverage	**Spec**	[ISO/IEEE 11073-20601-2015A]		
	Testable items	CommonCharac 3; M		
	Spec	[ISO/IEEE 11073-10407]		
	Testable items	ComCh_2; M		
Test purpose		Check that: Check that the total size of the response do not exceed of the maximum APDU size established by the specialization [AND] A PHD according to this definition shall be capable of receiving an APDU up to the size of at least Nrx. For this standard it is Nrx = 224 octets		
Applicability		C_AG_OXP_000 AND C_AG_OXP_177		
Other PICS		C_AG_OXP_041, C_AG_OXP_100		
Initial condition		The simulated PHG and the PHD are in the Operating state.		
Test procedure		1. The simulated PHG issues a "Remote Operation Invoke | Get" command with: a. Obj-handle set to 0 (to request for MDS object) b. attribute-id-list.count = 103 c. attribute-id-list: (MDC_ATTR_ID_MODEL, MDC_ATTR_SYS_ID, MDC_ATTR_DEV_CONFIG_ID) repeated 34 times followed by an additional MDC_ATTR_ID_MODEL. 2. Check the response of the PHD. 3. The simulated PHG issues "Remote Operation Invoke | Get" command with the handle set to 0 (to request for MDS object) and an empty attribute-id-list to indicate all attributes. 4. Check the response of the PHD.		
Pass/Fail criteria		• In step 2, the PHD under test may respond with a rors-cmip-get listing all the requested attributes, or with a roer message. If PICS C_AG_OXP_100 =TRUE and the PHD does not respond with a rors-cmip-get message, it responds with a roer message or a rorj(resource-limitation) message, a WARNING will appear. ❑ If the response is a get response, the total size of the response cannot exceed the sum of the APDU sizes of the supported specializations (limited to an absolute limit of 64512 octets): ○ Pulse oximeter -> 9216 octets		

	○ Weighing scales -> 896 octets ○ Glucose meter -> 5120 octets or 64512 octets if the PHD supports PM-Store ○ Blood pressure -> 896 octets ○ Thermometer -> 896 octets ○ Independent activity hub -> 5120 octets ○ Cardiovascular -> 64512 octets or 6624 octets if the PHD under test only supports Step Counter Profile ○ Strength -> 64512 octets: ○ Adherence monitor -> 1024 octets ○ Peak flow -> 2030 octets ○ Body composition analyser -> 7730 octets ○ Basic ECG/Simple ECG -> 7168 octets or 64512 octets if the PHD supports PM-Store ○ Basic ECG/Heart Rate -> 1280 octets or 64512 octets if the PHD supports PM-Store ○ International Normalized Ratio -> 896 octets or 64512 if PHD supports PM-Store ○ In case it responds with a roer, the reason must not be protocol-violation (23). • In step 4, the PHD must respond with a rors-cmip-get message.
Notes	

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