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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

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Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN interface Part 5E: Thermometer: Agent

Recommendation ITU-T H.845.5

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Recommendation ITU-T H.845.5

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN interface Part 5E: Thermometer: Agent

Summary

Recommendation ITU-T H.845.5 is a transposition of Continua Test Tool DG2013, Test Suite Structure & Test Purposes, PAN-LAN-TAN Interface; Part 5E: Device Specializations. Agent (Thermometer) (Version 1.4, 2014-01-24), that was developed by the Continua 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.845.5	2015-01-13	16	11.1002/1000/12266

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

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

Table of Contents

Electronic attachment: Protocol implementation conformance statements (PICS) and protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A.

Introduction

This Recommendation is a transposition of Continua Test Tool DG2013, Test Suite Structure & Test Purposes, PAN-LAN-TAN Interface; Part 5E: Device Specializations. Agent (Thermometer) (Version 1.4, 2014-01-24), that was developed by the Continua Health Alliance. A number of versions of this specification existed before transposition and these can be found in the table below.

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_5E_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_5E_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_5E_v1.3.doc" as a baseline and adds new features included in [ITU-T H.810]: • Adds glucose meter BLE • Adds BLE SSP support • Adds NFC new transport • Adds INR device specialization

Recommendation ITU-T H.845.5

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN interface Part 5E: Thermometer: Agent

1 Scope

The scope of this Recommendation[1] is to provide a test suite structure and the test purposes (TSS & TP) for the PAN/LAN/TAN interface based on the requirements defined in the Continua Design Guidelines (CDG) [ITU-T H.810]. The objective of this test specification is to provide a high probability of air interface interoperability between different devices.

The TSS and TP for the PAN/LAN/TAN Interface document have been divided into ten parts. Each part is listed below:

– **Part 1:** Optimized exchange protocol [ISO/IEEE 11073-20601A] Agent
– **Part 2:** Optimized exchange protocol [ISO/IEEE 11073-20601A] Manager
– **Part 3:** Continua design guidelines. Agent
– **Part 4:** Continua design guidelines. Manager
– **Part 5:** Device specializations. Agent. This document is divided in 12 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 (Future development)
  - **Part 5K:** Peak flow
  - **Part 5L:** Body composition analyser
  - **Part 5M:** Basic electrocardiograph
  - **Part 5N:** International normalized ratio monitor
– **Part 6:** Device specializations. Manager
– **Part 7:** Continua design guidelines. Agent BLE
– **Part 8:** Continua design guidelines. Manager BLE
– **Part 9:** Personal health devices transcoding white paper. Agent
– **Part 10:** Personal health devices transcoding white paper. Manager

[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.

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] Recommendation ITU-T H.810 (2013*), Interoperability design guidelines for personal health systems*.

[ISO/IEEE 11073-20601A] 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.
<http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=54331> with
<http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=63972>

[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 11073-20601A], where xx can be any number from 01 to 99, inclusive.

[ISO/IEEE 11073-10408] ISO/IEEE 11073-10408-2008, *Health informatics – Personal health device communication – Device specialization – Thermometer*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 agent [ISO/IEEE 11073-20601A]: A node that collects and transmits personal health data to an associated manager.

3.1.2 manager [ISO/IEEE 11073-20601A]: 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

DUT Device Under Test

CDG Continua Design Guidelines

GUI Graphical User Interface

INR International Normalized Ratio

IUT Implementation Under Test

MDS Medical Device System

NFC Near Field Communication

PAN Personal Area Network

PCT Protocol Conformance Testing

PCO Point of Control and Observation

PHD Personal Healthcare Device

PHDC Personal Healthcare Device Class

PHM Personal Health Manager

PICS Protocol Implementation Conformance Statement

PIXIT Protocol Implementation extra Information for Testing

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 document 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 to the various versions of the CDG

CDG name	Transposed as	Version	Description	Designation
2013 plus errata	ITU-T H.810	4.1	CDG 2013 plus errata noting all ratified bugs.	–
2013	–	4.0	Release 2013 of the CDG including maintenance updates of CDG 2012 and additional guidelines that cover new functionalities.	Endorphin
2012 plus errata	–	3.1	CDG 2012 plus errata noting all ratified bugs [b-CDG 2012].	–
2012	–	3.0	Release 2012 of the CDG including maintenance updates of 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 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 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 PAN/LAN/TAN interface have been divided into the main subgroups specified below. Annex A describes the TPs for subgroup 1.3.5 (shown in bold).

– Group 1: Agent (AG)
  - 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: 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) (Future development)
    - 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)
- 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)

– Group 2: Manager (MAN)

- 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: 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) (Future development)
- 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)

- 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)

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 (TPs)

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

A.1 TP definition conventions

The test purposes 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 bellow:
  - 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.
    - AG: PAN/LAN Agent
    - MAN: PAN/LAN Manager
  - <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 behavior test
    - BI: Invalid behavior 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 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.).
- **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 1.3.5: Thermometer (TH)

<table>
<tr><td colspan="2">TP Id</td><td colspan="3">TP/PLT/AG/CLASS/TH/BV-000</td></tr>
<tr><td colspan="2">TP label</td><td colspan="3">Get MDS Object for Thermometer specialization: Mandatory, Conditional and Optional Attributes. Agent real-time clock</td></tr>
<tr><td rowspan="7">Coverage</td><td>Spec</td><td colspan="3">[ISO/IEEE 11073-10408]</td></tr>
<tr><td rowspan="6">Testable items</td><td>MDS_Obj_Atrib1; M</td><td>MDS_Obj_Atrib2; M</td><td>MDS_Obj_Atrib3; M</td></tr>
<tr><td>MDS_Obj_Atrib4; M</td><td>MDS_Obj_Atrib5; R</td><td>MDS_Obj_Atrib6; C</td></tr>
<tr><td>MDS_Obj_Atrib7; R</td><td>MDS_Obj_Atrib8; R</td><td>MDS_Obj_Atrib9; C</td></tr>
<tr><td>MDS_Serv1; M</td><td>MDS_Serv3; M</td><td>Thermometer DIM2; M</td></tr>
<tr><td>TH_ CM Operat1; M</td><td></td><td></td></tr>
<tr><td colspan="2">Applicability</td><td colspan="3">C_AG_OXP_171 AND C_AG_OXP_000</td></tr>
<tr><td colspan="2">Initial condition</td><td colspan="3">The simulated manager and the agent under test are in the operating state.</td></tr>
<tr><td colspan="2">Test procedure</td><td colspan="3">1. The simulated manager issues a "roiv-cmip-get" command with the handle set to 0 (to request for MDS object) and the attribute-id-list set to 0 to indicate all attributes.
2. The agent 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 = 0x0320 (800)
❑ 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_TEMP , 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
❑ 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),</td></tr>
</table>

	▪ 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/AG/CLASS/TH/BV-002		
TP label		MDS objects events, Association procedure		
Coverage	**Spec**	[ISO/IEEE 11073-10408]		
	Testable items	MDS_Obj_Ev1; M	MDS_Obj_Ev3; M	MDS_Obj_Ev5; M
		MDS_Obj_Ev6; M	TH_Serv_Model2; M	TH_ CM_Assoc1; M
		TH_ CM_Assoc2; M	TH_ CM_Assoc3; M	TH_ CM_Assoc4; M
		TH_ CM_Assoc5; M	TH_ CM_Assoc6; M	TH_ CM_Assoc7; M
		TH_ CM_Assoc8; M	TH_ CM_Assoc9; M	TH_ CM_Assoc11; M
		TH_ CM_Assoc12; M	TH_ CM_Assoc13; M	
Applicability		C_AG_OXP_171 AND C_AG_OXP_000		
Initial condition		The simulated manager and the agent under test are in the unassociated state.		
Test procedure		1. The agent sends a message to associate with the simulated manager, the expected fields sent by the Agent 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 =
     - Bit 0 must be set (support MDER)
     - Bits 1 and 2 may be set
     - The rest of the bits must be 0

f. nomenclature version
   - ❑ field- type = NomenclatureVersion
   - ❑ field-length = 4 bytes
   - ❑ field- value=0x80 0x00 0x00 0x00
   - ❑ This value indicates version 1 is supported (nom-version1(0) is set).

g. functional–units
   - ❑ field- type = FunctionalUnits
   - ❑ field-length = 4 bytes
   - ❑ field-value =
     - Bit 0 must not be set

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 =
     - IF NOT C_AG_OXP_181 then attribute-value = 0x0320 (800)
     - ELSE <between 0x40 0x00 and 0x7F 0xFF >

k. data-req-mode-flags (DataReqModeCapab)
   - ❑ field- type = DataReqModeFlags
   - ❑ field-length = 2 bytes

	❑ If the Agent supports Agent-initiated measurement transfer → Bit 15 is set (data-req-supp-init-agent(15)) ❑ If Agent supports requesting objects based on object handle →Bit 6 will be set (data-req-supp-scope-handle(6)). ❑ If Agent supports single response →Bit 8 will be set (data-req-supp-mode-single-rsp(8)). ❑ If Agent 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/AG/CLASS/TH/BV-003		
TP label		MDS Configuration objects events for thermometer agent		
Coverage	**Spec**	[ISO/IEEE 11073-10408]		
	Testable items	MDS_Obj_Ev7; M	TH_CM_Config 1; M	
Applicability		C_AG_OXP_171 AND C_AG_OXP_000		
Initial condition		The simulated manager and the agent under test are in the configuring state.		
Test procedure		1. The simulated manager receives an association request from the agent under test. 2. The simulated manager responds with a result = accepted-unknown-config 3. The agent responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the manager: a. APDU Type ❑ field- type = PrstApdu ❑ field-length =2 bytes ❑ field-value =0xE7 0x00 b. invoke-id ❑ field- type = InvokeIDType ❑ field-length =INT-U16 ❑ field- value=<Not relevant for this test> c. message ❑ field- type = roiv-cmip-confirmed-event-report ❑ field-length =two bytes ❑ field- value=0x01 0x01 (EventReportArgumentSimple)		

	d. obj-handle (EventReportArgumentSimple) ❑ field- type = HANDLE ❑ field-length =INT-U16 e. event-time (EventReportArgumentSimple) ❑ field- type = Relative Time ❑ field-length =INT-U32 ❑ field-value = ▪ IF NOT C_AG_OXP_010 THEN value = 0xFF 0xFF 0xFF 0xFF f. event-type (EventReportArgumentSimple) ❑ field- type = OID-Type ❑ field-length =INT-U16 ❑ field- value=0x0D 0x1C (MDC_NOTI_CONFIG) g. config-report-id (ConfigReport) ❑ field- type = ConfigId ❑ field-length = INT-U16 ▪ field- value = IF NOT C_AG_OXP_181 then 0x02 0xBC ▪ ELSE <between 0x40 0x00 and 0x7F 0xFF > h. obj-class (ConfigReport → ConfigObjectList (ConfigObject)) ❑ field- type = OID-Type ❑ field-length = INT-U16 ❑ field- value = One or more of MDC_MOC_VMO_METRIC_NU must appear
Pass/Fail criteria	All checked values are as specified in the test procedure.
Notes	

TP Id		TP/PLT/AG/CLASS/TH/BV-004		
TP label		MDS objects events for thermometer agent		
Coverage	**Spec**	[ISO/IEEE 11073-10408]		
	Testable items	MDS_Obj_Ev9; C	MDS_Obj_Ev11; C	MDS_Obj_Ev12; C
		MDS_Obj_Ev13; C	MDS_Obj_Ev14; M	MDS_Obj_Ev15; M
		MDS_Obj_Ev16; M	MDS_Obj_Ev17; M	TH_Serv_Model1; M
		TH_ CM Operat 4; M	TH_Serv_ModelX; O	
Applicability		C_AG_OXP_171 AND C_AG_OXP_000 AND (C_AG_OXP_182 OR C_AG_OXP_183 OR C_AG_OXP_184 OR C_AG_OXP_189)		
Initial condition		The simulated manager and the agent under test are in the operating state.		
Test procedure		1. Take measurements for every supported object in the agent 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 agent, for the confirmed event configuration, roiv-cmip-confirmed-event-report.
Pass/Fail criteria	Check that every received report is 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/AG/CLASS/TH/BV-005_A		
TP label		Get Temperature Numeric Object attributes (Mandatory, Conditional and Optional), Standard configuration		
Coverage	**Spec**	[ISO/IEEE 11073-10408]		
	Testable items	Num Objec Temp1; M	Num Objec Temp3; M	Num Objec Temp4; M
		Num Objec Temp5; M	Num Objec Temp6; M	Num Objec Temp8; R
		Num Objec Temp9; M	Num Objec Temp10; R	Num Objec Temp12; R
		Num Objec Temp13; R	Num Objec Temp14; R	Num Objec Temp15; M
		Num Objec Temp17; M	Num Objec Temp18; R	Num Objec Temp19; C
		Num Objec Temp20; R	Num Objec Temp21; C	Num Objec Temp22; R
		Num Objec Temp24; R		
Applicability		(C_AG_OXP_171) AND (NOT C_AG_OXP_181) AND C_AG_OXP_000		
Initial condition		The simulated manager and the agent under test have been associated, but the agent configuration is unknown to the simulated manager, so the agent and the simulated manager will be in the configuring state.		
Test procedure		1. The simulated manager receives an association request from the the agent under test. 2. The simulated manager responds with a result = accepted-unknown-config 3. The agent responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the manager. 4. Check that the field Dev-Config-Id is set to 0x0320 (800). If it is not, the manager responds with an "unsupported-config" and waits for a new configuration. Repeat this step until a Dev-config-Id equal to 0x032 is received. 5. Wait until the agent under test has sent a standard configuration. 6. The body temperature 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) , 0x05 0x0C (MDC_TEMP_BODY) 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) must be set. ▪ Bit 1 (mss-avail-stored-data) must be set. ▪ Bit 2 (mss-upd-aperiodic) must be set. ▪ Bit 3 (mss-msmt-aperiodic) must be set. ▪ Bit 9 (mss-acc-agent-initiated) 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_DEGC e. Mandatory attribute Attribute-Value-Map ❑ attribute-id = MDC_ATTR_ATRIBUTE_VAL_MAP Arterial Pressure ❑ attribute-type = AttrValMap (sequence of attribute-id(OID-Type) ❑ attribute-length= 12 bytes ❑ If the configuration is standard: attribute-value map.length = 8 bytes ❑ If the configuration is standard: attribute-value = 0x0A 0x4C 0x00 0x02 MDC_ATTR_NU_VAL_OBS_BASIC,MDC_ATTR_TIME_STAMP_ABS, 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). 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/AG/CLASS/TH/BV-005_B		
TP label		Get Temperature Numeric Object attributes (Mandatory, Conditional and Optional), Extended configuration		
Coverage	**Spec**	[ISO/IEEE 11073-10408]		
	Testable items	Num Objec Temp3; M	Num Objec Temp5; M	Num Objec Temp7; M
		Num Objec Temp8; R	Num Objec Temp9; M	Num Objec Temp10; R
		Num Objec Temp11; R	Num Objec Temp13; R	Num Objec Temp16; M
		Num Objec Temp23; R	Num Objec Temp18; R	Num Objec Temp20; R
Applicability		(C_AG_OXP_171) AND (C_AG_OXP_181) AND C_AG_OXP_000		
Initial condition		The simulated manager and the agent under test have been associated, but the agent configuration is unknown to the simulated manager, so the agent and the simulated manager		

	will be in the configuring state.
Test procedure	1. The simulated manager receives an association request from the agent under test. 2. The simulated manager responds with a result = accepted-unknown-config 3. The agent responds with a "Remote Operation Invoke | Confirmed Event Report" message with an MDC_NOTI_CONFIG event to send its configuration to the manager. 4. Check that the field Dev-Config-Id is in the extended range.. If it is not, the manager responds with an "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 agent under test has sent an extended configuration. 6. The body temperature 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 = b. Mandatory attribute Type ❑ attribute-id = MDC_ATTR_ID_TYPE ❑ attribute-type = TYPE ❑ attribute-value = 0x00 0x02(MDC_PART_SCADA) , (MDC_TEMP_zzz), as per the following list:

MDC_TEMP_ZZZ	0xXX 0xYY	Temperature Type
MDC_TEMP_AXILLA	0xE0 0x24 (57380)	Axillary (armpit)
MDC_TEMP_BODY	0x4B 0x5C (19292)	General body temperature measurement
MDC_TEMP_EAR	0xE0 0x0C (57356)	Ear (usually earlobe)
MDC_TEMP_FINGER	0xE0 0x10 (57360)	Finger
MDC_TEMP_GIT	0xE0 0x28 (57384)	Gastro-intestinal tract
MDC_TEMP_ORAL	0xE0 0x08 (57352)	Mouth
MDC_TEMP_RECT	0xE0 0x04 (57348)	Rectum
MDC_TEMP_TOE	0xE0 0x20 (57376)	Toe
MDC_TEMP_TYMP	0x4B 0x78 (19320)	Tympanum (ear drum)

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) must be set. ▪ Bit 1 (mss-avail-stored-data) must be set. ▪ Bit 3 (mss-msmt-aperiodic) must be set. ▪ Bit 9 (mss-acc-agent-initiated) must 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_DEGC (0x17 0xA0) OR MDC_DIM_FAHR (0x11 0x40)

e. 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>

f. IF Not Recommended attribute Metric-Structure-Small
   - ❑ attribute-id = MDC_ATTR_METRIC_STRUCTURE_SMALL
   - ❑ attribute-type = MetricStructureSmall
   - ❑ attribute-value.length = 2 bytes
   - ❑ attribute-value =

     ms-struct = one of the following:
     - ms-struct-simple (0x01)
     - ms-struct-compound (0x02)
     - ms-struct-reserved (0x03)
     - ms-struct-compound-simple (0x04)

     ms-compound-no = one of the following:
     - IF ms-struct = ms-struct-simple THEN = 0
     - ELSE = maximum number of components in a compound value

g. IF Recommended attribute Measurement-Status is present
   - ❑ attribute-id = MDC_ATTR_MSMT_STAT
   - ❑ attribute-type = MeasurementStatus
   - ❑ attribute-value.length = 2 bytes

h. Only one attribute of Metric-Id and Metric-Id-List shall be present.

i. IF 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>

j. IF Not 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 =
   - ❑ 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. Only one attribute of Metric-Id and Metric-Id-List shall be present.

k. IF attribute Metric-Id-Partition is present
   - ❑ attribute-id = MDC_ATTR_METRIC_ID_PART
   - ❑ attribute-type = NomPartition
   - ❑ attribute-value.length = INT-U16
   - ❑ attribute-value = one of the next
     - nom-part-unspec (0x00 0x00)
     - nom-part-obj (0x00 0x01)
     - nom-part-metric (0x00 0x02)

	▪ nom-part-alert (0x00 0x03) ▪ nom-part-dim (0x00 0x04) ▪ nom-part-vattr (0x00 0x05) ▪ nom-part-pgrp (0x00 0x06) ▪ nom-part-sites (0x00 0x07) ▪ nom-part-infrastruc (0x00 0x08) ▪ nom-part-fef (0x00 0x09) ▪ nom-part-ecg-extn (0x00 0x0A) ▪ nom-part-phd-dm (0x00 0x80) ▪ nom-part-phd-hf (0x00 0x81) ▪ nom-part-phd-ai (0x00 0x82) ▪ nom-part-ret-code(0x00 0xFF) ▪ nom-part-ext-nom (0x01 0x00) ▪ nom-part-priv (0x04 0x00) l. IF Not Recommended attribute Source-Handle-Reference ❑ attribute-id = MDC_ATTR_SOURCE_HANDLE_REF ❑ attribute-type = HANDLE ❑ attribute-value.length = INT-U16 ❑ attribute-value = Handle value of the associated object. m. 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> n. 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
Pass/Fail criteria	All checked values are as specified in the test procedure.
Notes	

TP Id		TP/PLT/AG/CLASS/TH/BV-006		
TP label		Sample period for measurements		
Coverage	**Spec**	[ISO/IEEE 11073-10408]		
	Testable items	MDS_Obj_Ev10		
Applicability		C_AG_OXP_171 AND C_AG_OXP_000		
Initial condition		The simulated manager and the agent under test are in the operating state.		

Test procedure	1. Take some measurements as quickly as possible. 2. Wait for the simulated manager to receive the event reports and record the arriving time: IF C_AG_OXP_032 3. Disconnect the agent under test from the simulated manager. 4. Take some measurements with the agent under test while is disconnected. 5. Connect the agent to the simulated manager. 6. Wait until the agent starts to send its measurements to the simulated manager.
Pass/Fail criteria	The interval between event reports cannot be less than 1 second in both cases.
Notes	

TP Id		TP/PLT/AG/CLASS/TH/BV-015		
TP label		Config Changes Service. Contextual Attribute.		
Coverage	**Spec**	[ITU-T H.810]		
	Testable items	Communication 8; M		
Applicability		C_AG_OXP_171 AND C_AG_TH_003 AND C_AG_OXP_000		
Initial condition		The simulated manager and the agent under test are in the operating state.		
Test procedure		1. Take some measurements with the agent under test. 2. Make a change to the contextual attribute Unit-Code for the Temperature object. 3. The agent shall send a MDS event report indicating the new contextual attribute value. 4. Take some more measurements. 5. Wait for the manager to receive new event reports from the agent which report the measurements from step 4.		
Pass/Fail criteria		• The agent sends an MDS event report to inform about the contextual attribute that has been changed. • Data has changed accordingly to new contextual attribute.		

TP Id		TP/PLT/AG/CLASS/TH/BV-016		
TP label		Operating State. Manager to Agent Maximum APDU Size		
Coverage	**Spec**	[ISO/IEEE 11073-20601A]		
	Testable items	CommonCharac 3; M		
	Spec	[ISO/IEEE 11073-10408]		
	Testable items	TH_CM_Charac2; M		
Applicability		C_AG_OXP_000 AND C_AG_OXP_171		
Initial condition		The simulated manager and the agent are in the operating state.		

Test procedure	1. The simulated manager 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 agent. 3. The simulated manager issues a "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 agent.
Pass/Fail criteria	• In step 2, the agent 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 agent does not respond with a rors-cmip-get message, but it responds with a roer message or rorj(resource-limitation) message, a WARNING will appear. o 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 agent supports PM-Store ▪ Blood pressure → 896 octets ▪ Thermometer → 896 octets ▪ Independent activity hub -> 5120 octets ▪ Cardiovascular → 64512 octets or 6624 octets the agent 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 agent supports PM-Store ▪ Basic ECG/Heart Rate → 1280 octets or 64512 octets if the agent supports PM-Store ▪ International normalized ratio → 896 octets or 64512 if the agent supports PM-Store o In the case where it responds with a roer, the reason must not be protocol-violation (23) • In step 4, the agent must respond with a rors-cmip-get message.
Notes	

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