International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

H.849

(01/2015)

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 devices: PAN/LAN/TAN interface Part 9: Transcoding for Bluetooth low energy (BLE): Agent

Recommendation ITU-T H.849

ITU-T H-SERIES RECOMMENDATIONS

AUDIOVISUAL AND MULTIMEDIA SYSTEMS

CHARACTERISTICS OF VISUAL TELEPHONE SYSTEMS	H.100–H.199
INFRASTRUCTURE OF AUDIOVISUAL SERVICES	
General	H.200–H.219
Transmission multiplexing and synchronization	H.220–H.229
Systems aspects	H.230–H.239
Communication procedures	H.240–H.259
Coding of moving video	H.260–H.279
Related systems aspects	H.280–H.299
Systems and terminal equipment for audiovisual services	H.300–H.349
Directory services architecture for audiovisual and multimedia services	H.350–H.359
Quality of service architecture for audiovisual and multimedia services	H.360–H.369
Telepresence	H.420–H.429
Supplementary services for multimedia	H.450–H.499
MOBILITY AND COLLABORATION PROCEDURES	
Overview of Mobility and Collaboration, definitions, protocols and procedures	H.500–H.509
Mobility for H-Series multimedia systems and services	H.510–H.519
Mobile multimedia collaboration applications and services	H.520–H.529
Security for mobile multimedia systems and services	H.530–H.539
Security for mobile multimedia collaboration applications and services	H.540–H.549
Mobility interworking procedures	H.550–H.559
Mobile multimedia collaboration inter-working procedures	H.560–H.569
BROADBAND, TRIPLE-PLAY AND ADVANCED MULTIMEDIA SERVICES	
Broadband multimedia services over VDSL	H.610–H.619
Advanced multimedia services and applications	H.620–H.629
Ubiquitous sensor network applications and Internet of Things	H.640–H.649
IPTV MULTIMEDIA SERVICES AND APPLICATIONS FOR IPTV	
General aspects	H.700–H.719
IPTV terminal devices	H.720–H.729
IPTV middleware	H.730–H.739
IPTV application event handling	H.740–H.749
IPTV metadata	H.750–H.759
IPTV multimedia application frameworks	H.760–H.769
IPTV service discovery up to consumption	H.770–H.779
Digital Signage	H.780–H.789
E-HEALTH MULTIMEDIA SERVICES AND APPLICATIONS	
Interoperability compliance testing of personal health systems (HRN, PAN, LAN, TAN and WAN)	**H.820–H.859**
Multimedia e-health data exchange services	H.860–H.869

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T H.849

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN interface Part 9: Transcoding for Bluetooth low energy (BLE): Agent

Summary

Recommendation ITU-T H.849 is a transposition of Continua Health Alliance Test Tool DG2013, Test Suite Structure & Test Purposes, LP-PAN Interface; Part 9: PHD Transcoding Whitepaper. Agent BLE (Version 1.2, 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.849	2015-01-13	16	11.1002/1000/12278

* 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

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

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 the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A.

Introduction

This Recommendation is a transposition of Continua Health Alliance Test Tool DG2013, Test Suite Structure & Test Purposes, LP-PAN Interface; Part 9: PHD Transcoding Whitepaper. Agent BLE (Version 1.2, 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
1.0	2012-10-05	Initial release for Test Tool DG2011.
1.1	2013-05-24	Initial release for Test Tool DG2012. This uses "TSS&TP_DG2011_LP-PAN_PART_9_v1.0.doc" as a baseline and adds new features included in [b¬-CDG 2012] (BPM and HR profiles)
1.2	2014-01-24	Initial release for Test Tool DG2013. This uses "TSS&TP_DG2012_LP-PAN_PART_9_v1.1.doc" as a baseline and adds new features included in [ITU-T H.810]: • Adds glucose meter BLE • Adds BLE SSP support • Adds NFC new transport • Adds INR device specialization

Recommendation ITU-T H.849

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN interface Part 9: Transcoding for Bluetooth low energy (BLE): 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 the ten parts specified below. This Recommendation covers Part 9.

– **Part 1:** Optimized exchange protocol [IEEE 11073-20601A] Agent
– **Part 2:** Optimized exchange protocol [IEEE 11073-20601A] Manager
– **Part 3:** Continua design guidelines [ITU-T H.810]- Agent
– **Part 4:** Continua design guidelines [ITU-T H.810]- Manager
– **Part 5:** Device specializations - Agent [ISO/IEEE 11073-104xx] This document is divided into 14 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 [ISO/IEEE 11073-104xx] Manager
– **Part 7:** Continua Design Guidelines [ITU-T H.810] Agent BLE
– **Part 8:** Continua Design Guidelines [ITU-T H.810] Manager BLE
– **Part 9:** Personal Health Devices Transcoding Whitepaper [Bluetooth PHDT] Agent
– **Part 10:** Personal Health Devices Transcoding Whitepaper [Bluetooth PHDT] Manager

[1] This Recommendation includes an electronic attachment with 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.

[Bluetooth PHDT] Bluetooth SIG (2013), *Personal Health Devices Transcoding White Paper, v1.4*. <https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=272346>

[IEEE 11073-20601A] IEEE 11073-20601A-2010, IEEE Health informatics – Personal health device communication Part 20601: Application profile – Optimized Exchange Protocol Amendment 1. <http://standards.ieee.org/findstds/standard/11073-20601a-2010.html>

[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 [b-ISO/IEEE 11073-20601, where xx can be any number from 01 to 99, inclusive.

3 Definitions

3.1 Terms defined elsewhere

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

3.1.2 manager [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

BLE Bluetooth Low Energy

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
uint8, uint16	8 and 16 bits unsigned integer
USB	Universal Serial Bus
WDM	Windows Driver Model

5 Conventions

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

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

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

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

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

– MAY is equivalent to 'is permitted'.

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

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

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. Furthermore, the 2013 edition of the Continua design guidelines, which is published as [ITU-T H.810], is designated by "CDG 2013" as an extension of the designations indicated in the bibliography.

Table 1 – List of designations associated with 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 CDG including maintenance updates of the 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 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 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 subgroups 1.4.1 to 1.4.5 (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: 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) (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: General requirements (GEN)**
  - **Subgroup 1.4.2: Thermometer requirements (TH)**
  - **Subgroup 1.4.3: Blood pressure requirements (BPM)**
  - **Subgroup 1.4.4: Heart rate requirements (HR)**
  - **Subgroup 1.4.5: Glucose meter requirements (GL)**

– 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: General requirements (GEN)
  - Subgroup 2.4.2: Thermometer requirements (TH)
  - Subgroup 2.4.3: Blood pressure measurement requirements (BPM)
  - Subgroup 2.4.4: Heart rate requirements (HR)
  - Subgroup 2.4.5: Glucose meter requirements (GL)

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 (TP) are defined according to the following rules:

- **TP Id:** This is a unique identifier (TP/<TT>/<DUT>/<GR>/<SGR>/<XX> – <NNN>). It is specified according to the naming convention defined below:
  - Each test purpose identifier is introduced by the prefix "TP".
  - <TT>: This is the test tool that will be used in the test case
    - PAN: Personal area network (Bluetooth or USB)
    - LAN: Local area network (ZigBee)
    - PAN-LAN: Personal area network (Bluetooth or USB)- Local area network (ZigBee)
    - LP-PAN: Low power personal area network (BLE)
    - TAN: Touch area network (NFC)
    - PLT: Personal area network (Bluetooth or USB) – Local area network (ZigBee) – Touch area network (NFC)
  - <DUT>: This is the device under test.
    - 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 behaviour test.
    - BI: invalid behaviour test.
  - <NNN>: This is a sequential number that identifies the test purpose.
- **TP label:** This is the title of the TP.
- **Coverage:** This contains the specification reference and clause to be checked by the TP.
  - Spec: This indicates the earliest version of the specification from which the testable items to be checked by the TP are included.
  - Testable item: This contains 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 1.4.1 – General requirements (GEN)

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

A.3 Subgroup 1.4.2 – Thermometer requirements (TH)

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

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

TP Id		TP/LP-PAN/AG/PHDTW/TH/BV-002		
TP label		Whitepaper. Temperature type value		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	TH Numeric 3; M		
Applicability		C_AG_BLE_000 AND C_AG_BLE_001		
Initial condition		The agent under test and the simulated manager are in a standby state		
Test procedure		1. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 2. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with agent under test (initiating state). 3. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 4. The agent under test sends a temperature measurement to the simulated manager 5. The test tool checks the measurement sent by the agent under test. a. IF Temperature Type Flag = 1 (Temperature Type field present) THEN check that the Temperature Type field value is correct: 1 ≤ value ≤ 9 b. IF the Temperature Type Flag = 0 (Temperature Type field not present) THEN the simulated Manager reads the temperature type characteristic (if it is implemented) and checks that its value is correct: 1 ≤ value ≤ 9		
Pass/Fail criteria		In step 5.a, the value of the Temperature Type field is within the range specified in the test procedure. In step 5.b, the value of the temperature type characteristic (if it is implemented) is within the range specified in the test procedure.		
Notes				

A.4 Subgroup 1.4.3 – Blood pressure requirements (BPM)

TP Id		TP/LP-PAN/AG/PHDTW/BPM/BV-000		
TP label		Whitepaper. Blood Pressure Measurement value		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	Short Float Type 1; C	BP Numeric 6; M	BP Numeric 10; M
Applicability		C_AG_BLE_000 AND C_AG_BLE_004		
Initial condition		The agent under test and the simulated manager are in a standby state		
Test procedure		1. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 2. The simulated manager initiates a discovery process (scanning state), it discovers the the agent under test and it starts a pairing process with the agent under test (initiating state). 3. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 4. The agent under test sends a blood pressure measurement to to the simulated manager. 5. The test tool checks the measurement sent by the agent under test a. IF the Blood Pressure Units Flag = 0 (mmHg) THEN • Check that the systolic value reported in the Blood Pressure Measurement Value (mmHg) field is coherent: 20 < value < 200 • Check that the Diastolic value reported in the Blood Pressure Measurement Value (mmHg) field is coherent: 20 < value < 200 • Check that the MAP reported in the Blood Pressure Measurement Value (mmHg) field is coherent: 20 < value < 200 • The test operator checks that the systolic value reported in the Blood Pressure Measurement Value (mmHg) field is correct (value and units) • The test operator checks that the diastolic value reported in the Blood Pressure Measurement Value (mmHg) field is correct (value and units) • The test operator checks that the mean arterial pressure (MAP) value reported in the Blood Pressure Measurement Value (mmHg) field is correct (value and units) b. IF Blood Pressure Units Flag = 1 (kPa) THEN • Check that the systolic value reported in the Blood Pressure Measurement Value (kPa) field is coherent: 2.66 < value < 26.66 • Check that the diastolic value reported in the Blood Pressure Measurement Value (kPa) field is coherent: 2.66 < value < 26.66 • Check that the MAP value reported in the Blood Pressure Measurement Value (kPa) field is coherent: 2.66 < value < 26.66 • The test operator checks that the systolic value reported in the Blood Pressure Measurement Value (kPa) field is correct (value and units) • The test operator checks that the diastolic value reported in the Blood Pressure Measurement Value (kPa) field is correct (value and units) • The test operator checks that the MAP value reported in the Blood Pressure Measurement Value (kPa) field is correct (value and units)		
Pass/Fail criteria		In step 5.a, the values of the Blood Pressure Measurement Compound Value (mmHg) fields are within the range specified in the test procedure and the values are correct. In step 5.b, the values of the Blood Pressure Measurement Compound Value (kPa) fields are within the range specified in the test procedure and the values are correct.		
Notes				

TP Id		TP/LP-PAN/AG/PHDTW/BPM/BV-001		
TP label		Whitepaper. Blood Pressure Measurement, Time Stamp value		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	Date-Time Conv 1; M	BP Numeric 9; M	PR Numeric 6; M
Applicability		C_AG_BLE_000 AND C_AG_BLE_004		
Initial condition		The agent under test and the simulated manager are in a standby state		
Test procedure		1. Turn on the agent under test, and configure it as a discoverable Bluetooth device (advertising state). 2. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 3. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 4. The agent under test sends a blood pressure measurement to the simulated manager. 5. The test tool checks measurement sent by the agent under test a. IF C_AG_BLE_005 = TRUE (time stamp is reported) THEN • the test tool checks that Time Stamp Flag = 1 • the test tool checks that the time stamp reported in Time Stamp field is coherent: - Year: 1900 ≤ value ≤ 2100 OR value = 0 - Month: 1 ≤ value ≤ 12 OR value = 0 - Day: 1 ≤ value ≤ 31 OR value = 0 - Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • the test operator checks that the time stamp reported in the Time Stamp field is correct (value and units) b. IF C_AG_BLE_005 = FALSE (time stamp is not reported) THEN • the test tool checks that Time Stamp Flag = 0		
Pass/Fail criteria		In step 5.a, the time stamp is reported, the value of the Time Stamp field is within the range specified in the test procedure and the value is correct. In step 5.b, the time stamp is not reported.		
Notes				

TP Id		TP/LP-PAN/AG/PHDTW/BPM/BV-002		
TP Label		Whitepaper. Blood Pressure Measurement, Pulse Rate value		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	Short Float Type 1; C	PR Numeric 7; M	
Applicability		C_AG_BLE_000 AND C_AG_BLE_004		
Initial condition		The agent under test and the simulated manager are in a standby state		
Test procedure		1. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 2. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 3. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 4. The agent under test sends a blood pressure measurement to the simulated manager. 5. The test tool checks the measurement sent by the agent under test a. IF C_AG_BLE_006 = TRUE (the Agent reports the pulse rate) THEN • the test tool checks that Pulse Rate Flag = 1 • the test tool checks that the pulse rate reported in the Pulse Rate field is coherent: 20 <= value <= 250 • the test operator checks that the pulse rate reported in the Pulse Rate field is correct (value and units) b. IF C_AG_BLE_006 = FALSE (the Agent does not report the pulse rate) THEN • the test tool checks that the Pulse Rate Flag = 0 • the test tool checks that the Pulse Rate field is not reported		
Pass/Fail criteria		In step 5.a, the pulse rate is reported, the value of the Pulse Rate field is within the range specified in the test procedure and the value is correct. In step 5.b, the pulse rate is not reported.		
Notes				

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

A.5 Subgroup 1.4.4 – Heart rate requirements (HR)

TP Id		TP/LP-PAN/AG/PHDTW/HR/BV-000		
TP label		Whitepaper. Heart Rate Measurement value		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	HR Numeric 6; M		
Applicability		C_AG_BLE_000 AND C_AG_BLE_015		
Initial condition		The agent under test and the simulated manager are in a standby state		
Test procedure		1. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 2. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 3. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 4. The agent under test sends a heart rate measurement to the simulated manager. 5. The test tool checks the measurement sent by the agent under test a. IF Heart Rate Value Format Flag = 0 (Heart Rate Value Format is set to unit8) THEN • Check that the heart rate reported in the Heart Rate Measurement Value (uint8) field is codified in unit8 format and its value is coherent: 20 < value < 250 • The test operator checks that the heart rate reported in the Heart Rate Measurement Value (uint8) field is correct (value and units) b. IF Heart Rate Value Format Flag = 1 (Heart Rate Value Format is set to unit16) THEN • Check that the heart rate reported in the Heart Rate Measurement Value (uint16) field is codified in unit16 format and its value is coherent: 20 < value < 250 • The test operator checks that the heart rate reported in the Heart Rate Measurement Value (uint16) field is correct (value and units)		
Pass/Fail criteria		In step 5.a, the value of Heart Rate Measurement (uint8) field is within the range specified in the test procedure and the value is correct. In step 5.b, value of the Heart Rate Measurement Value (uint16) field is within the range specified in the test procedure and the value is correct.		
Notes				

TP Id		TP/LP-PAN/AG/PHDTW/HR/BV-002		
TP label		Whitepaper. Heart Rate Measurement, RR-Interval values		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	HR Numeric 6; M		
Applicability		C_AG_BLE_000 AND C_AG_BLE_015		
Initial condition		The agent under test and the simulated manager are in a standby state.		
Test procedure		1. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 2. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 3. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 4. The agent under test sends a heart rate measurement to the simulated manager 5. The test tool checks the measurement sent by the agent under test a. IF C_AG_BLE_017 = TRUE (Agent reports RR-Interval) THEN • the test tool checks that RR-Interval Flag = 1 • the test tool checks that the RR-Interval values reported in the RR-Interval field are coherent: 250 <= value <= 3000 [ticks] • the test operator checks that the RR-Interval values reported in the RR-Interval field are correct b. IF C_AG_BLE_017 = FALSE (the Agent does not report the RR-Interval) THEN • the test tool checks that RR-Interval Flag = 0 • the test tool checks that the RR-Interval field is not reported		
Pass/Fail criteria		In step 5.a, the RR-Interval is reported, the values of the RR-Interval field are within the range specified in the test procedure and the values are correct In step 5.b, the RR-Interval is not reported		
Notes				

A.6 Subgroup 1.4.5 – Glucose requirements (GL)

<table>
<tr><td colspan="2">TP Id</td><td colspan="3">TP/LP-PAN/AG/PHDTW/GL/BV-000</td></tr>
<tr><td colspan="2">TP label</td><td colspan="3">Whitepaper. Glucosemeter, Glucose Concentration value</td></tr>
<tr><td rowspan="2">Coverage</td><td>Spec</td><td colspan="3">[Bluetooth PHDT]</td></tr>
<tr><td>Testable items</td><td>Float Type 1; C</td><td>GL Numeric 4; M</td><td>GL Numeric 6; M</td></tr>
<tr><td colspan="2">Applicability</td><td colspan="3">C_AG_BLE_000 AND C_AG_BLE_008</td></tr>
<tr><td colspan="2">Initial condition</td><td colspan="3">The agent under test and the simulated manager are in a standby state.</td></tr>
<tr><td colspan="2">Test procedure</td><td colspan="3">1. Ask the operator to acquire a glucose concentration measurement.
2. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state).
3. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state).
4. The simulated manager initiates a Bluetooth connection with the agent under test (connection state).
5. The simulated manager requests the agent under test report stored records and write an operation in the record access control point (RACP).
6. The agent under test sends a glucose measurement to the simulated manager.
7. The test tool checks the measurement sent by the agent under test
a. IF C_AG_BLE_010 = TRUE (the agent reports the glucose concentration, type and sample location) THEN the test tool checks that the Glucose Concentration, Type and Sample Location Present Flag = 1
i. IF Glucose Concentration Units Flag = 0 THEN
• the test tool checks that the glucose concentration reported in the Glucose Measurement field is coherent: 0,0002 ≤ value ≤ 0,003 (kg/L)
• the test operator checks that the glucose concentration reported in the glucose measurement (kg/L) is correct (value and units)
ii. IF the Glucose Concentration, Type and Sample Location Present Flag = 1 AND the Glucose Concentration Units Flag = 1 THEN
• the Test Tool checks that the glucose concentration reported in the glucose measurement is coherent: 0,001 ≤ value ≤ 0,017 (mol/L)
• the test operator checks that the glucose concentration reported in the glucose measurement (mol/L) is correct (value and units)
b. IF C_AG_BLE_010 = FALSE (the Agent reports the glucose concentration, type and sample location) THEN
• the test tool checks that the Glucose Concentration, Type and Sample Location Present Flag = 0
• the test tool checks that the glucose concentration is not reported</td></tr>
<tr><td colspan="2">Pass/Fail criteria</td><td colspan="3">In step 7.a.i, the value of the Glucose Concentration field (kg/L) is within the range specified in the test procedure and the value is correct.
In step 7.a.ii, the value of the Glucose Concentration field (mol/L) is within the range specified in the test procedure and the value is correct.
In step 7.b, the glucose concentration is not reported.</td></tr>
<tr><td colspan="2">Notes</td><td colspan="3"></td></tr>
</table>

TP Id		TP/LP-PAN/AG/PHDTW/GL/BV-001		
TP label		Whitepaper. Glucosemeter, Base Time and Time Offset values		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	GL Numeric 5; M	Date-Time Conv 1; M	
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Initial condition		The agent under test and the simulated manager are in a standby state.		
Test procedure		1. Ask the operator to acquire a glucose concentration measurement. 2. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 3. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 4. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 5. The simulated manager requests the agent under test to report stored records by writing an operation in the record access control point (RACP). 6. The agent under test sends a glucose measurement to the simulated manager. 7. The test tool checks the measurement sent by the agent under test a. the test tool checks that the time stamp reported in the Base Time field and the Time Offset field (if present) is coherent • The Base Time field is present and its value is: - Year: 1900 ≤ value ≤ 2100 - Month: 1 ≤ value ≤ 12 - Day: 1 ≤ value ≤ 31Hours: 0 ≤ value ≤ 23 - Minutes: 0 ≤ value ≤ 59 - Seconds: 0 ≤ value ≤ 59 • IF C_AG_BLE_009 = TRUE (the Agent reports the time offset) THEN Time Offset Flag = 1, the Time Offset field is present and its value is: -1440 ≤ value ≤ 1440 (minutes) • IF C_AG_BLE_009 = FALSE (the Agent does not report the time offset) THEN Time Offset Flag = 0 and the Time Offset field is not present b. the test operator checks that the time stamp reported in the Base Time field and the Time Offset field is correct (value and units) • IF the Time Offset field is not present or its value is 0x0000, THEN the time stamp matches with the Base Time field • IF the Time Offset field is present and its value is other than 0x0000 THEN the time stamp equals base time + time offset.		
Pass/Fail criteria		In step 7.a The base time is reported and the time offset may be reported, the values of the Base Time field and the Time Offset field are within the ranges specified in the test procedure. In step 7.b the time stamp value is correct.		
Notes				

TP Id		TP/LP-PAN/AG/PHDTW/GL/BV-002		
TP label		Whitepaper. Glucosemeter, Type and Sample Location values		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	GL Numeric 2; M	GL Enumeration 15; M	
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Initial condition		The agent under test and the simulated manager are in a standby state.		
Test procedure		1. Ask the operator to acquire a glucose concentration measurement and include the type and sample location information. 2. Turn on the agent under test, and configure it as a discoverable Bluetooth device (advertising state). 3. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (Initiating state). 4. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 5. The simulated manager requests the agent under test to report stored records by writing an operation in the record access control point (RACP). 6. The agent under test sends a glucose measurement to the simulated manager. 7. The test tool checks the measurement sent by the agent under test a. IF C_AG_BLE_010 = TRUE (the agent reports the glucose concentration, type and sample location) THEN • the test tool checks that Glucose Concentration, Type and Sample Location Flag = 1 • the test tool checks that the Type field value reported in the glucose measurement is present, and is set to allowed values: 1 ≤ value ≤ 10 (dec) • the test operator checks that the Type field value reported in the glucose measurement is correct • the test tool checks that the Sample Location field reported in glucose measurement is present and is set to allowed values: 1 ≤ value ≤ 4 (dec) OR value = 15 (dec) • the test operator checks that the sample location reported in the glucose measurement is correct b. IF C_AG_BLE_010 = FALSE (the agent does not report the glucose concentration, type and sample location) THEN • the test tool checks that Glucose Concentration, Type and Sample Location Flag = 0 • the test tool checks that the Glucose Concentration, Type and Sample Location field is not reported		
Pass/Fail criteria		In step 7.a, value of Type and Sample Location fields are within the range specified in the test procedure and the values are correct. In step 7.b, Type and Sample Location fields are not present		
Notes				

TP Id		TP/LP-PAN/AG/PHDTW/GL/BV-003		
TP label		Whitepaper. Glucosemeter, Sensor Status Annunciation value		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	GL Enumeration 15; M		
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Initial condition		The agent under test and the simulated manager are in a standby state		
Test procedure		1. Ask the operator to acquire a glucose concentration measurement and include, if it is possible, the sensor status annunciation information. 2. Turn on the Agent under test and configure it as a discoverable Bluetooth device (advertising state). 3. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 4. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 5. The simulated manager requests the agent under test to report stored records by writing an operation in the record access control point (RACP). 6. The agent under test sends a glucose measurement to the simulated manager 7. The test tool checks the measurement sent by the agent under test a. IF C_AG_BLE_011 = TRUE (the agent reports the sensor status annunciation) THEN • the test tool checks that the Sensor Status Annunciation Flag = 1 • the test tool checks that the Sensor Status Annunciation field reported in the glucose measurement is present, and is set to allowed values: Bits 0 to 11 may be set to 0 o 1, Bits 11 to 15 must be set to 0 • the test operator checks that the sensor status annunciation reported in the glucose measurement is correct b. IF C_AG_BLE_011 = FALSE (the agent does not report sensor status annunciation) THEN • the test tool checks that the Sensor Status Annunciation Flag = 0 • the test tool checks that the Sensor Status Annunciation field is not reported		
Pass/Fail criteria		In step 7.a, the value of the Sensor Status Annunciation field is within the range specified in the test procedure and the value is correct. In step 7.b, the Sensor Status Annunciation field is not present		
Notes				

TP Id		TP/LP-PAN/AG/PHDTW/GL/BV-004		
TP label		Whitepaper. Glucosemeter, Blood Glucose Concentration below the capabilities of the device sensor		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	GL Numeric 6; M		
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Initial condition		The agent under test and the simulated manager are in a standby state.		
Test procedure		1. Ask the operator to remove all stored measurements and then to place in a device sensor a blood sample with a blood glucose level below the capabilities of the device sensor. In addition ask the operator to acquire a glucose concentration measurement and include, if it is possible, the sensor status annunciation information. 2. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 3. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 4. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 5. The simulated manager requests the agent under test to report stored records by writing an operation n the record access control point (RACP). 6. The agent under test sends a glucose measurement to the simulated manager. 7. The test tool checks the measurement sent by the agent under test a. Glucose Concentration field b. IF the Sensor Status Annunciation field is present THEN Bit 6 = 1		
Pass/Fail criteria		In step 7.a, the value of the Glucose Concentration field is set to 0x0802 (-INFINITY) In step 7.b, bit 6 of Sensor Status Annunciation field (the sensor result is lower than the device can process) is set to 1		
Notes		The vendor must provide a blood sample (or a simulated blood solution) with a blood glucose level below the capabilities of device sensor.		

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

TP Id		TP/LP-PAN/AG/PHDTW/GL/BV-006		
TP label		Whitepaper. Glucosemeter Context values		
Coverage	**Spec**	[Bluetooth PHDT]		
	Testable items	GL Numeric 11; M	GL Numeric 17; M	GL Numeric 24; M
		GL Numeric 31; M	GL Enumeration 10; M	GL Enumeration 20; M
		GL Enumeration 25; M		
Applicability		C_AG_BLE_000 AND C_AG_BLE_008		
Initial condition		The agent under test and the simulated manager are in a standby state.		
Test procedure		1. Ask the operator to acquire a glucose concentration measurement and include, if it is possible, as much as possible of Glucose measurement context information (Carbohydrate ID, Carbohydrate (kg), Meal, Tester, Health, Exercise duration, Exercise intensity, Medication ID, Medication (kg or l) and/or HbA1c). 2. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 3. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 4. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 5. The simulated manager requests the Agent under test to report stored records by writing an operation in the record access control point (RACP). 6. The agent under test sends a glucose measurement followed by a Glucose measurement context to the simulated manager 7. Ask the operator to acquire a glucose concentration measurement and include, if it is possible, as much as possible of Glucose measurement context information (Carbohydrate ID, Carbohydrate (kg), Meal, Tester, Health, Exercise duration, Exercise intensity, Medication ID, Medication (kg or l) and/or HbA1c).		

	8. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 9. The simulated manager initiates a discovery process (scanning state), it discovers the agent under test and it starts a pairing process with the agent under test (initiating state). 10. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). 11. The simulated manager requests the Agent under test to report stored records by writing an operation in the record access control point (RACP). 12. The agent under test sends a glucose measurement followed by a Glucose measurement context to the simulated manager 13. The test tool checks the measurement sent by the agent under test a. IF Context Information Follows Flag = 1 from Glucose Measurement Flags field THEN i. Check that the Glucose measurement is followed by a Glucose Measurement Context ii. Check that the Glucose Measurement Context includes at least one field in addition to the Flags field and the Sequence Number field iii. Check that the sequence number value from Glucose measurement context is the same as the value of the sequence number of its corresponding glucose measurement characteristic iv. Check that IF Extended Flags Present Flag = 1, THEN Extended Flags field is present, and is set to 00000000 v. Check that IF Carbohydrate ID And Carbohydrate Present Flag = 1, THEN • Carbohydrate ID and Carbohydrate fields are present, and Carbohydrate ID is set to allowed values (Carbohydrate ID: 1 <= value <= 7) and Carbohydrate is set to a coherent value (0<carbohydrate (kg) < 0.4) • The test operator checks that the Carbohydrate ID and Carbohydrate reported in the Glucose measurement context are correct vi. Check that IF Meal Present Flag = 1, THEN • Meal field is present, and is set to allowed values (1 <= value <= 5 (dec)) • the test operator checks that Meal reported in the Glucose measurement context is correct vii. Check that IF Tester-Health Present Flag = 1, THEN • Tester and Health fields are present and they are set to allowed values (Tester: 0 <= value <= 3 (dec) OR value = 15 (dec), Health: 0 <= value <= 5 (dec) OR value = 15) • the test operator checks that the Tester-Health reported in the Glucose measurement context is correct viii. Check that IF Exercise Duration And Exercise Intensity Present Flag = 1, THEN • Exercise Duration And Exercise Intensity fields are present, and Exercise intensity is set to allowed values (0 <= Exercise intensity (%) <= 100) • the test operator checks that Exercise duration and Exercise intensity reported in the Glucose measurement context is correct ix. Check that IF Medication ID and Medication Present Flag = 1, THEN • Medication ID and Medication fields are present. If Medication Value Units Flag = 1, Medication is set in kilograms; else, Medication is set in litres. Medication ID is set to allowed values (1 <= Medication ID <= 5 (dec)) • the test operator checks that the Medication ID and Medication reported in the Glucose measurement context is correct and Medication is set to a coherent value (0< Medication (l) < 0.000002 or 0< Medication (kg) < 0.000002)

	x. Check that IF HbA1c Present Flag = 1, THEN • HbA1c field is present, and is set to allowed values (0 <= HbA1c (%) <= 100) • the test operator checks that HbA1c reported in the Glucose measurement context is correct b. IF Context Information Follows Flag = 0 from Glucose Measurement Flags field THEN Check that Glucose measurement is not followed by a Glucose measurement context
Pass/Fail criteria	In step 7.a, the Glucose measurement is followed by Glucose Measurement Context and it fulfils requisites described in the test procedure. In step 7.b, the Glucose Measurement Context is not received
Notes	

Bibliography

[b-CDG 1.0] Continua Health Alliance, Continua Design Guidelines v1.0 (2008), *Continua Design Guidelines*.

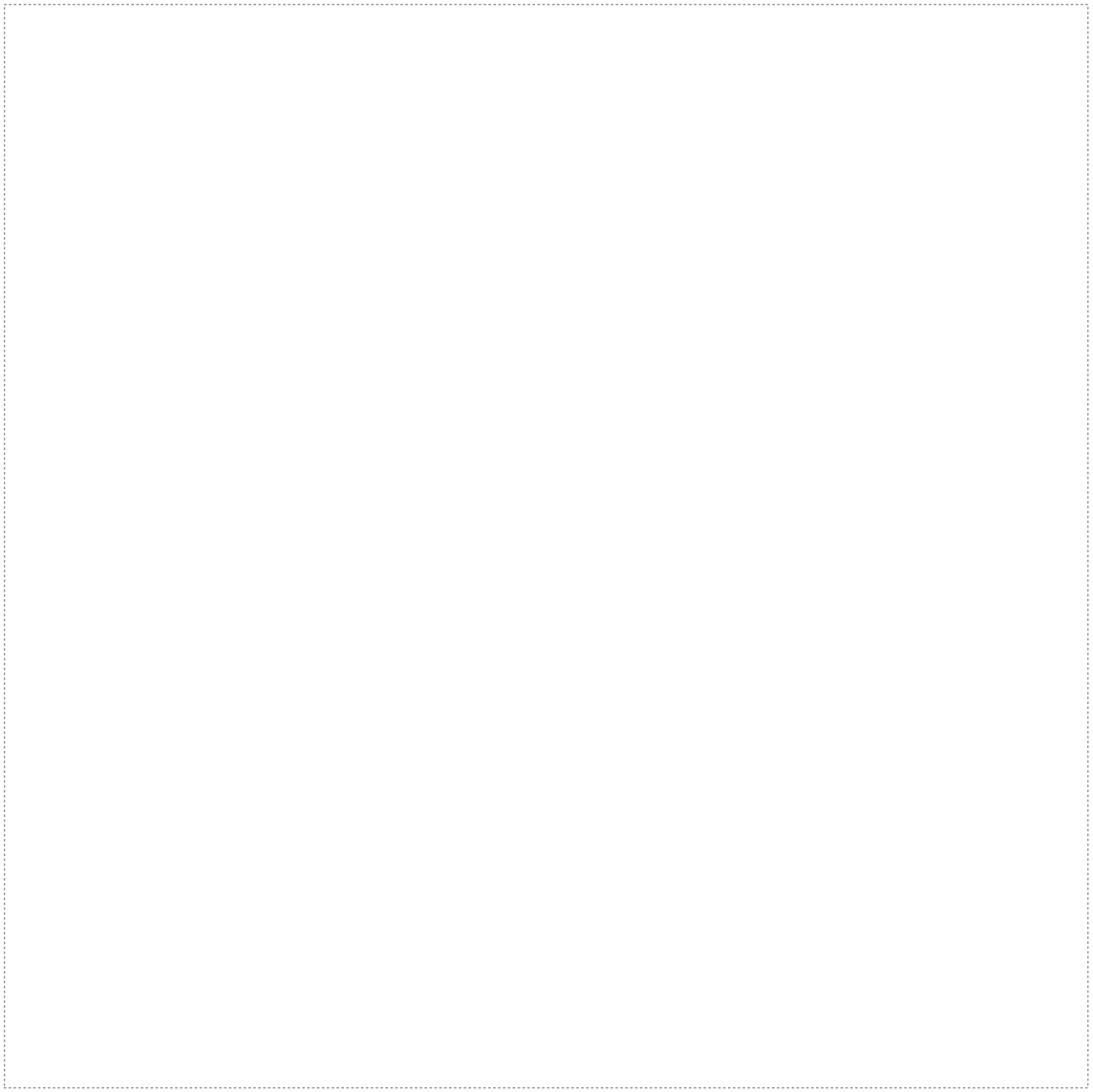
[b-CDG 2010] Continua Health Alliance, Continua Design Guidelines v1.5 (2010), *Continua Design Guidelines*.

[b-CDG 2011] Continua Health Alliance, Continua Design Guidelines (2011) "Adrenaline", *Continua Design Guidelines.*

[b-CDG 2012] Continua Health Alliance Continua Design Guidelines (2012) "Catalyst", *Continua Design Guidelines*.

[b-ETSI SR 001 262] ETSI SR 001 262 v1.8.1 (2003), *ETSI drafting rules*.

[b-ISO/IEEE 11073-20601] ISO/IEEE 11073-20601-2010, *Health informatics – Personal health device communication – Part 20601: Application profile – Optimized exchange protocol*.



SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	**Audiovisual and multimedia systems**
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Terminals and subjective and objective assessment methods
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects and next-generation networks
Series Z	Languages and general software aspects for telecommunication systems

Printed in Switzerland
Geneva, 2015