International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

H.847

(07/2016)

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 7: Bluetooth low energy (BLE): Agent

Recommendation ITU-T H.847

ITU International Telecommunication Union

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Recommendation ITU-T H.847

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN interface Part 7: Bluetooth low energy (BLE): Agent

Summary

Recommendation ITU-T H.847 is a transposition of Continua Health Alliance Test Tool DG2013, Test Suite Structure & Test Purposes, PAN-LAN-TAN Interface; Part 7: Continua Design Guidelines. 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.847	2015-01-13	16	11.1002/1000/12276
2.0	ITU-T H.847	2016-07-14	16	11.1002/1000/12954

Keywords

Conformance testing, continua design guidelines, e-health, H.810, PAN/LAN/TAN interface, personal area network, personal connected health devices, touch area network.

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

FOREWORD

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

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

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

NOTE

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

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

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

Introduction

This Recommendation is a transposition of Continua Health Alliance Test Tool DG2013, Test Suite Structure & Test Purposes, PAN-LAN-TAN Interface; Part 7: Continua Design Guidelines. 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_7_v1.0.doc" as a baseline and it 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 PAN-LAN-TAN Interface PART_7_v1.1.doc" as a baseline and it 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.847

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN interface Part 7: 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 (2015)]. The objective of this test specification is to provide a high probability of air interface interoperability between different devices.

TSS and TP for the PAN/LAN/TAN interface have been divided into the ten parts specified below. This Recommendation covers Part 7.

– **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 (2015)] – Agent

– **Part 4**: Continua design guidelines [ITU-T H.810 (2015)] – 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 (2015)] **– Agent BLE**

– **Part 8**: Continua design guidelines [ITU-T H.810 (2015)] – Manager BLE

– **Part 9**: Personal health devices transcoding White paper [Bluetooth PHDT v1.4] – Agent

– **Part 10**: Personal health devices transcoding White paper [Bluetooth PHDT v1.4] – Manager

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

[ITU-T H.810 (2015)] Recommendation ITU-T H.810 (2015), *Interoperability design guidelines for personal health systems*.

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

[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 series (in force), *Health informatics – Personal health device communication – Device specialization*.

NOTE – Shorthand is used 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

This Recommendation uses the following 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

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
SABTE	Sleep Apnoea Breathing Therapy Equipment
SDP	Service Discovery Protocol
SOAP	Simple Object Access Protocol
TCRL	Test Case Reference List
TCWG	Test and Certification Working Group
TP	Test Purpose
TSS	Test Suite Structure
USB	Universal Serial Bus
WDM	Windows Driver Model

5 Conventions

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

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

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

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

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

– MAY is equivalent to 'is permitted'.

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

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

Reference is made in the ITU-T H.800-series of Recommendations to different versions of the Continua Design Guidelines (CDG) by a specific designation. The list of terms that may be used in this Recommendation is provided in Table 1.

Table 1 – List of designations associated with the various versions of the CDG

CDG release	Transposed as	Version	Description	Designation
2016 plus errata	[ITU-T H.810 (2016)]	6.1	Release 2016 plus errata noting all ratified bugs [ITU-T H.810 (2016)].	–
2016	–	6.0	Release 2016 of the CDG including maintenance updates of the CDG 2015 and additional guidelines that cover new functionalities.	Iris
2015 plus errata	[ITU-T H.810 (2015)]	5.1	Release 2015 plus errata noting all ratified bugs [ITU-T H.810 (2015)].	–
2015	–	5.0	Release 2015 of the CDG including maintenance updates of the CDG 2013 and additional guidelines that cover new functionalities.	Genome
2013 plus errata	[ITU-T H.810 (2013)]	4.1	Release 2013 plus errata noting all ratified bugs [b-ITU-T H.810 (2013)].	–
2013	–	4.0	Release 2013 of the CDG including maintenance updates of the CDG 2012 and additional guidelines that cover new functionalities.	Endorphin
2012 plus errata	–	3.1	Release 2012 plus errata noting all ratified bugs [b-CDG 2012].	–
2012	–	3.0	Release 2012 of the CDG including maintenance updates of the CDG 2011 and additional guidelines that cover new functionalities.	Catalyst
2011 plus errata	–	2.1	CDG 2011 integrated with identified errata.	–
2011	–	2.0	Release 2011 of the CDG including maintenance updates of the CDG 2010 and additional guidelines that cover new functionalities [b-CDG 2011].	Adrenaline
2010 plus errata	–	1.6	CDG 2010 integrated with identified errata	–
2010	–	1.5	Release 2010 of the CDG with maintenance updates of the CDG Version 1 and additional guidelines that cover new functionalities [b-CDG 2010].	1.5
1.0	–	1.0	First released version of the CDG [b-CDG 1.0].	–

6 Test suite structure (TSS)

The test purposes (TPs) for the PAN/LAN/TAN interface have been divided into the main subgroups specified below. Annex A describes the TPs for subgroup 1.1.9 (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 analyzer (BCA)
  - Subgroup 1.3.13: Basic electrocardiograph (ECG)
  - Subgroup 1.3.14: International normalized ratio (INR)
  - Subgroup 1.3.15: Sleep apnoea breathing therapy equipment (SABTE)
- Group 1.4: Personal health device transcoding whitepaper (PHDTW)
  - Subgroup 1.4.1: Whitepaper general requirements (GEN)
  - Subgroup 1.4.2: Whitepaper thermometer requirements (TH)
  - Subgroup 1.4.3: Whitepaper blood pressure requirements (BPM)
  - Subgroup 1.4.4: Whitepaper heart rate requirements (HR)
  - Subgroup 1.4.5: Whitepaper glucose meter requirements (GL)
  - Subgroup 1.4.6: Whitepaper weight scale requirements (WS)

– 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 analyzer (BCA)
    - Subgroup 2.3.13: Basic electrocardiograph (ECG)
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    - Subgroup 2.4.5: Whitepaper glucose meter requirements (GL)
    - Subgroup 2.4.6: Whitepaper weight scale requirements (WS)

7 Electronic attachment

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

In the electronic attachment, letters "C" and "I" in the column labelled "Mandatory" are used to distinguish between "PICS" and "PIXIT" respectively during testing. If the cell is empty, the corresponding PICS is "independent". If the field contains a "C", the corresponding PICS is dependent on other PICS, and the logical expression is detailed in the "SCR_Expression" field. The static conformance review (SCR) is used in the test tool to assert whether the PICS selection is consistent.

Annex A

Test purposes

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

A.1 TP definition conventions

The test purposes (TPs) are defined according to the following rules:

- **TP Id**: This is a unique identifier (TP/<TT>/<DUT>/<GR>/<SGR>/<XX> – <NNN>). It is specified according to the naming convention defined below:
  - Each test purpose identifier is introduced by the prefix "TP".
  - <TT>: This is the test tool that will be used in the test case.
    - PAN: Personal area network (Bluetooth or USB)
    - LAN: Local area network (ZigBee)
    - PAN-LAN: Personal area network (Bluetooth or USB) – Local area network (ZigBee)
    - LP-PAN: Low power personal area network (BLE)
    - TAN: Touch area network (NFC)
    - PAN-LAN-TAN: 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).
- **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.).
- **Other PICS**: This contains additional PICS items (apart from the PICS specified in the Applicability row) which are used within the test case implementation and can modify the final verdict. When this row is empty, it means that only the PICS specified in the Applicability row are used within the test case implementation.
- **Initial condition**: This indicates the state to which the DUT needs to be moved at the beginning of TC execution.

- **Test procedure**: This describes the steps to be followed in order to execute the test case.
- **Pass/Fail criteria**: This provides criteria to decide whether the DUT passes or fails the test case.

A.2 Subgroup 1.1.9: Bluetooth low energy design guidelines (BLEDG)

TP Id		TP/LP-PAN/AG/TR/BLEDG/BI-000		
TP label		Abnormal cases management – Data exchange before pairing		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Discovery_Pairing BT LE 8; M		
Test purpose		Check that: BLE Agent data (other than service discovery data or capability or service name from the advertising packet) shall not be exchanged with a BLE Manager prior to pairing		
Applicability		C_AG_BLE_000		
Other PICS				
Initial condition		The agent under test and the simulated manager are in a standby state and they have not been paired before.		
Test procedure		1. Reset the agent under test to the default configuration and turn it on. 2. The simulated manager initiates discovery, it finds the agent under test, but it does not start the pairing process. 3. The simulated manager waits until a 2-minute timeout expires. During this time, the agent under test shall not exchange data (except the service discovery data or capability or service name from the advertising packet) with the simulated manager.		
Pass/Fail criteria		In step 3, the agent under test does not exchange data prior to pairing.		
Notes				

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-000		
TP label		Discoverability mode service		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Discovery_Pairing BT LE 4; M	Discovery_Pairing BT LE 10; M	
Test purpose		Check that: BLE Agents shall not be discoverable unless initiated by a user [AND] After a BLE Agent is successfully paired, it shall immediately (e.g. within 1 second) become undiscoverable until made discoverable again by the user.		
Applicability		C_AG_BLE_000		
Other PICS				
Initial condition		The agent under test and the simulated manager are in a standby state and they have not been paired before.		

Test procedure	1. Turn on the agent under test and configure it as a non- discoverable Bluetooth device. 2. The simulated manager initiates a discovery process (scanning state). Check if simulated manager finds the agent under test. 3. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 4. The simulated manager again initiates a discovery process (scanning state), it discovers the agent under test and it completes the pairing process with the agent under test (initiating state). 5. The simulated manager initiates a new discovery process. Check if the agent under test is discoverable or not.
Pass/Fail criteria	In step 2, the agent under test shall not be discoverable. In step 5, the agent under test shall not be discoverable.
Notes	

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-001		
TP label		Maximum Discovery service duration		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Discovery_Pairing BT LE 9; R		
Test purpose		Check that: BLE Agent should have a documented maximum duration for discoverable mode whereby after the maximum time, the BLE Agent ceases to be discoverable until put back into that mode by the user		
Applicability		C_AG_BLE_000		
Other PICS				
Initial condition		The agent under test and the simulated manager support the same device specialization, they are in a standby state and they have not been paired before.		
Test procedure		1. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 2. The simulated manager waits until Twait1 = Tdiscoverable – Tguard 3. The simulated manager initiates a discovery process (scanning state). Check that simulated manager finds the agent under test. 4. The simulated manager waits (from initial time = 0) until Twait2 = Tdiscoverable + Tguard 5. When Twait2 expires, the simulated manager initiates a new discovery process. Check if the simulated manager finds the agent under test.		
Pass/Fail criteria		In step 3, the agent under test is discoverable. In step 5, the agent under test should not be discoverable. If it is discoverable, the test tool gives a warning message.		
Notes		Tdiscoverable is defined in PIXIT I_AG_BLEDG_006 Tguard = Tdiscoverable/2		

TP Id	TP/LP-PAN/AG/TR/BLEDG/BV-002
TP label	Pairing service and delete pairing service

Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Discovery_Pairing BT LE 7; M	Discovery_Pairing BT LE 5; R	Notify BT LE 1; R
Test purpose		Check that: BLE Agent shall support replacing its pairing [AND] BLE Agent should have a way to delete pairings [AND] If supported by the UI, BLE Agent should inform the user that pairing and authentication was successful		
Applicability		C_AG_BLE_000		
Other PICS		C_AG_BLEDG_001		
Initial condition		The agent under test and the simulated manager are in a standby state and they have not been paired before.		
Test procedure		1. Turn on the agent under test and configure it as a discoverable Bluetooth device (advertising state). 2. The test tool simulated manager initiates the 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. Ask the operator to remove the paired devices in the agent under test.		
Pass/Fail criteria		In step 2, the Agent finishes the pairing process successfully. In step 2, if agent supports an UI that provides information about the Bluetooth connection (C_AG_BLEDG_001 = TRUE) and the agent has not notified the pairing and authentication process, the test tool gives a warning message. In step 4, if the Agent cannot remove the paired devices, the test tool gives a warning message.		
Notes				

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-003		
TP label		Storage pairing service		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Discovery_Pairing BT LE 11; M		
Test purpose		Check that: BLE Agents should store pairing data from at least the most recently paired device such that the data is persistent (e.g. with loss of power, including removal of a battery)		
Applicability		C_AG_BLE_000		
Other PICS		C_AG_BLEDG_001		
Initial condition		The agent under test and the simulated manager are in a standby state and they have not been paired before.		

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 finds the agent under test and it establishes a pairing with the agent under test (initiating state). 3. Turn off the agent under test by removing the batteries or unplugging the power supply. 4. Turn on the agent under test again (standby state). 5. The simulated manager initiates a Bluetooth connection with the agent under test (connection state). Check if the pairing process is dispatched again.
Pass/Fail criteria	In step 5, the pairing process should not be dispatched again because both devices should have stored the pairing data from the previous pairing process. If the pairing process is dispatched again then the test tool gives a WARNING message.
Notes	

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-004		
TP label		Supported service profiles		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Discovery_Pairing BT LE 14; M		
Test purpose		Check that: BLE Agent's Attribute database shall list all supported LE Services/Profiles claimed in Continua certification documentation		
Applicability		C_AG_BLE_000		
Other PICS		C_AG_BLEDG_001		
Initial condition		The agent under test and the simulated manager support the same device specialization, they are in a standby state and they have not been paired before.		
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 finds the agent under test. 3. The simulated manager discovers all the primary services of the agent under test. 4. The test tool checks the UUID services supported by the agent under test: • IF the thermometer specialization is going to be certified (C_AG_BLE_001 = TRUE) THEN the health thermometer primary service (UUID 0x1809) shall be supported by the agent under test. • IF the blood pressure specialization is going to be certified (C_AG_BLE_004 = TRUE) THEN the blood pressure primary service (UUID 0x1810) shall be supported by the agent under test. • IF the heart rate specialization is going to be certified (C_AG_BLE_015 = TRUE) THEN the heart rate primary service (UUID 0x180D) shall be supported by the agent under test. • IF the glucose meter specialization is going to be certified (C_AG_BLE_008 = TRUE) THEN the glucose primary service (UUID 0x1808) shall be supported by the agent under test.		
Pass/Fail criteria		In step 4 the specializations claimed in the Continua certification shall match the services listed by the agent under test.		
Notes				

Notes	

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-005		
TP label		Authentication support service (Secure simple pairing support)		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Authentication BT LE 1; M		
Test purpose		Check that: Continua LP wireless PAN service components shall support at least one of the following Bluetooth 4.0 pairing methods depending on its I/O capabilities and the appropriate security for the service component device type: Just Works or Passkey Entry		
Applicability		C_AG_BLE_000		
Other PICS				
Initial condition		The agent under test and the simulated manager are in a standby state and they have not been paired before.		
Test procedure		1. Check the agent under test IO capabilities declared in PIXIT I_AG_BLEDG_002, the man in the middle (MITM) protection declared in PIXIT I_AG_BLEDG_003 and the association model declared in PIXIT I_AG_BLEDG_004 a. IF the agent under test does not support MITM protection (PIXIT I_AG_BLEDG_003 = FALSE) THEN • IF the agent under test supports the just works association model (PIXIT I_AG_BLEDG_004 = 0) THEN the test tool simulated manager is configured with NoInputOutput capabilities and without man in the middle (MITM) support • IF the agent under test supports the passkey entry association model (PIXIT I_AG_BLEDG_004 = 1) THEN the combination of IO capabilities, association model and MITM support declared by the agent under test in PIXITs is not feasible and the test case ends by giving a FAIL verdict due to inconsistency among the agent under test SSP features declared in PIXITs b. IF the agent under test supports MITM protection (PIXIT I_AG_ BLEDG _003 = TRUE) THEN • IF the agent under test supports the just works association model (PIXIT I_AG_ BLEDG _004 = 0) THEN the combination of IO capabilities, association model and MITM support declared by the agent under test in PIXITs is not feasible and the test case ends giving a FAIL verdict due to inconsistency among the agent under test SSP features declared in PIXITs • IF the agent under test supports the passkey entry association model (PIXIT I_AG_ BLEDG_004 = 1) and DisplayOnly capabilities (PIXIT I_AG_ BLEDG_002 = 0) THEN the test tool simulated manager is configured with KeyboardOnly capabilities (see Note 1) and with MITM support • IF the agent under test supports the passkey entry association model (PIXIT I_AG_ BLEDG _004 = 1) and DisplayYesNo capabilities (PIXIT I_AG_ BLEDG _002 = 1) THEN the test tool simulated manager is configured with KeyboardOnly capabilities (see Note 1) and with MITM support • IF the agent under test supports the passkey entry association model (PIXIT I_AG_ BLEDG _004 = 1) and KeyboardOnly capabilities (PIXIT I_AG_ BLEDG _002 = 2) THEN the test tool simulated manager is configured with DisplayOnly capabilities (see Note 2) and with MITM support • IF the agent under test supports the passkey entry association model (PIXIT I_AG_ BLEDG _004 = 1) and NoInputNoOutput capabilities (PIXIT I_AG_ BLEDG _002 = 4) THEN the combination of IO capabilities, association model and MITM support declared by the agent under test in PIXITs is not feasible and the test case ends by giving a FAIL verdict due to inconsistency among		

	the agent under test SSP features declared in PIXITs • IF the agent under test supports the passkey entry association model (PIXIT I_AG_ BLEDG _004 = 1) and KeyboardDisplay capabilities (PIXIT I_AG_ BLEDG _002 = 3) THEN the test tool simulated manager is configured with DisplayOnly capabilities (see Note 2) and with MITM support 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 finds the agent under test and it establishes a pairing with the agent under test (initiating state)
Pass/Fail criteria	In step 3, the pairing process is completed successfully.
Notes	Note 1 – "KeyboardOnly" and "KeyboardDisplay" are both OK. The test tool simulated manager is configured with "KeyboardOnly". Note 2 – "DisplayOnly", "DisplayYesNo", "KeyboardOnly" and "KeyboardDisplay" are all OK. The test tool simulated manager is configured with "DisplayOnly".

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-006		
TP label		Continua DG Bluetooth LE attribute requirements - System Model		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	OEM 1; M	OEM 2;M	
	Spec	[Bluetooth PHDT v1.1]		
	Testable items	Common MDS 2; M	String Conv 2; M	MDS Conv 1;M
Test purpose		Check that: BLE Agents implement Manufacturer Name String characteristic [AND] BLE Agents shall set the Manufacturer Name String defined in the Bluetooth SIG Device Information Service to the device original manufacturer's name. If this capability is available, the Manufacturer Name String may be overwritten to the customer facing company's name by the customer facing company [AND] BLE Agents implement Model Number String characteristic [AND] BLE Agents shall set Model Number String defined in the Bluetooth SIG Device Information Service to the device original manufacturer's model number. The Model Number String field may be overwritten to the customer facing company's model by the customer facing company		
Applicability		C_AG_BLE_000		
Other PICS				
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 if the agent under test implements the model number string Bluetooth characteristic. 5. IF the agent under test implements the model number string Bluetooth characteristics value THEN a. the simulated manager reads the model number string Bluetooth characteristics value b. the Agent under test sends the model number string Bluetooth characteristics value 6. The test tool checks if the agent under test implements manufacturer name string Bluetooth characteristics value. 7. IF the agent under test implements the manufacturer name string Bluetooth characteristics value THEN a. the simulated manager reads the manufacturer name string Bluetooth characteristics value b. the Agent under test sends the manufacturer name string Bluetooth characteristics value
Pass/Fail criteria	In step 4, the agent under test implements the model number string Bluetooth characteristics value In step 5.b, the model number string Bluetooth characteristics value matches with value declared by the vendor in PIXIT I_AG_BLEDG_010 In step 6, the agent under test implements the manufacturer name string Bluetooth characteristics value In step 5.b, the manufacturer name string Bluetooth characteristics value matches with the value declared by the vendor in PIXIT I_AG_BLEDG_009
Notes	

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-007		
TP label		Continua DG Bluetooth LE attribute requirements - System ID		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	OEM 3; M	OEM 4;M	OEM 5; M
	Spec	[Bluetooth PHDT v1.4]		
	Testable items	Common MDS 3; M	MDS Conv 4; M	
Test purpose		Check that: BLE Agents implement System ID characteristic [AND] The OUI part of the System ID field defined in the Bluetooth SIG Device Information Service in a BLE Agent shall remain unchanged from the value set by the original manufacturer [AND] The 40 bit manufacturer defined identifier in the System ID field defined in the Bluetooth SIG Device Information Service of a BLE Agent shall remain unchanged from the value set by the original manufacturer [AND] There shall not be multiple different System-Id values that identify the same BLE Agent		
Applicability		C_AG_BLE_000		

Other PICS	
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 if the agent under test implements the system ID Bluetooth characteristic value. 5. IF the Agent under test implements the system ID Bluetooth characteristic value THEN a. the simulated manager reads the system ID Bluetooth characteristic b. the agent under test sends the manufacturer name Bluetooth characteristics value c. Disconnect the agent under test and connect it again (standby state). d. the test tool simulated manager connects the agent under test (connection state) and it reads the system ID Bluetooth characteristic e. the agent under test sends the manufacturer name Bluetooth characteristics value
Pass/Fail criteria	In step 4, the agent implements the system ID Bluetooth characteristic value. In step 5.b, the system ID Bluetooth characteristic value matches with the value declared by the vendor in PIXITs I_AG_BLEDG_007 and I_AG_BLEDG_008. In step 5.e, the system ID Bluetooth characteristic value must be the same as the value displayed in step 5.b.
Notes	

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-008		
TP label		Continua DG Bluetooth LE attribute requirements - Production Specification		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	OEM 6; M	OEM 7; M	
	Spec	[Bluetooth PHDT v1.4]		
	Testable items	Common MDS 5; M	String Conv 2; M	MDS Conv 6; M
Test purpose		Check that: BLE Agents implement Serial Number String and Firmware Revision String characteristics [AND] BLE Agents shall set the Serial Number String defined in the Bluetooth SIG Device Information Service to the serial number of the device. [AND] BLE Agents that provide a firmware identifier shall set the Firmware Revision String defined in the Bluetooth SIG Device Information Service to the firmware identifier of the device		
Applicability		C_AG_BLE_000		
Other PICS		C_AG_BLEDG_002		
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 if the agent under test implements the serial number string Bluetooth characteristic value. 5. IF the agent under test implements the serial number string Bluetooth characteristic value THEN a. the simulated manager reads the serial number string Bluetooth characteristic value b. the agent under test sends the serial number string Bluetooth characteristic value 6. The test tool checks if the agent under test implements the firmware revision string Bluetooth characteristic value. 7. IF the agent under test implements the firmware revision string Bluetooth characteristic value THEN a. the simulated manager reads the firmware revision string Bluetooth characteristic value b. the agent under test sends the firmware revision string Bluetooth characteristics value
Pass/Fail criteria	In step 4, the agent implements the serial number string characteristic value. In step 5.b, the serial number string Bluetooth characteristic value matches with the value declared by the vendor in PIXIT I_AG_BLEDG_011 In step 6, IF PICS C_AG_BLEDG_002 = TRUE THEN the agent implements the firmware revision string Bluetooth characteristic value. In step 6, IF PICS C_AG_BLEDG_002 = FALSE THEN the agent does not implement the firmware revision string Bluetooth characteristic value. In step 7.b, the firmware revision string Bluetooth characteristic value matches with the value declared by the vendor in PIXIT I_AG_BLEDG_012
Notes	

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-009		
TP label		Continua DG Bluetooth LE attribute requirements - Reg-Cert-Data-List		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Cert_Reg 1; M	Cert_Reg 2; M	Cert_Reg 3; M
		Cert_Reg 4; M	Cert_Reg 5; M	Cert_Reg 6; M
	Spec	[Bluetooth PHDT v1.4]		
	Testable items	Common MDS 14; M	Regulatory Conv 1; M	
Test purpose		Check that: BLE Agents shall support and fill the IEEE 11073-20601 Regulatory Certification Data List characteristic defined in the Bluetooth SIG Device Information Service with an MDER encoded version of the IEEE 11073-20601 RegCertDataList data structure [AND] All Continua BLE Agents shall report information on which Certified Device Classes exist on the device. This includes providing information to the BLE Manager component on the		

	transport used (Bluetooth LE) as well as the Profile used [AND] All BLE Agents shall report information on whether or not they are regulated. This is a single Boolean entitled unregulated-device, which is set to 1 if not regulated and 0 if regulated and contained as part of IEEE 11073-20601 Regulatory Certification Data List defined in the Bluetooth SIG Device Information Service
Applicability	C_AG_BLE_000
Other PICS	
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. 2. The test tool simulated manager initiates a discovery process, it discovers the agent under test and it starts a pairing process with the agent under test. 3. The test tool simulated manager initiates a Bluetooth connection with the agent under test. 4. The test tool checks the characteristics implemented by the agent under test. 5. The test tool simulated manager reads the Bluetooth equivalent characteristics "IEEE 11073-20601 Regulatory Certification Data List" 6. The agent under test sends the "IEEE 11073-20601 Regulatory Certification Data List" Bluetooth equivalent characteristics value and the test tool checks its content: ❑ Element: • auth-body-and-struc-type: - auth-body: 02 (hex). auth-body-continua(2) - auth-body-struc-type: 01 (hex). continua-version-struct(1) • auth-body-data: - major-IG-version: 04 (hex) - minor-IG-version: 00 (hex) - certified-devices: SEQUENCE {CertifiedDeviceClassEntry: MDC_DEV_*_SPEC_PROFILE_* - 4096 + TCode x 8192, and TCode=4 (Bluetooth LE)} ❑ Element: • auth-body-and-struc-type: - auth-body: 02 (hex). auth-body-continua(2) - auth-body-struc-type: 02 (hex). continua-reg-struct(2) • auth-body-data: - regulation-bit-field: 00 00 (hex). Regulated device OR 80 00 (hex). Unregulated device
Pass/Fail criteria	In step 4, the agent implements the "IEEE 11073-20601 Regulatory Certification Data List" characteristic value. In step 6, check that the IEEE 11073-20601 Regulatory Certification Data List characteristic value is as described in the test procedure and: • IF the agent under test supports the thermometer specialization (C_AG_BLE_001) THEN MDC_DEV_*_SPEC_PROFILE_* is MDC_DEV_SPEC_PROFILE_TEMP = 4104 and CertifiedDeviceClassEntry = 4104-4096+4*8192 = 32776 • IF the agent under test supports the blood pressure specialization (C_AG_BLE_004) THEN MDC_DEV_*_SPEC_PROFILE_* is MDC_DEV_SPEC_PROFILE_BP = 4103 and CertifiedDeviceClassEntry = 4103-4096+4*8192 = 32775 • IF the agent under test supports the heart rate specialization (C_AG_BLE_015) THEN MDC_DEV_*_SPEC_PROFILE_* is [MDC_DEV_SPEC_PROFILE_ECG =

	4102 and MDC_DEV_SUB_SPEC_PROFILE_HR = 4237] and CertifiedDeviceClassEntry = [(4102-4096+4*8192 = 32774) and (4237-4096+4*8192 = 32909)] • IF the agent under test supports the glucose specialization (C_AG_BLE_008) THEN MDC_DEV_*_SPEC_PROFILE_* is MDC_DEV_SPEC_PROFILE_GLUCOSE = 4113 and CertifiedDeviceClassEntry = 4113-4096+4*8192 = 32785]
Notes	

TP Id		TP/LP-PAN/AG/TR/BLEDG/BV-010		
TP label		Measurement time stamp and Date Time characteristic		
Coverage	**Spec**	[ITU-T H.810 (2015)]		
	Testable items	Date_Time 1; M		
	Spec	[Bluetooth PHDT v1.4]		
	Testable items	MDS Conv 9; M		
Test purpose		Check that: If BLE Agent reports the Time Stamp in measurements then it should support the Current Time Service.		
Applicability		C_AG_BLE_000 AND (C_AG_BLE_001 OR C_AG_BLE_004 OR C_AG_BLE_008)		
Other PICS		C_AG_BLE_002, C_AG_BLE_003, C_AG_BLE_005, C_AG_BLE_019, C_AG_BLE_020, C_AG_BLE_025, C_AG_BLE_030		
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 measurement to the simulated manager a. IF the agent under test sends a thermometer measurement with a time stamp THEN the test tool checks if the agent implements the Date Time characteristic 0x2A08 inside the thermometer service and the PICS C_AG_BLE_003 value b. IF the agent under test sends a blood pressure measurement with a time stamp THEN the test tool checks if the agent implements the Date Time characteristic 0x2A08 inside the blood pressure service and the PICS C_AG_BLE_005 value c. IF the agent under test sends a glucose measurement with a Base Time THEN the test tool checks if the agent implements the Date Time characteristic 0x2A08 inside the glucose service		
Pass/Fail criteria		In step 4.a, the agent implements the Date Time characteristic inside the thermometer service and PICS C_AG_BLE_003 = TRUE In step 4.b, the agent implements the Date Time characteristic inside the blood pressure service and PICS C_AG_BLE_005 = TRUE In step 4.c, the agent implements the Date Time characteristic inside the glucose service		
Notes				

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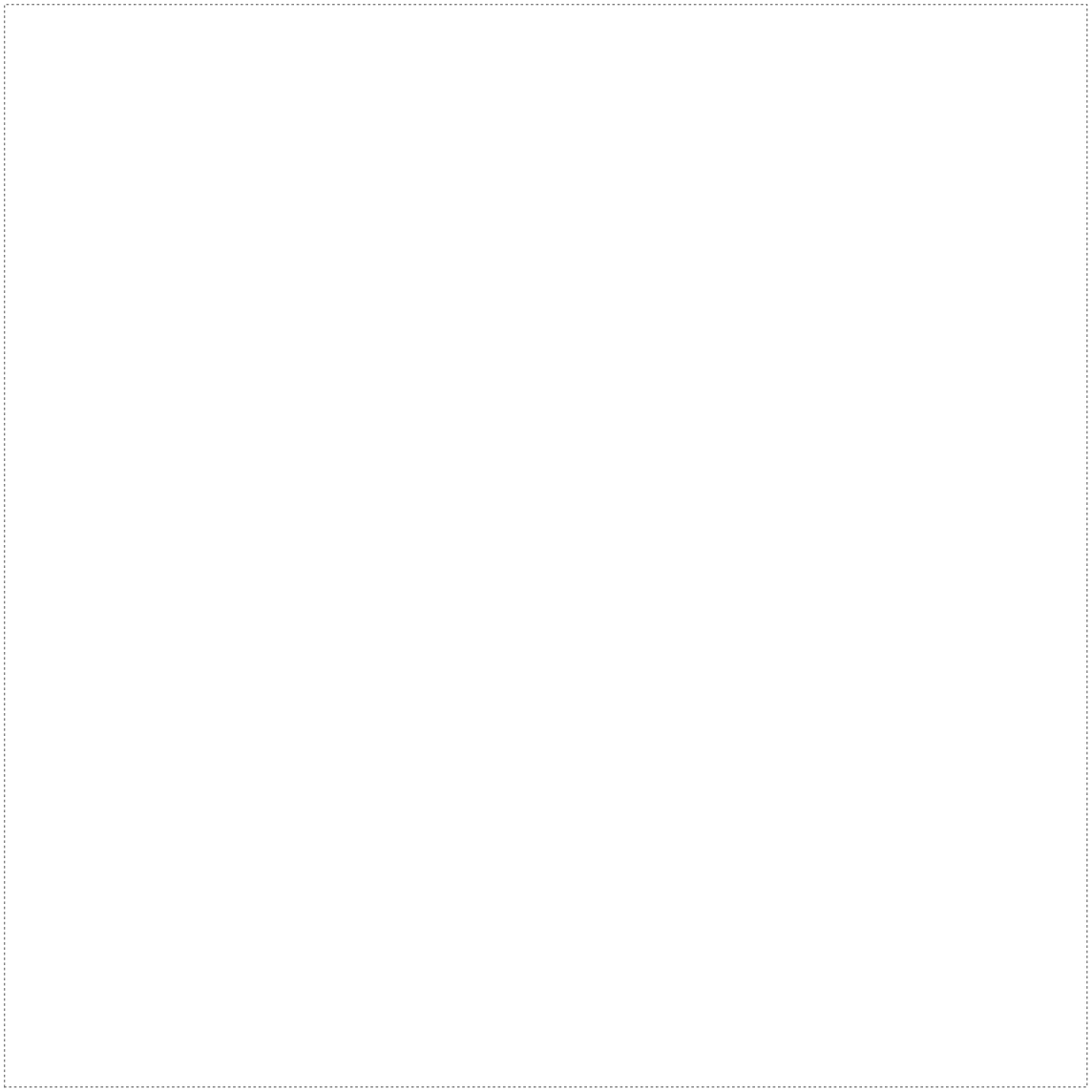

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Printed in Switzerland
Geneva, 2016