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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

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

Conformance of ITU-T H.810 personal health system: Services interface Part 14: Capability Exchange: Health & Fitness Service receiver

Recommendation ITU-T H.830.14

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Recommendation ITU-T H.830.14

Conformance of ITU-T H.810 personal health system: Services interface Part 14: Capability Exchange: Health & Fitness Service receiver

Summary

Recommendation ITU-T H.830.14 provides a test suite structure (TSS) and the test procedures (TP) for Capability Exchange through the Health & Fitness Service (HFS) receiver in the Services interface, based on the requirements defined in the Recommendations of the ITU-T H.810 sub--series, of which Recommendation ITU-T H.810 (2017) is the base Recommendation. The objective of this test specification is to provide a high probability of interoperability at this interface.

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.830.14	2018-08-29	16	11.1002/1000/13675

Keywords

Capability exchange, conformance testing, continua design guidelines, e-health, health & fitness service receiver, personal connected health devices, services interface

* 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: 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

The table below shows the revision history of this test specification.

Version	Date	Revision history
1.0	2018-02-27	Initial release for the inclusion of Capability Exchange for Health & Fitness Service receivers.

Recommendation ITU-T H.830.14

Conformance of ITU-T H.814 personal health system: Services interface Part 14: Capability Exchange: Health & Fitness Service receiver

1 Scope

The scope of this Recommendation[1] is to provide a test suite structure (TSS) and the test procedures (TP) for the Services 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 interoperability at this interface.

The TSS and TP for the Services interface have been divided into the parts specified below. This Recommendation covers Part 14.

– Part 1: Web services interoperability: Health & Fitness Service sender
– Part 2: Web services interoperability: Health & Fitness Service receiver
– Part 3: SOAP/ATNA: Health & Fitness Service sender
– Part 4: SOAP/ATNA: Health & Fitness Service receiver
– Part 5: PCD-01 HL7 messages: Health & Fitness Service sender
– Part 6: PCD-01 HL7 messages: Health & Fitness Service receiver
– Part 7: Consent Management: Health & Fitness Service sender
– Part 8: Consent Management: Health & Fitness Service receiver
– Part 9: hData Observation Upload: Health & Fitness Service sender
– Part 10: hData Observation Upload: Health & Fitness Service receiver
– Part 11: Questionnaires: Health & Fitness Service sender
– Part 12: Questionnaires: Health & Fitness Service receiver
– Part 13: Capability Exchange: Health & Fitness Service sender
– **Part 14: Capability Exchange: Health & Fitness Service receiver**
– Part 15: FHIR Observation Upload. Health & Fitness Service sender
– Part 16: FHIR Observation Upload. Health & Fitness Service receiver

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.

[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.

[ITU-T H.810] Recommendation ITU-T H.810 (2017), *Interoperability design guidelines for personal connected health systems: Introduction.*

[ITU-T H.811] Recommendation ITU-T H.811 (2017), *Interoperability design guidelines for personal health systems: Personal Health Devices interface.*

[ITU-T H.812] Recommendation ITU-T H.812 (2017), *Interoperability design guidelines for personal health systems: Services interface.*

[ITU-T H.812.1] Recommendation ITU-T H.812.1 (2017), *Interoperability design guidelines for personal health systems: Services interface: Observation Upload certified capability class.*

[ITU-T H.812.2] Recommendation ITU-T H.812.2 (2017), *Interoperability design guidelines for personal health systems: Services interface: Questionnaire capability.*

[ITU-T H.812.3] Recommendation ITU-T H.812.3 (2017), *Interoperability design guidelines for personal health systems: Services interface: Capability Exchange capability.*

[ITU-T H.812.4] Recommendation ITU-T H.812.4 (2017), *Interoperability design guidelines for personal connected health systems: Services interface: Authenticated Persistent Session capability.*

[ITU-T H.813] Recommendation ITU-T H.813 (2017), *Interoperability design guidelines for personal connected health systems: Healthcare Information System interface.*

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AHD Application Hosting Device

ATNA Audit Trail and Node Authentication

CDA Clinical Document Architecture

CDG Continua Design Guidelines

CGM Continuous Glucose Monitor

DUT Device Under Test

FHIR Fast Healthcare Interoperability Resources

GUI Graphical User Interface

HFS Health & Fitness Service

HFSR Health & Fitness Service Receiver

HFSS Health & Fitness Service Sender

HL7 Health Level 7

HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
INR	International Normalized Ratio
IP	Insulin Pump
IUT	Implementation Under Test
MDS	Medical Device System
NFC	Near Field Communication
PCD	Patient Care Device
PCO	Point of Control and Observation
PCT	Protocol Conformance Testing
PHD	Personal Health Device
PHDC	Personal Healthcare Device Class
PHG	Personal Health Gateway
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation extra Information for Testing
PSM	Power Status Monitor
SABTE	Sleep Apnoea Breathing Therapy Equipment
SCR	Static Conformance Review
SOAP	Simple Object Access Protocol
SUT	System Under Test
TCRL	Test Case Reference List
TCWG	Test and Certification Working Group
TLS	Transport Level Security
TP	Test Purpose
TSS	Test Suite Structure
URI	Uniform Resource Identifier
USB	Universal Serial Bus
WAN	Wide Area Network
WDM	Windows Driver Model
WS	Web Service
WSDL	Web Service Description Language
WSI	Web Services Interoperability
XDR	Cross-Enterprise Document Reliable Interchange
XML	Extensible Markup Language

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
2017	–	7.0	Release 2017 of the CDG including maintenance updates of the CDG 2016 and additional guidelines that cover new functionalities.	–
2016 plus errata	[ITU-T H.810]	6.1	Release 2016 plus errata noting all ratified bugs [b-CDG 2016].	–
2016	–	6.0	Release 2016 of the CDG including maintenance updates of the CDG 2015 and additional guidelines that cover new functionalities.	Iris
2015 plus errata	[b-ITU-T H.810]	5.1	Release 2015 plus errata noting all ratified bugs [b-CDG 2015]. The 2013 edition of H.810 is split into eight parts in the H.810-series.	–
2015	–	5.0	Release 2015 of the CDG including maintenance updates of the CDG 2013 and additional guidelines that cover new functionalities.	Genome
2013 plus errata	[b-ITU-T H.810]	4.1	Release 2013 plus errata noting all ratified bugs [b-CDG 2013].	–
2013	–	4.0	Release 2013 of the CDG including maintenance updates of the CDG 2012 and additional guidelines that cover new functionalities.	Endorphin
2012 plus errata	–	3.1	Release 2012 plus errata noting all ratified bugs [b-CDG 2012].	–
2012	–	3.0	Release 2012 of the CDG including maintenance updates of the CDG 2011 and additional guidelines that cover new functionalities.	Catalyst
2011 plus errata	–	2.1	CDG 2011 integrated with identified	–

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

CDG release	Transposed as	Version	Description	Designation
			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 procedures (TPs) for the Services interface have been divided into the main subgroups specified below. Annex A describes the TPs for subgroups 2.8.1 and 2.8.2 (shown in bold):

– Group 1: HFS sender (HFSS)
  - Group 1.1: Web services interoperability (WSI)
    - Subgroup 1.1.1: Basic profile (BP)
    - Subgroup 1.1.2: Basic security profile (BSP)
    - Subgroup 1.1.3: Reliable messaging (RM)
  - Group 1.2: Simple object access protocol (SOAP)
    - Subgroup 1.2.1: SOAP headers (HEAD)
  - Group 1.3: Audit trail and node authentication (ATNA)
    - Subgroup 1.3.1: General (GEN)
    - Subgroup 1.3.2: PCD-01 (PCD-01)
    - Subgroup 1.3.3: Consent Management (CM)
  - Group 1.4: PCD-01 HL7 messages (PCD-01-DATA)
    - Subgroup 1.4.1: General (GEN)
    - Subgroup 1.4.2: Design guidelines (DG)
    - Subgroup 1.4.3: Pulse oximeter (PO)
    - Subgroup 1.4.4: Blood pressure monitor (BPM)
    - Subgroup 1.4.5: Thermometer (TH)
    - Subgroup 1.4.6: Weighing scales (WEG)
    - Subgroup 1.4.7: Glucose meter (GL)
    - Subgroup 1.4.8: Cardiovascular fitness and activity monitor (CV)
    - Subgroup 1.4.9: Strength fitness equipment (ST)
    - Subgroup 1.4.10: Independent living activity hub (HUB)
    - Subgroup 1.4.11: Adherence monitor (AM)

- Subgroup 1.4.12: Peak expiratory flow monitor (PF)
- Subgroup 1.4.13: Body composition analyser (BCA)
- Subgroup 1.4.14: Basic electrocardiograph (ECG)
- Subgroup 1.4.15: International normalized ratio (INR)
- Subgroup 1.4.16: Sleep apnoea breathing therapy equipment (SABTE)
- Subgroup 1.4.17: Insulin pump (IP)
- Subgroup 1.4.18: Continuous glucose monitor (CGM)

• Group 1.5: Consent Management (CM)
  - Subgroup 1.5.1: HFS XDR transaction (TRANS)
  - Subgroup 1.5.2: HFS metadata validation (META)
  - Subgroup 1.5.3: HFS consent directive validation (CDV)

• Group 1.6: hData Observation Upload (HDATA)
  - Subgroup 1.6.1: General (GEN)

• Group 1.7: Questionnaires (QUE)
  - Subgroup 1.7.1: General (GEN)
  - Subgroup 1.7.2: CDA validation (CDA)

• Group 1.8: Capability Exchange (CE)
  - Subgroup 1.8.1: General (GEN)
  - Subgroup 1.8.2: hData record format (HRF)

• Group 1.9: FHIR Observation Upload (FHIR)
  - Subgroup 1.9.1: General (GEN)
  - Subgroup 1.9.2: FHIR Encoding Guidelines (ENC)

– Group 2: HFS receiver (HFSR)

• Group 2.1: Web service interoperability (WSI)
  - Subgroup 2.1.1: Basic profile (BP)
  - Subgroup 2.1.2: Basic security profile (BSP)
  - Subgroup 2.1.3: Reliable messaging (RM)

• Group 2.2: SOAP (SOAP)
  - Subgroup 2.2.1: SOAP headers (HEAD)

• Group 2.3: Audit (ATNA)
  - Subgroup 2.3.1: General (GEN)
  - Subgroup 2.3.2: PCD-01 (PCD-01)
  - Subgroup 2.3.3: Consent Management (CM)

• Group 2.4: PCD-01 HL7 messages (PCD-01-DATA)
  - Subgroup 2.4.1: General (GEN)
  - Subgroup 2.4.2: Design guidelines (DG)
  - Subgroup 2.4.3: Pulse oximeter (PO)
  - Subgroup 2.4.4: Blood pressure monitor (BPM)
  - Subgroup 2.4.5: Thermometer (TH)
  - Subgroup 2.4.6: Weighing scales (WEG)
  - Subgroup 2.4.7: Glucose meter (GL)

- Subgroup 2.4.8: Cardiovascular fitness and activity monitor (CV)
- Subgroup 2.4.9: Strength fitness equipment (ST)
- Subgroup 2.4.10: Independent living activity hub (HUB)
- Subgroup 2.4.11: Adherence monitor (AM)
- Subgroup 2.4.12: Peak expiratory flow monitor (PF)
- Subgroup 2.4.13: Body composition analyser (BCA)
- Subgroup 2.4.14: Basic electrocardiograph (ECG)
- Subgroup 2.4.15: International normalized ratio (INR)
- Subgroup 2.4.16: Sleep apnoea breathing therapy equipment (SABTE)
- Subgroup 2.4.17: Insulin pump (IP)
- Subgroup 2.4.18: Continuous glucose monitor (CGM)

- Group 2.5: Consent Management (CM)
  - Subgroup 2.5.1: HFS XDR transaction (TRANS)
  - Subgroup 2.5.2: HFS service validation (SER)
- Group 2.6: hData Observation Upload (HDATA)
  - Subgroup 2.6.1: General (GEN)
  - Subgroup 2.6.2: hData record format (HRF)
- Group 2.7: Questionnaires (QUE)
  - Subgroup 2.7.1: General (GEN)
  - Subgroup 2.7.2: CDA validation (CDA)
  - Subgroup 2.7.3: hData record format (HRF)
- **Group 2.8: Capability Exchange (CE)**
  - **Subgroup 2.8.1: General (GEN)**
  - **Subgroup 2.8.2: hData record format (HRF)**
- Group 2.9: FHIR Observation Upload (FHIR)
  - Subgroup 2.9.1: General (GEN)

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. See [b-HFSR PICS & PIXIT] and [b-HFSS PICS & PIXIT].

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 procedures

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

A.1 TP definition conventions

The test procedures (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.
    - HFS: Health & Fitness Services interface
  - <DUT>: This is the device under test.
    - SEN: HFS sender
    - REC: HFS receiver
  - <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 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 were included.
  - Testable item: This contains testable items to be checked by the TP.
- **Test purpose:** This is a description of the requirements to be tested.
- **Applicability:** This contains the protocol implementation conformance statement (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 device under test (DUT) needs to be moved at the beginning of TC execution.
- **Test procedure:** This describes the steps to be followed in order to execute the test case.
- **Pass/Fail criteria:** This provides criteria to decide whether the DUT passes or fails the test case.

A.2 Subgroup 2.8.1: General (GEN)

TP Id		TP/HFS/REC/CAP/GEN/BV-000		
TP label		Root file retrieval		
Coverage	**Spec**	[ITU-T H.812]		
	Testable items	RESTSec 7; M	RESTSec 8; M	CommonReq 5; M
	Spec	[ITU-T H.812.3]		
	Testable items	Capab 2; M	Capab 3; M	Capab 5; M
		Capab 6; O	Capab 17; M	Capab 18; M
		Capab 19; M		
Test purpose		Check that: The H&FS under test accepts a request to send its root file using a secure TLS 1.1 connection and sends it to the simulated PHG correctly and in the appropriate format.		
Applicability		C_REC_000 AND C_REC_GEN_005		
Other PICS		C_REC_CAP_001		
Initial condition		The simulated PHG is compliant with Capability Exchange and is ready to retrieve the root file of the H&FS under test using TLS 1.1. The system under test (SUT) has previously provided a base URL.		
Test procedure		1. The simulated PHG sends an HTTP GET request with no HTTP accept header to retrieve the root file of the H&FS under test (using the provided URL and a secure TLS 1.1 connection). 2. The H&FS under test sends the root.xml file to the simulated PHG. 3. The simulated PHG sends an HTTP GET request with the value "application/json" in the HTTP accept header to retrieve the root file of the H&FS under test in JSON format (using the provided URL and a secure TLS 1.1 connection). 4. The H&FS under test sends the root.json file to the simulated PHG using TLS 1.1 OR an <HTTP 501> response (Not Implemented) if it does not support a JSON version of the root file.		
Pass/Fail criteria		• By default (with no HTTP accept header specified), the H&FS under test sends its root file in XML version as a response to an HTTP GET request using a TLS 1.1 connection and the appropriate URL. • In step 4, IF C_REC_CAP_001=TRUE, the H&FS sends its root file in JSON format. • In step 4, IF C_REC_CAP_001=FALSE, the H&FS sends <HTTP 501> (Not Implemented) as a response to the HTTP GET request.		
Notes				

<table>
<tr><td colspan="2">TP Id</td><td colspan="3">TP/HFS/REC/CAP/GEN/BV-001</td></tr>
<tr><td colspan="2">TP label</td><td colspan="3">Root file posting</td></tr>
<tr><td rowspan="5">Coverage</td><td>Spec</td><td colspan="3">[ITU-T H.812]</td></tr>
<tr><td>Testable items</td><td>RESTSec 7;M</td><td>RESTSec 8;M</td><td>CommonReq 5;M</td></tr>
<tr><td>Spec</td><td colspan="3">[ITU-T H.812.3]</td></tr>
<tr><td rowspan="2">Testable items</td><td>Capab 20; M</td><td>Capab 21; M</td><td>Capab 22; M</td></tr>
<tr><td>Capab 23; M</td><td>Capab 24; M</td><td></td></tr>
<tr><td colspan="2">Test purpose</td><td colspan="3">Check that:
The H&FS under test shall accept an HTTP POST at [baseURL]/roots only if the sending PHG has a valid authorization token of type bearer, or else it shall respond with a <HTTP 401> (Unauthorized error) response.
[AND]
If the root.xml file is accepted, the H&FS shall validate the file against the hData Version 1 root.xsd and return <HTTP 201> if validation is successful or <HTTP 422> (Unprocessable Entity) if validation fails.
[AND]
If the PHG performs an HTTP POST at [baseURL]/roots including its root file in JSON format, the H&FS shall return <HTTP 201> if validation is successful or <HTTP 422> (Unprocessable Entity) if validation fails.
[AND]
After a successful POST of the PHG root file to [baseURL]/roots, the H&FS shall return the unique URL of the newly created root resource.</td></tr>
<tr><td colspan="2">Applicability</td><td colspan="3">C_REC_000 AND C_REC_GEN_005</td></tr>
<tr><td colspan="2">Other PICS</td><td colspan="3"></td></tr>
<tr><td colspan="2">Initial condition</td><td colspan="3">The simulated PHG is compliant with Capability Exchange and is ready to send its root file of the H&FS under test using TLS 1.1. The SUT has previously provided a base URL and an Authorization Server to provide a valid OAuth bearer token.</td></tr>
<tr><td colspan="2">Test procedure</td><td colspan="3">1. The simulated PHG uses a valid OAuth bearer token to send a correctly formed root.xml file to the URL provided by the SUT using a TLS 1.1 connection using an HTTP POST request.
2. The H&FS under test responds with <HTTP 201> and returns the unique URL of the newly created root resource.
3. The simulated PHG performs an HTTP POST request to send a correctly formed root.xml file to the H&FS under test with no OAuth bearer token and using a TLS 1.1 connection.
4. The H&FS under test responds with an <HTTP 401> (Unauthorized error) response.
5. The simulated PHG uses a valid OAuth bearer token to send a malformed root.xml file to the URL provided by the SUT using a TLS 1.1 connection and using an HTTP POST request.
6. The H&FS under test responds with an <HTTP 422> (Unprocessable Entity) response (validation against the hData Version 1 root.xsd failed).
7. The simulated PHG uses a valid OAuth bearer token to send a malformed root.json file to the URL provided by the SUT using a TLS 1.1 connection and using an HTTP POST request.
8. The H&FS under test responds with an <HTTP 422> (Unprocessable Entity) response (the JSON does not conform to the hData root file specification).
9. The simulated PHG uses a valid OAuth bearer token to send a correctly formed root.json file to the URL provided by the SUT using a TLS 1.1 connection and using an HTTP POST request.</td></tr>
</table>

	10. The H&FS under test responds with <HTTP 201> and returns the unique URL of the newly created root resource.

Pass/Fail criteria		• H&FS responses are as described in steps 2, 4, 6, 8 and 10.		
Notes				
TP Id		TP/HFS/REC/CAP/GEN/BV-002		
TP label		Root file content		
Coverage	**Spec**	[ITU-T H.812]		
	Testable items	CommonReq 5;M		
	Spec	[ITU-T H.812.3]		
	Testable items	Capab 4; M	Capab 6; O	Capab 10; M
		Capab 11; M	Capab 12; M	Capab 13; M
		Capab 14; M	Capab 15; M	
Test purpose		Check that: The root file of the H&FS under test contains all elements and values required by the Capability Exchange Continua Certified Capability Class. [AND] The root file of the Health & Fitness Service shall contain a profile element for each CCC it supports.		
Applicability		C_REC_000 AND C_REC_GEN_005		
Other PICS		C_REC_CAP_001, C_REC_GEN_003, C_REC_GEN_004, C_REC_GEN_006, C_REC_GEN_007, C_REC_GEN_008		
Initial condition		The simulated PHG is compliant with Capability Exchange and is ready to retrieve the root file of the H&FS under test using TLS 1.1. The SUT has previously provided a base URL.		
Test procedure		1. The simulated PHG sends an HTTP GET request with no HTTP accept header to retrieve the root file of the H&FS under test (using the provided URL and a secure TLS 1.1 connection). 2. The H&FS under test sends the root.xml file to the simulated PHG. 3. Check in the received root.xml file that: a) It contains a <profile> element with: • an <id> element with the value "CapabilityExchange"; • a <reference> element with the value "http://handle.itu.int/11.1002/3000/hData/CX/2015/01/H.812.3.pdf". b) It contains a <resourceType> element with: • an <id> element with the value "root"; • a <reference> element with the value http://www.hl7.org/implement/standards/product_brief.cfm?product_id=261.		

	c) It contains a <resourceType> element with: • an <id> element with the value "root"; • a <reference> element with the value http://www.hl7.org/implement/standards/product_brief.cfm?product_id=261; • a <representation> element with: ▪ a <mediaType> element with the value "application/xml"; ▪ an optional <mediaType> element with the value "application/json". d) It contains a <section> element with: • a <path> element with the value "roots"; • a <profileID> element with the value "CapabilityExchange"; • a <resourceTypeID> with the value "root"; • no <resourcePrefix> or <metadataSupport> elements. e) If C_REC_GEN_003=TRUE the root file contains a <profile> element with an <id> element with the appropriate value for SOAP Observation Upload – HFS Continua Certified Capability Class. f) If C_REC_GEN_004=TRUE the root file contains a <profile> element with an <id> element with the appropriate value for hData Observation Upload – HFS Continua Certified Capability Class. g) If C_REC_GEN_006=TRUE the root file contains a <profile> element with an <id> element with the appropriate value for the Questionnaire Continua Certified Capability Class. h) If C_REC_GEN_007=TRUE the root file contains a <profile> element with an <id> element with the appropriate value for the FHIR Observation Server Continua Certified Capability Class. i) If C_REC_GEN_008=TRUE the root file contains a <profile> element with an <id> element with the appropriate value for the FHIR Observation Reporting Server Continua Certified Capability Class. 4. IF C_REC_CAP_001=TRUE, the simulated PHG sends an HTTP GET request with the value "application/json" in the HTTP accept header to retrieve the root file of the H&FS under test in JSON format (using the provided URL and a secure TLS 1.1 connection). 5. The simulated PHG receives the root.json file and checks that its content is as described in step 3 for the XML version.
Pass/Fail criteria	• The root file (XML, JSON or both) contains all the elements and values described in step 3.
Notes	Contents of the JSON version of the root file can be checked by applying the XML-to-JSON conversion rules in [b-HL7 V3 HRF]

A.3 Subgroup 2.8.2: hData record format (HRF)

TP Id		TP/HFS/REC/CAP/HRF/BV-000		
TP label		Root file format		
Coverage	**Spec**	[ITU-T H.812]		
	Testable items	CommonReq 5;M		
	Spec	[ITU-T H.812.3]		
	Testable items	Capab 1; M	Capab 7; M	Capab 9; M

	Spec	[b-HL7 V3 HRF]		
	Testable items	Root 1;M	Root 2;M	Root 3;M
		Root 4;M	Root 5;M	Root 6;M
		Root 7;M	Root 8;M	Root 9;M
		Root 10;M	Root 11;M	Root 12;M
		Root 13;M	Root 14;M	Root 15;M
		Root 16;M	Root 17;M	Root 18;M
		Root 19;M	Root 20;M	Root 21;M
		Root 22;M	Root 23;M	Root 24;M
Test purpose		Check that: The root file of the H&FS under test complies with the HL7 Version 3 Specification: hData Record Format, Release 1		
Applicability		C_REC_000 AND C_REC_GEN_005		
Other PICS		C_REC_CAP_001		
Initial condition		The simulated PHG is compliant with Capability Exchange and is ready to retrieve the root.xml file of the H&FS under test using TLS 1.1. The SUT has previously provided a base URL.		
Test procedure		1. The simulated PHG sends an HTTP GET to retrieve the root file of the H&FS under test in XML format (using provided URL and TLS 1.1). 2. The H&FS under test sends the root.xml file to the simulated PHG. 3. In the received root file check that: a. The id element of the root is present (1..1) and its type is xs:string. b. The version element of the root is present (1..1), its type is xs:integer, and its value is "1". c. The created element of the root is present (1..1) and its type is xs:dateTime. The value of this element should be significant to at least the second. d. The lastModified element of the root is present (1..1) and its type is xs:dateTime. The value of this element should be significant to at least the second. e. The author element of the root may be present (0..*). • The name element of the author is present (1..1) and its type is xs:string. • The uri element of the author may be present (0..1) and its type is xs:anyURI. • The email element of the author may be present (0..1) and its type is xs:string. f. The profile element of the root may be present (0..*). • The id element of the profile is present (1..1) and its type is xs:string. The id must be unique within the root file. • The reference element of the profile is present (1..1) and its type is xs:string. It is recommended to use an URL. g. The resourceType element of the root is present (1..*). Each type of resource must have a resourceType element. • The id element of resourceType is present (1..1) and its type is xs:string. The id must be unique within the root file. It is recommended to use a human-readable class or type name for this id. • The reference element of resourceType is present (1..1) and its type is xs:string. It is recommended to use an URL.		

	• The representation element of resourceType may be present (0..*). It is recommended to provide an explicit representation. ▪ The mediaType element of representation is present (1..1) and its type is xs:string ▪ The validator element of representation may be present (0..*) and its type is xs:string. It is recommended to use an URL. h. The section element of root is present (1..*). Each section except the top level section of the hierarchy must have a corresponding section element. • The path element of a section is present (1..1) and its type is xs:string. The path is used to construct the full path to the section. A section path must not begin with the "@" symbol. • The profileID element of a section may be present (0..*) and its type is xs:string. The value of this element must be equal to the id attribute of a profile element. • The resourcePrefix element of a section may be present (0..*) and its type is xs:boolean. If resourcePrefix is false, path templates must not be used. • The resourceTypeID element of a section may be present (0..*) and its type is xs:string. The value of this element must be equal to the id attribute of a resourceType element. • The metadataSupport element of a section may be present (0..*) and its type is xs:boolean. • The section element of a section may be present (0..*), as subsections of the current section. 4. IF C_REC_CAP_001=TRUE, the simulated PHG sends an HTTP GET to retrieve the root file of the H&FS under test in JSON format (using provided URL and TLS 1.1). 5. The H&FS under test sends the root.json file to the simulated PHG. 6. In the received root file check compliance to the format described in 2, applying the following rules to create the JSON representation: • Simple XML elements are represented by JSON name-value pairs. • Complex XML elements are represented by JSON objects, whose names are the same as the corresponding XML element names. • XML attributes appear as JSON properties, using the name of the attribute as the property name. • Namespace references are not present. • Repeating XML elements are represented as JSON arrays. This rule applies even to XML elements that appear only once in a particular instance, if the upper cardinality of that element is greater than one. • xs:integer values are represented using a native JSON int. • xs:boolean values are represented using JSON's "true" and "false" values. • xs:dateTime is represented as plain text. • Other primitive types are represented as JSON strings, using the same serialization as the XML form.
Pass/Fail criteria	• Received root.xml file is compliant with the format described in step 3. • Received root.json file is compliant with the format described in step 6.
Notes	xs prefix refers to the XML Schema namespace (http://www.w3.org/2001/XMLSchema)

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