

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

H.812

(11/2017)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

E-health multimedia services and applications – Personal
health systems

**Interoperability design guidelines for personal
connected health systems:
Services interface**

Recommendation ITU-T H.812

ITU-T

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
VEHICULAR GATEWAYS AND INTELLIGENT TRANSPORTATION SYSTEMS (ITS)	
Architecture for vehicular gateways	H.550–H.559
Vehicular gateway interfaces	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	
Personal health systems	H.810–H.819
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.812

Interoperability design guidelines for personal connected health systems: Services interface

Summary

The Continua Design Guidelines (CDG) defines a framework of underlying standards and criteria that ensure the interoperability of devices and data used for personal connected health services. The Continua Design Guidelines also contains design guidelines (DGs) that further clarify the underlying standards or specifications by reducing options or by adding missing features to improve interoperability.

ITU-T H.812 contains an overview of the Services interface (Services-IF), common design guidelines for all Services-IF Certified Capability Classes (CCC) and the design guidelines for Consent Enabled Personal Health Gateway (PHG) and Services CCCs.

The design guidelines which support the following Certified Capability Classes (CCC) are defined in separate guidelines documents, as follows:

- Observation Upload capability in ITU-T H.812.1 (2017)
- Questionnaire capability in ITU-T H.812.2 (2017)
- Capability Exchange capability in ITU-T H.812.3 (2017)
- Authenticated Persistent Session capability in ITU-T H.812.4(2017)

ITU-T H.812 is part of the "ITU-T H.810 interoperability design guidelines for personal connected health systems" subseries that covers the following areas:

- ITU-T H.810 – Interoperability design guidelines for personal connected health systems: Introduction
- ITU-T H.811 – Interoperability design guidelines for personal connected health systems: Personal Health Devices interface
- ITU-T H.812 – Interoperability design guidelines for personal connected health systems: Services interface (this design guidelines document)
- ITU-T H.812.1 – Interoperability design guidelines for personal connected health systems: Services interface: Observation upload capability
- ITU-T H.812.2 – Interoperability design guidelines for personal connected health systems: Services interface: Questionnaire capability
- ITU-T H.812.3 – Interoperability design guidelines for personal connected health systems: Services interface: Capability exchange capability
- ITU-T H.812.4 – Interoperability design guidelines for personal connected health systems: Services interface: Authenticated persistent session capability
- ITU-T H.813 – Interoperability design guidelines for personal connected health systems: Healthcare information system interface

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.812	2015-11-29	16	11.1002/1000/12653
2.0	ITU-T H.812	2016-07-14	16	11.1002/1000/12913
3.0	ITU-T H.812	2017-11-29	16	11.1002/1000/13415

Keywords

CDG, Continua Design Guidelines, healthcare information systems, personal connected health systems, personal health devices, services.

* 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.

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Table of Contents

	Page
0 Introduction.....	vi
0.1 Organization	vi
0.2 Guideline releases and versioning	vi
0.3 What's new.....	vi
1 Scope.....	1
2 References.....	1
3 Definitions	2
4 Abbreviations and acronyms	2
5 Conventions	2
6 Architecture	2
7 Use cases.....	6
7.1 Consent management use cases.....	6
7.1.1 Upload consent to the server	6
7.1.2 Retrieve the already completed patient consent from the server	7
7.1.3 Upload updated consent to the server	7
7.2 Consent enforcement use case.....	7
7.2.1 Content encryption before upload	7
7.3 Other CCC use cases	7
8 Behavioural models	7
8.1 Common Services-IF message exchange behaviour	8
8.2 Common security model for REST based CCC implementations	8
8.3 Consent management behavioural model.....	9
8.4 Consent enforcement behavioural model	10
9 Implementation	10
9.1 Consent representation	10
9.2 Transport protocols.....	11
9.2.1 Transport protocol using data over HTTP.....	11
9.2.2 Transport protocol using IHE XDR	11
9.3 Consent enforcement	11
9.3.1 Consent enforcement using XML encryption	11
9.3.2 Consent enforcement using IHE DEN	11
Annex A Normative guidelines overview.....	12

	Page
Annex B General security guidelines for Services-IF CCCs	14
Annex C Normative guidelines for consent management	16
Appendix I ATOM feed elements for consent management	24
I.1 Information for consent in the root.xml	24
Appendix II Examples of consent management using SOAP	25
Appendix III OAuth example	28
Appendix IV Consent Enabled PHG Questionnaire response association	30
Bibliography.....	32

List of Tables

	Page
Table A.1 – Certified Capability Classes.....	12
Table A.2 – Guidelines for Certified Capability Classes.....	12
Table A.3 – Requirements common to all CCCs.....	13
Table B.1 – PHG security guidelines using REST	14
Table B.2 – Health & Fitness service security guidelines using REST	15
Table B.3 – Services-IF transport security guidelines	15
Table C.1 – Consent management guidelines using REST for the Consent Enabled PHG.....	16
Table C.2 – Consent management guidelines using REST for Consent Enabled Health & Fitness service	17
Table C.3 – Consent enforcement guidelines using data for the Consent Enabled PHG	18
Table C.4 – Consent enforcement guidelines using data for Consent Enabled Health & Fitness service	19
Table C.5 – Consent management guidelines using SOAP for the Consent Enabled PHG	20
Table C.6 – Consent management guidelines using SOAP for Consent Enabled Health & Fitness service	21
Table C.7 – Consent enforcement guidelines using SOAP for the Consent Enabled PHG.....	21
Table C.8 – Consent enforcement guidelines using SOAP for Consent Enabled Health & Fitness service	22
Table I.1 – ATOM feed child elements for consent management	24
Table IV.1 – The elements of the confidentiality code system.....	30
Table IV.2 – The elements of the Continua Consent Directive code system	30
Table IV.3 – The translation of the confidentiality code system to the Continua Consent Directive code system.....	30

Table IV.4 – OID distribution for Personal Connected Health Alliance	31
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List of Figures

Figure 1-1 – Services interface in the Continua architecture.....	1
Figure 6-1 – Services interface in the Continua E2E architecture	2
Figure 6-2 – Services-IF example	3
Figure 6-3 – Continua Services-IF showing the Services-IF Certified Capability Classes	4
Figure 6-4 – Services-IF reference model.....	5
Figure 8-1 – All connections are initiated from PHG	8
Figure 8-2 – Security behaviour for authorized RESTful CCC behaviour (Questionnaire use case is taken as an example).....	9
Figure 8-3 – Transactions between PHG and Health & Fitness service related to consent management	10
Figure 8-4 – Consent enforcement at the Services-IF.....	10
Figure II.1 – The PCD-01 transaction with un-encrypted payload.....	25
Figure II.2 – Encrypted PCD-01 transaction – public key based.....	26
Figure II.3 – Encrypted PCD-01 transaction – symmetric key based.....	27

0 Introduction

The Continua Design Guidelines (CDG) defines a framework of underlying standards and criteria that ensure the interoperability of devices and data used for personal connected health services. The Continua Design Guidelines also contains additional design guidelines (DGs) that further clarify the underlying standards or specifications by reducing options or by adding missing features to improve interoperability.

This design guidelines document contains additional design guidelines (DGs) for interoperability that further clarify or reduce the options or add features missing from underlying standards or specifications.

This design guidelines document contains a Services-IF overview, common design guidelines for all Services-IF Certified Capability Classes (CCC) and the design guidelines for Consent Enabled Personal Health Gateway (PHG) and Health & Fitness Service CCCs.

The design guidelines which support the following Certified Capability Classes (CCC) are defined in separate design guidelines documents as follows:

- [ITU-T H.812.1] *Interoperability design guidelines for personal connected health systems: Services interface: Observation upload capability.*
- [ITU-T H.812.2] *Interoperability design guidelines for personal connected health systems: Services interface: Questionnaire capability.*
- [ITU-T H.812.3] *Interoperability design guidelines for personal connected health systems: Services interface: Capability Exchange capability.*
- [ITU-T H.812.4] *Interoperability design guidelines for personal connected health systems: Services interface: Authenticated Persistent Session capability.*

This design guidelines document is part of the "ITU-T H.810 interoperability design guidelines for personal health systems" subseries. See [ITU-T H.810] for more details.

0.1 Organization

This design guidelines document is organized in the following manner.

Clauses 0-5: Introduction and terminology – These clauses provide Services-IF specific information to help understand the structure of the design specifications.

Clause 6: Services-IF overview – This clause provides an overview of the Services-IF CCCs.

Clause 7: Use cases – This clause provides practical examples.

Clause 8: Behavioural model – This clause provides an overview of sequences of interactions under Services interface common CCCs and summarizes typical interactions, constraints and exceptions.

Clause 9: Implementation – This clause details the use of common payload content and simple object access protocol (SOAP) vs representational state transfer (REST) based transport methodology in the common Services-IF Certified Capability Classes.

0.2 Guideline releases and versioning

See clause 0.2 of [ITU-T H.810] for release and versioning information.

0.3 What's new

To see what is new in this release of the design guidelines refer to clause 0.3 of [ITU-T H.810].

Recommendation ITU-T H.812

Interoperability design guidelines for personal connected health systems: Services interface

1 Scope

This design guidelines document focuses on the following interface:

- **Services-IF** The interface between a Personal Health Gateway (PHG) and Services.

This interface is defined in the Continua architecture as described in clause 6 of [ITU-T H.810] and is shown in Figure 1-1.

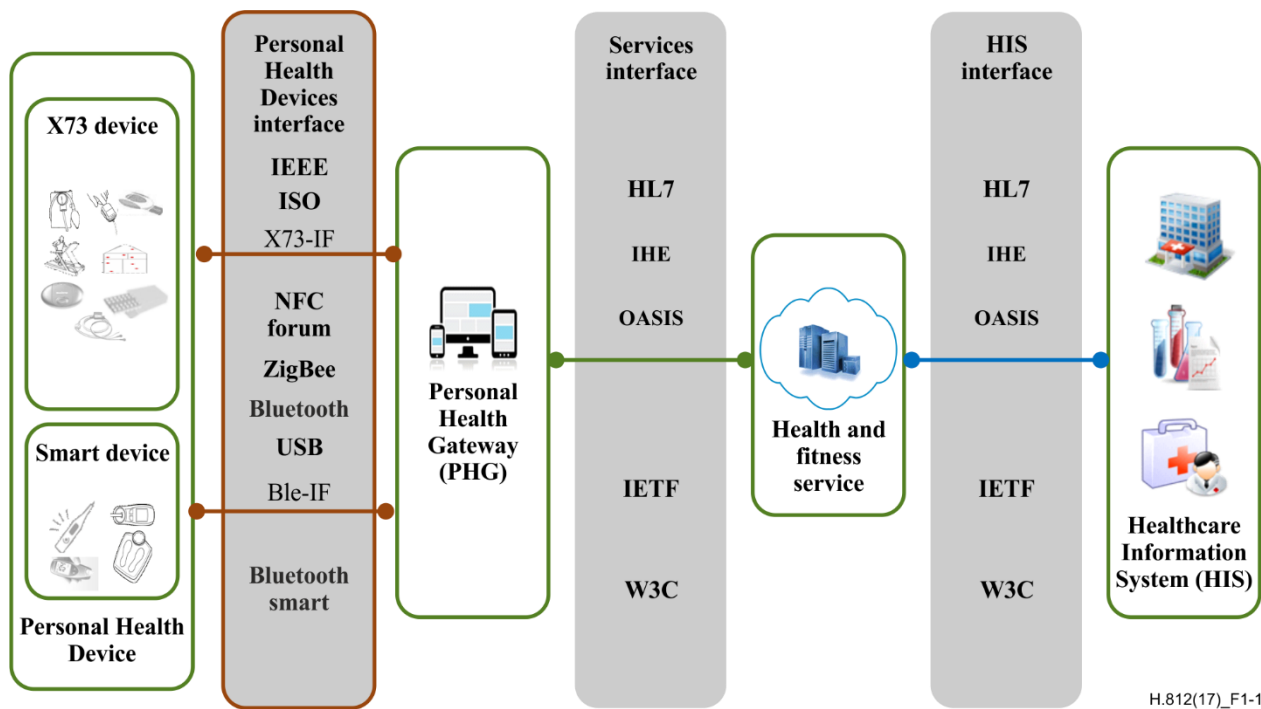


Figure 1-1 – Services interface in the Continua architecture

There are a number of Certified Capability Classes (CCCs) related to the Services-IF. This design guidelines document contains interoperability design guidelines that are applicable to several CCCs. Security interoperability design guidelines are one such example. In addition, this design guidelines document contains the design guidelines for the Consent Enabled PHG and Services interface CCCs. These CCCs may be grouped with multiple other Services-IF related CCCs, such as for example, Observation Upload CCCs or Questionnaire enabled CCCs.

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 (2017), *Interoperability design guidelines for personal connected health systems: Introduction*.

Other referenced documents can be found in clause 2 of [ITU-T H.810].

3 Definitions

This design guidelines document uses terms defined in [ITU-T H.810].

4 Abbreviations and acronyms

This design guidelines document uses abbreviations and acronyms defined in [ITU-T H.810].

5 Conventions

This design guidelines document follows the conventions defined in [ITU-T H.810].

6 Architecture

In this end-to-end (E2E) reference architecture, the Services interface (Services-IF) connects a Personal Health Gateway (PHG) to a Health & Fitness service (HFS). Figure 6-1 shows the Services interface in the Continua E2E architecture and Figure 6-2 shows an example of a Services-IF.

The Services-IF design guidelines are focused on enabling the interoperable exchange of information across a Services interface. A set of Services-IF related Certified Capability Classes is defined for the PHG and the Health & Fitness service to enable interoperability for a number of different use cases, including the uploading of measurement data, completing of questionnaires and executing of commands.

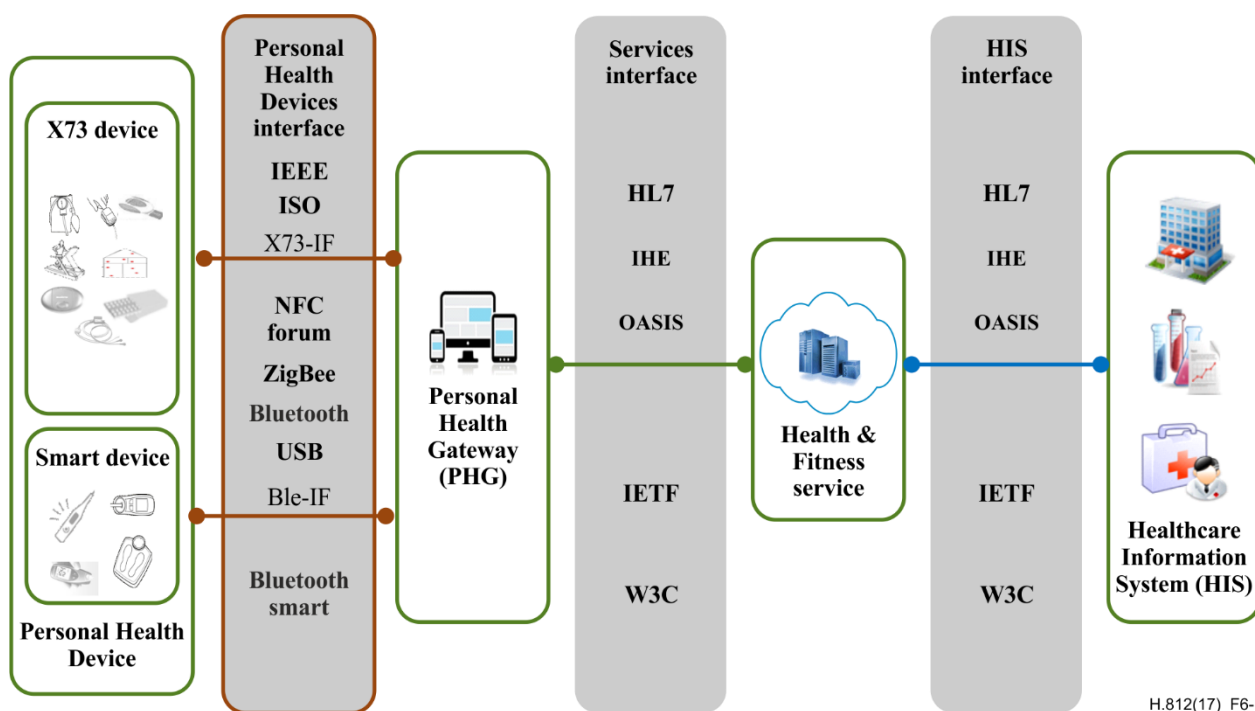


Figure 6-1 – Services interface in the Continua E2E architecture

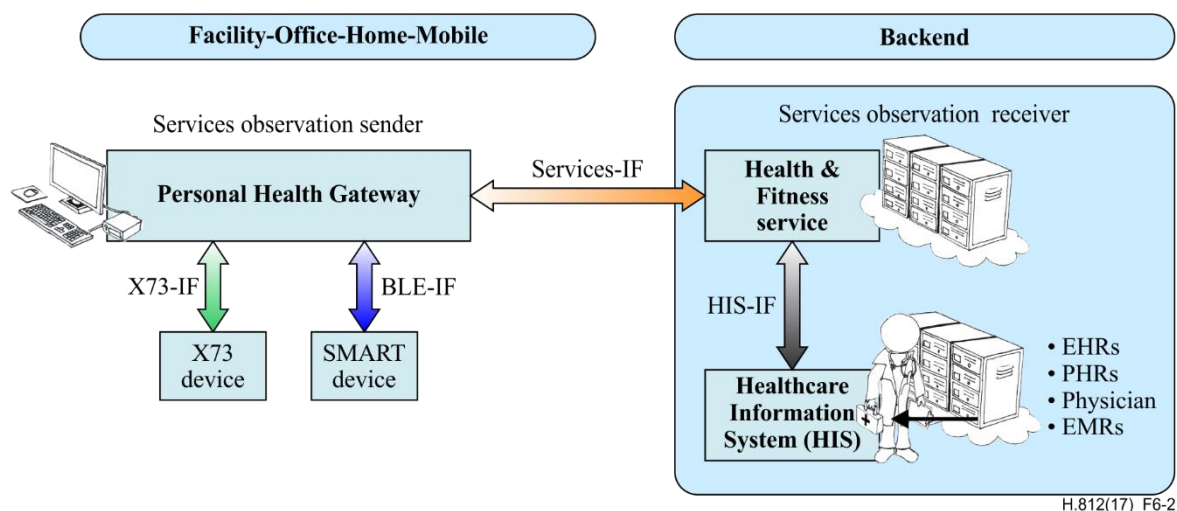


Figure 6-2 – Services-IF example

In addition to the Services-IF, the end-to-end reference architecture also defines the Healthcare Information System interface (HIS-IF). The Services-IF is designed to enable granular information exchange between a PHG (typically a PC, laptop, tablet, mobile phone or other type of embedded device), which is a device close to the user/patient and a Health & Fitness service (typically a backend cloud based service) which collects the information from such users and makes it available for further usage. In contrast the HIS-IF is designed to enable aggregated information exchange between two backend systems, e.g., a disease management system and an electronic health record (EHR)¹. The HIS-IF is defined in [ITU-T H.813].

It is also expected that a PHG may be deployed to in-home or user-carried applications, which places a number of constraints on the Services-IF design. Due to the difficulty in maintaining and/or upgrading these devices "in the field", a PHG should be robust and stand-alone and simple enough to keep costs low and technical operational experience or expertise requirements to a minimum. Because of this focus, the Services-IF allows the majority of the contextual metadata associated with the exchange of observations to reside outside of the PHG.

On the other hand, it is expected that a Health & Fitness service will be hosted by a more capable system such as a server or personal computer. Therefore, the design of the Services-IF aims to push complexity and maintainability issues to the Health & Fitness service as this means that the issues can be avoided on the PHG.

The Services-IF is an abstract channel composed of one or more CCC pairs that connect a PHG application with a Health & Fitness service application. Each CCC pair has a component that resides in the Health & Fitness service application and a component that resides in the PHG application. Continua defines Certified Capability Classes on both sides of the Services-IF.

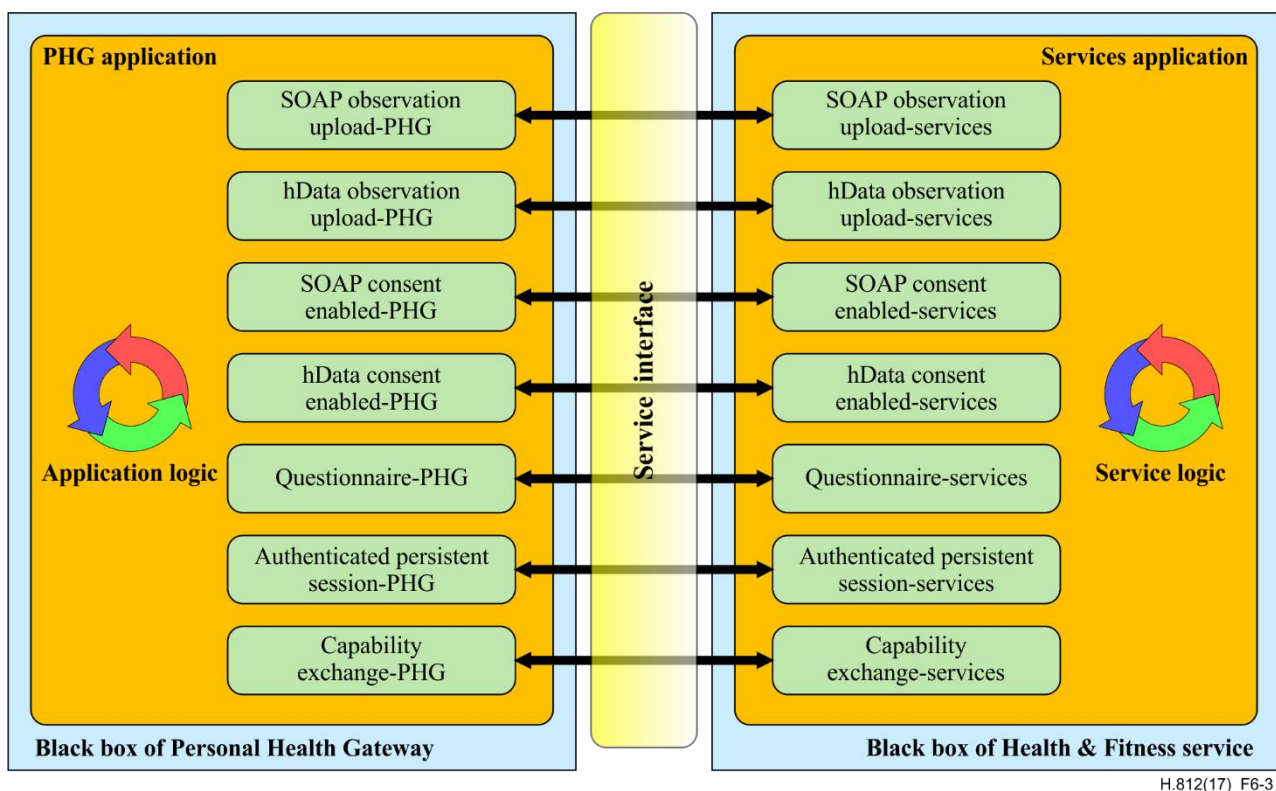
This version of the Services-IF guidelines enables the following Certified Capability Classes:

- the uploading of observations from the PHG to the Health & Fitness service in two different styles: web services (SOAP) and REST (data) [ITU-T H.812.1];

¹ NOTE – Within the end-to-end architecture, both the Services and the Healthcare Information System (HIS) interfaces can be implemented on a device close to the user/patient (PC, laptop, mobile phone, etc.) in order to exchange information with entities that are geographically distant from such devices. The guidelines place no restrictions on the deployment of Certified Capability Classes on specific hardware.

- the uploading of consent information from the PHG to the Health & Fitness service in two different styles: web services (SOAP) and REST (data) [ITU-T H.812];
- the downloading of to-be-completed questionnaires from the Health & Fitness service to the PHG and the uploading of completed questionnaires from the PHG to the Health & Fitness service [ITU-T H.812.2];
- the exchange of information (e.g., unsolicited commands) between the Health & Fitness service and the PHG over an authenticated persistent session [ITU-T H.812.4];
- the exchange of supported Certified Capability Class information (capability exchange) between the PHG and the Health & Fitness service as an enabler for the other use cases [ITU-T H.812.3].

A PHG can support one or more applications that each implement one or more Continua Certified Capability Classes. Figure 6-3 depicts the Continua Services-IF, showing a PHG application and a Health & Fitness service application in which all of the possible Services-IF Certified Capability Classes are implemented.



H.812(17)_F6-3

Figure 6-3 – Continua Services-IF showing the Services-IF Certified Capability Classes

The intent of these guidelines is to specify system behaviour in enough detail to achieve an acceptable level of interoperability for a particular use case. A use case is encapsulated in a Certified Capability Class (CCC). The guidelines make normative statements about how the network interface of the components of the CCC functions. For the Services-IF these components exist in the context of applications or services that reside on a PHG or on a Health & Fitness service.

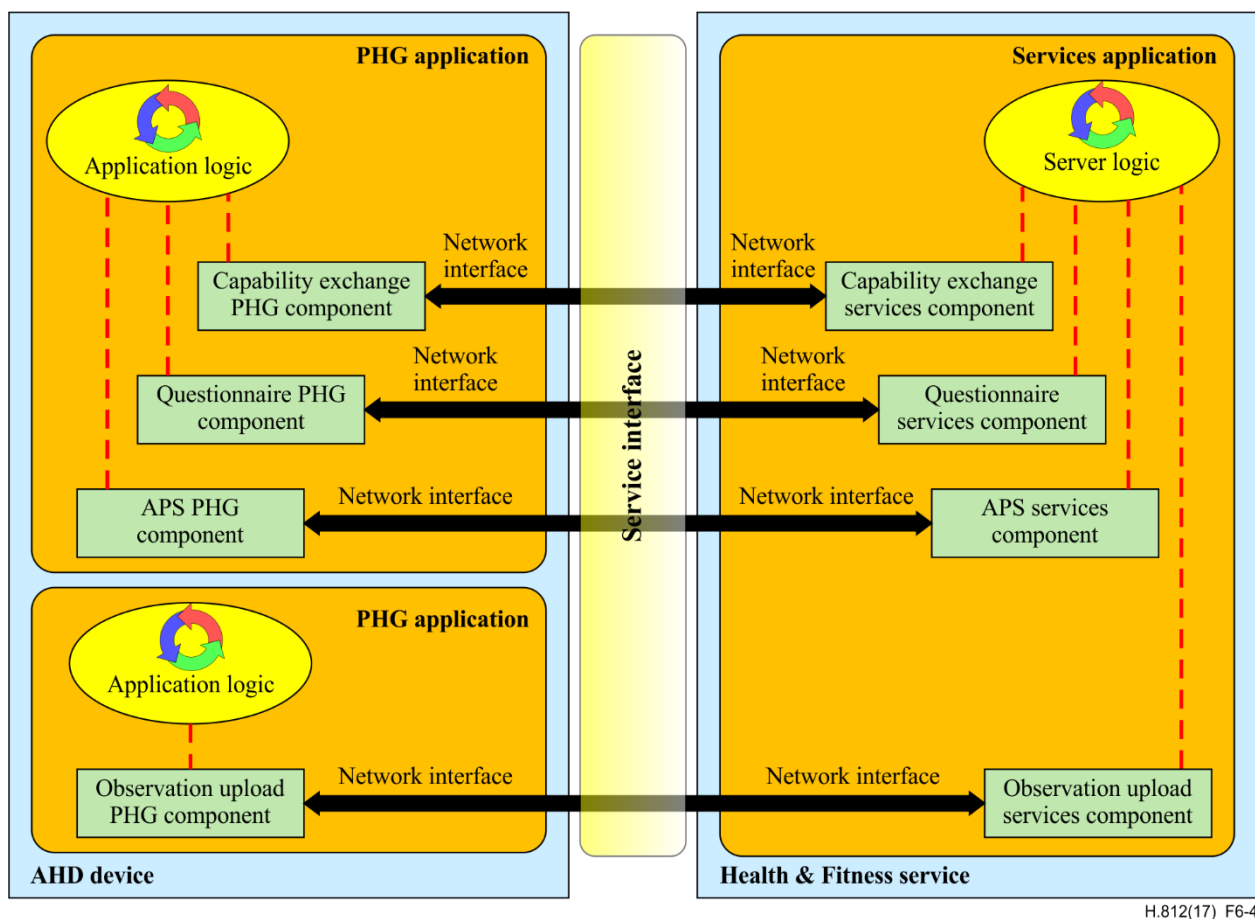
Common platforms often limit the manner in which applications can communicate with each other to ensure the stability of the overall platform. This limited interaction between applications is called sandboxing. In order to support sandboxed applications this version of the Services-IF uses a reference model that defines an application as a container for one or more CCC components. Interactions between the components within the application container do not have normative

requirements and are fully up to the developer of the application. Interactions on the Services-IF between the application's CCCs on the PHG and the corresponding CCCs on the Health & Fitness service are visible and do have normative requirements in order to pass certification.

The reference model allows multiple applications to exist in a PHG or a Health & Fitness service, but applications do not interact with other applications except through network interfaces. In these guidelines applications that run on a Health & Fitness service are often referred to as services since Health & Fitness services are commonly web service platforms. A Health & Fitness service is conceptually the same as a PHG application.

These guidelines document mechanisms by which components may communicate with each other through an internal application programming interface (API). Future versions of the Services-IF may use these mechanisms to enable interoperability between components within an application.

In Figure 6-4 the concepts of the Services-IF reference model are used to depict a PHG with two independent applications communicating with a Services application. One PHG application supports three CCCs and the other supports a single CCC. Normative requirements are made on the network interfaces between the PHG and the Health & Fitness service. The interactions between the CCC components within an application container are not normative and are shown as red dashed lines coordinated by application internal processing that are out of the scope of these guidelines.



H.812(17)_F6-4

Figure 6-4 – Services-IF reference model

Communications that use the Services-IF start with the PHG's Capability Exchange component. This component sends a request to its peer component on the Health & Fitness service. The request asks the Health & Fitness service to specify the different Certified Capability Classes that it supports. In common language the PHG application is asking "What things can you do?" The Health & Fitness service application answers this in terms of the CCCs it supports. In the case of Figure 6-4 the Health & Fitness service application would say "I support Capability Exchange,