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Part 10206: Personal health device communication — Abstract content information model

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Partie 10206: Communication entre dispositifs de santé personnels — Modèle d'information de contenu abstrait

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IEEE Std 11073-10206™-2022

Health Informatics—Device Interoperability—

Part 10206: Personal Health Device Communication—Abstract Content Information Model

Developed by the

IEEE 11073 Standards Committee
of the
IEEE Engineering in Medicine and Biology Society

Approved 21 September 2022

IEEE SA Standards Board

Abstract: Within the context of the ISO/IEEE 11073 family of standards for device communication, a simplified framework for making an abstract model of personal health data is available in this standard. The specification addresses the structure and content of information. It does not address communication of the information between devices.

Keywords: device interoperability, IEEE 11073-10206™, personal health device communication

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Introduction

This introduction is not part of IEEE Std 11073-10206-2022, Health Informatics—Device Interoperability—Part 10206: Personal Health Device Communication—Abstract Content Information Model.

ISO and IEEE 11073 standards enable communication between medical devices and external computer systems. This standard addresses a need for a simplified content model that can be used for personal health devices and is not tied to a method of communicating the content model. This standard aligns with, and draws upon, the existing clinically focused standards as well as implementation experience gained over the past decade.

Other closely related standards include the following:

ISO/IEEE 11073-20601:2022, Health informatics—Device interoperability—Part 20601: Personal health device communication—Application profile—Optimized exchange protocol [B12].[6]

[6] The numbers in brackets correspond to those of the bibliography in Annex A.

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Health Informatics—Device Interoperability—

Part 10206: Personal Health Device Communication—Abstract Content Information Model

1. Overview

This standard defines an abstract content model (ACOM) for personal health devices (PHDs). The objective of this work is to document the information in a PHD and the content of health observations that are sent by the PHD so that when an observation is received from the PHD, regardless of the protocol used to perform the communication, the health information is complete, consistent, and unambiguous. This standard does not define a protocol by which information is exchanged between devices and hence does not make requirements on how concepts are represented. When specific representations are made herein the purpose is to provide clarity of concept.

1.1 Scope

This standard defines an object-oriented abstract information model to represent a PHD and the observations generated by a PHD. It specifies what information needs to be present and the relationships between the informational elements in the model. It models observations in a generic way by focusing on the information content contained in the presentation of health measurements. The modeling follows the practice of ISO/IEEE 11073-20601 [B12] where Unified Modeling Language (UML) is used to describe a set of objects and the relationship between the objects.[7] Tables provide descriptions of the attributes in the objects. IEEE 11073-10101™ nomenclature terms are used to express clinical content.[8] This standard provides guidance as to what an exchange protocols needs to communicate to properly represent health observations, but is not, in itself, sufficient to be an exchange protocol. However, the content model defined herein does have sufficient detail to help organizations validate that there is no loss of the semantic content induced by data exchanges in a protocol adhering to this standard. This standard does not define a security framework.

1.2 Purpose

This standard supports an ecosystem in which PHDs use the nomenclature and dictionary of IEEE 11073™. When the IEEE nomenclature is used it helps to ensure that data communicated by PHDs is clearly understood and useable by health professionals as well as intelligent systems in the wider digital health

[7] The numbers in brackets correspond to those of the bibliography in Annex A.

[8] Information on references can be found in Clause 2.

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ecosystem. In ISO/IEEE 11073-20601 [B12], which uses the IEEE 11073 nomenclature, the information model is integrated with an optimized data exchange mechanism. This standard seeks to establish a new, simplified information model that is independent of data exchange (such as physical or transport layer) dependencies. Further it seeks to reduce the breadth of objects and attributes in the information model based on implementation experience gained over the past ten years.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals is *required to*).[9, 10]

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The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals is *able to*).

1.4 Context

Figure 1 shows the categories and typical types of devices in the personal health space. *Personal health devices*, or PHDs (e.g., blood pressure monitors, weighing scales, and pedometers), collect information about a person (or persons) and transfer the information to a personal health gateway, or PHG (e.g., cell phone, health appliance, or personal computer) for collection, display, and possible later transmission. The PHG may also forward the data to remote support services for further analysis or to support disease management. The PHD may also send the data directly to remote support services. The information supports a range of domains including disease management, health and fitness, and aging independently.

The IEEE 11073 Personal Health Devices Working Group focuses on the information content and the data exchange between the PHDs and PHG and *remote support services* as shown in Figure 1. Within the overall IEEE 11073 context, this document concentrates on the information content of PHDs, with the objective of allowing the information to be used seamlessly across the healthcare ecosystem.

[9] The use of the word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.
[10] The use of *will* is deprecated and cannot be used when stating mandatory requirements; *will* is only used in statements of fact.

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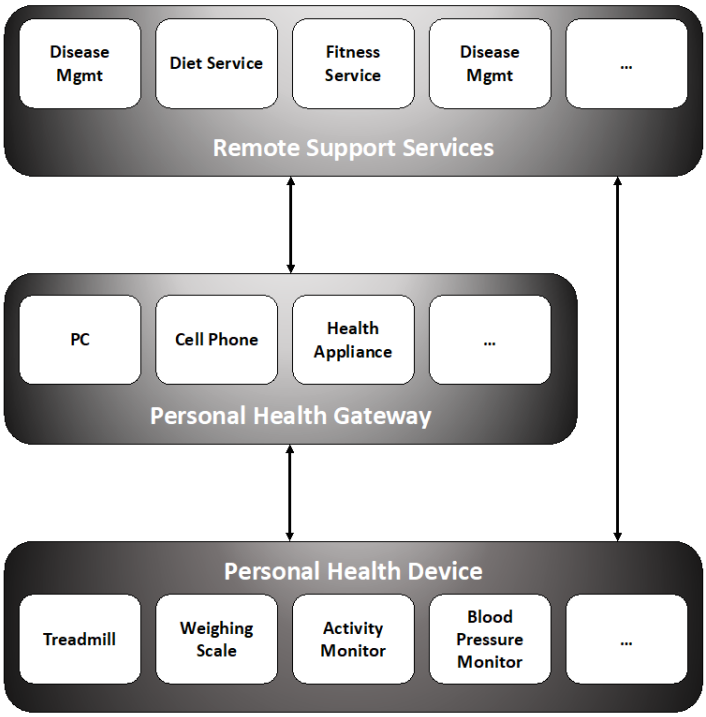


Figure 1—Overall context of work

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 11073-10101™-2019, IEEE Standard for Health informatics—Point-of-care medical device communication—Part 10101: Nomenclature.[11, 12]

IEEE Std 11073-10404™-2020, Health Informatics—Personal health device communication—Part 10404: Device specialization—Pulse oximeter.

IEEE Std 11073-10407™-2020, Health Informatics—Personal health device communication—Part 10407: Device specialization—Blood pressure monitor.

IEEE Std 11073-10408™-2019, Health Informatics—Personal health device communication—Part 10408: Device specialization—Thermometer.

IEEE Std 11073-10415™-2019, Health Informatics—Personal health device communication—Part 10415: Device specialization—Weighing scale.

[11] The IEEE standards or products referred to in Clause 2 are trademarks owned by The Institute of Electrical and Electronics Engineers, Incorporated.
[12] IEEE publications are available from The Institute of Electrical and Electronics Engineers (https://standards.ieee.org/).

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ISO/IEEE 11073-10406:2012, Health Informatics—Personal health device communication—Part 10406: Device specialization—Basic electrocardiograph (ECG) (1- to 3-lead ECG). [13]

ISO/IEEE 11073-10417-2017, Health Informatics—Personal health device communication—Part 10417: Device specialization—Glucose Meter.

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause. [14]

attribute: An attribute is an element in a class definition that describes a property or capability of the associated object that the class instantiates.

civil time: The statutory time scales as specified by governmental or civilian authorities. Civil time is typically standard time with a possible adjustment for daylight savings time.

class: As used in programming languages, an extensible template that defines the structure of objects.

NOTE—As used in this standard, *classes* capture the information content of the different components in the abstract information model. [15]

Coordinated Universal Time (UTC): The primary standard for expressing time in a precise, accurate, and unambiguous manner. UTC reports the solar mean time at 0º longitude.

device: A physical device implementing either a personal health device (PHD) or personal health gateway (PHG) role.

local time: The time in a given location based on the apparent movement of the sun due to the earth's rotation. Local time changes with longitude. Local time is often misused to mean *civil time*.

measurement: A datum generated by a personal health device (PHD), which is typically a reading from a sensor or the output of a counter.

object: The result of the instantiation of an abstraction, such as a class template.

NOTE—As used in this standard, the information content of an object can be understood through the associated class definition.

observation: Information associated with a measurement generated by a personal health device (PHD). An observation provides a more complete understanding of a measurement. By way of example, a temperature observation contains the numerical reading of a temperature sensor, the units of measure, and the time at which the sensor was read.

[13] ISO publications are available from the International Organization for Standardization (https://www.iso.org/) and the American National Standards Institute (https://www.ansi.org/).
[14] *IEEE Standards Dictionary Online* is available at: http://dictionary.ieee.org. An IEEE Account is required for access to the dictionary, and one can be created at no charge on the dictionary sign-in page.
[15] Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.

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