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Information technology — Biometric application programming interface —

Part 1: BioAPI specification

Technologies de l'information — Interface de programmation d'applications biométriques —
Partie 1: Spécifications BioAPI

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by ISO/IEC JTC 1, *Information technology*, SC 37, *Biometrics*.

This second edition cancels and replaces the first edition (ISO/IEC 19784-1:2006). It also incorporates the Amendments ISO/IEC 19784-1:2006/Amd 1:2007, ISO/IEC 19784-1:2006/Amd 2:2009 and ISO/IEC 19784-1:2006/Amd 3:2010.

A list of all the parts in the ISO 19784 series, can be found on the ISO website.

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Introduction

This document provides a high-level generic biometric authentication model suited to most forms of biometric technology. An architectural model is described which enables components of a biometric system to be provided by different vendors, and to interwork through fully-defined Application Programming Interfaces (APIs).

A key feature of the architecture is the BioAPI Framework, which supports calls by one or more application components (provided by different vendors, and potentially running concurrently) using the BioAPI API specification. The BioAPI Framework provides this support by invoking (through a Service Provider Interface, SPI) one or more Biometric Service Provider (BSP) components (provided by different vendors, and potentially running concurrently) which can be dynamically loaded and invoked as required by an application component.

However, this document can also be applied where a system is to be built from conforming BSP components (without a BioAPI Framework module), using platform-specific system-integration mechanisms - see Clause 6.

This document specifies the behaviour of the BioAPI Framework when applications and BSPs are in the same system. Other interworking standards (see 4.29) specify modifications of that behaviour that enable both BSPs and Graphical User Interfaces to be remote from the system containing an application.

NOTE 1 ISO/IEC 24708 BioAPI Interworking Protocol (BIP)[6] is an example of an interworking standard.

At the lowest level there is hardware or software that performs biometric functions such as capture, matching, or archiving. These parts of the architecture are called BioAPI Units, and can be integral to a BSP or can be supplied as part of a separate BioAPI Function Provider (BFP) component.

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Interactions (through the BioAPI Framework) can occur between BSPs from different vendors provided data structures used to record information from the BioAPI Units they access conform to other International Standards, and in particular to ISO/IEC 19794[5].

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The final component of the BioAPI architecture is the recognition that a BSP can provide its biometric services either:

a) by the use of BioAPI Units that are integral to (that is, directly managed by) the BSP, or

b) by invoking, through the BioAPI Function Provider Interface (FPI), one or more BFP components (provided by different vendors) that manage BioAPI Units that are integral to the BFP.

NOTE 2 A BioAPI Unit may consist of software only, or a combination of software and hardware (e.g., a biometric sensor, archive, or algorithm).

For each type of BioAPI Unit supported by a BSP (or BFP) there may be one or more BioAPI Units of that type which can be dynamically inserted and removed from the system. Insertion and removal generates events that can be signalled (through the BSP and the BioAPI Framework) to an application.

The BioAPI specification covers the basic biometric functions of Enrollment, Verification, and Identification (see Annex C), and includes a database interface to allow an application to manage the storage of biometric records through an archive BioAPI Unit managed by a BSP or BFP. This provides for optimum performance (e.g., when performing the biometric Identification function within a large population) of the archiving and biometric search processes.

The interface to the application provides primitives that allow it to manage the capture of biometric samples from a biometric sensor by accessing the corresponding BioAPI Unit, and the use of those biometric samples for Enrollment (storage in an application-controlled or BSP-controlled BIR database), and subsequent Verification or Identification against those stored records.

This document also specifies the content of a biometric component registry (information about the biometric components that have been installed on the biometric system). It also provides a component registry interface for the management and inspection of that registry.

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This documnet uses the C programming language (see ISO/IEC 9899) to specify the data structures and function calls that form the BioAPI interfaces.

Clause 6 describes the BioAPI architectural model and its components, and the interfaces that are specified between these components.

Clause 7 defines the data structures used in the BioAPI.

Clause 8 defines the function calls initiated by an application and supported by a conforming BioAPI Framework that are either handled internally by the BioAPI Framework (for example enumeration of installed BioAPI components) or mapped to a function provided by a BSP.

Clause 9 defines the function calls supported by a conforming BSP (and invoked by the BioAPI Framework in response to a call from a biometric application).

Clause 10 specifies the form of the biometric component registry and the component registry interface.

Clause 11 defines the handling of events and error returns.

Annex A is normative, and specifies details of conformance requirements and proformas that can be used by the vendor of a BioAPI Biometric Application, Framework, or BSP component to identify those functions and biometric record formats that shall be supported.

NOTE 3 A separate IS, ISO/IEC 24709, addresses conformance testing for this BioAPI specification[9].

Annex B is normative, and specifies the BioAPI Biometric Information Record (BIR) as a CBEFF Patron Format in accordance with ISO/IEC 19785-1. It provides a description of the biometric record specified in this part of ISO/IEC 19784, together with the (platform-independent) bit-pattern representation of such a record for storage and transfer.

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Annex C is informative, and provides a general tutorial on a number of aspects of the BioAPI specification.

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Annex D is informative, and provides example code to illustrate calling sequences and to provide implementation guidance.

Annex E provides an ASN.1 specification of the BioAPI Biometric Information Record (BIR).

This revision is a merged document of ISO/IEC 19784-1: 2006, ISO/IEC 19784-1: 2006/Amd 1: 2007, ISO/IEC 19784-1: 2006/Amd 2:2009, and ISO/IEC 19784-1: 2006/Amd 3 2010. But in this document, the defects in ISO/IEC 19784-1: 2006/Amd 3 are corrected. BioAPI 2.0 means specification from ISO/IEC 19784-1: 2006/Amd 2:2009, BioAPI 2.1 from ISO/IEC 19784-1: 2006/Amd 1: 2007, and BioAPI 2.2 from ISO/IEC 19784-1: 2006/Amd 3 2010.

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Information technology — Biometric application programming interface —

Part 1: BioAPI specification

1 Scope

This document defines the Application Programming Interface (API) and Service Provider Interface (SPI) for standard interfaces within a biometric system that support the provision of that biometric system using components from multiple vendors. It provides interworking between such components through adherence to this and to other International Standards.

For use in a system that does not include a BioAPI Framework (called a framework-free BioAPI system), only the SPI interface is applicable, with applications interfacing directly to that in a platform-specific manner.

NOTE 1 Many clauses and/or sub-clauses of this document are not applicable for implementation of a framework-free BioAPI system. These are identified at the head of the clause of sub-clause.

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The BioAPI specification is applicable to a broad range of biometric technology types. It is also applicable to a wide variety of biometrically enabled applications, from personal devices, through network security applications, to large complex identification systems.

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This document supports an architecture in which a BioAPI Framework supports multiple simultaneous biometric applications (provided by different vendors), using multiple dynamically installed and loaded (or unloaded) Biometric Service Provider (BSP) components and BioAPI Units (provided by other different vendors), possibly using one of an alternative set of BioAPI Function Provider (BFP) components (provided by other vendors) or by direct management of BioAPI Units.

NOTE 2 Where BioAPI Units are provided by a different vendor fom a BSP, a standardised BioAPI Function Provider Interface (FPI) may be needed. This is outside the scope of this document, but is specified by later parts for the different categories of FPI.

NOTE 3 Where a BioAPI Framework is not used in a system, the ability to support multiple applications and multiple BSPs is platform-dependent and depends on the nature of the system-integration techniques employed.

This document is not required (and should normally not be referenced) when a complete biometric system is being procured from a single vendor, particularly if the addition or interchange of biometric hardware, services, or applications is not a feature of that biometric system. (Such systems are sometimes referred to as "embedded systems".) Standardisation of such systems is not in the scope of this document.

This document does not define security requirements for biometric applications and biometric service providers.

NOTE 4 ISO 19092 provides guidelines on security aspects of biometric systems[3].

The performance of biometric systems (particularly in relation to searches of a large population to provide the biometric identification capability) is not in the scope of this document. Trade-offs between interoperability and performance are not in the scope of this document.

This document specifies a version of the BioAPI specification that is defined to have a version number described as Major 2, Minor 0, or version 2.0. It also specifies a version number described as Major 2, Minor 1, or version 2.1 that provides an enhanced Graphical User Interface. It also specifies a version

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number described as Major 2, Minor 2, or version 2.2 that provides features supporting fusion and security. Some clauses and sub-clauses apply only to one of these versions, some to two or more. This is identified at the head of the relevant clauses and sub-clauses.

NOTE 5 Earlier versions of the BioAPI specification were not International Standards.

NOTE 6 The differences between the requirements of the 2.0 specification and the 2.1 specification for framework-free operation relate only to the biometric type values and encodings.

Conformance requirements are specified in Clause 5.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 10646:2017, *Information technology — Universal Coded Character Set (UCS)*

ISO/IEC 19785-1, *Information technology — Common Biometric Exchange Formats Framework — Part 1: Data element specification*

ISO/IEC 19785-4:2010, *Information technology — Common Biometric Exchange Formats Framework — Part 4: Security block format specifications*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

NOTE 1 Function names and data element names are not included here, but are defined within the body of this document.

NOTE 2 Many of these terms and definitions are not relevant for the use of this document for framework-free BioAPI systems.

4.1
ACBio instance
report generated by a biometric processing unit (BPU) compliant to ISO/IEC 24761 to show the validity of the result of one or more subprocesses executed in the BPU

[SOURCE: ISO/IEC 24761]

4.2
adaptation
template adaptation
use of a BIR produced from a newly captured and verified biometric sample to automatically update or refresh a reference template

Note 1 to entry: This procedure is used to minimize the effects of template aging.

4.3
attach session
temporary association between an application, a single BSP, and a set of BioAPI Units that are managed either directly or indirectly by that BSP

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4.4
authentication context for biometrics
ACBio
international standard that specifies the form and encoding of ACBio instances

[SOURCE: ISO/IEC 24761]

4.5
BioAPI component
component of the BioAPI architecture with a defined interface that can be supplied by a separate vendor and which is subject to conformance testing

Note 1 to entry: BioAPI components include BioAPI applications, the BioAPI Framework, BSPs, and BFPs.

4.6
BioAPI Function Provider
BFP
component that manages one or more BioAPI Units of a specific category

Note 1 to entry: Interfaces to BioAPI Function Providers are standardized in subsequent parts of the ISO/IEC 19784 series.

Note 2 to entry: BFPs are categorized according to the categories of BioAPI Units that they manage (see 6.3.4).

4.7
BioAPI Unit
abstraction of a hardware or software resource that is directly managed by a BSP or BFP

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Note 1 to entry: Note1 to entry: BioAPI Units are categorized (see 6.3.2) and include sensor units, archive units, matching algorithm units and processing algorithm units.

ISO/IEC 19784-1:2018
https://standards.iteh.ai/catalog/standards/sist/20e9eb58-dc7b-4490-8bfb-b2a32dff762b/iso-iec-19784-1-2018

4.8
biographic data (BioAPI 2.2)
non-biometric data that potentially affects a biometric operation

4.9
biographic BIR (BioAPI 2.2)
non-biometric BIR that potentially affects a biometric operation

4.10
biometric
pertaining to the field of biometrics

4.11
Biometric Data Block
BDB
block of data with a defined format that contains one or more biometric samples or biometric templates

Note 1 to entry: Note1 to entry: ISO/IEC 19784 does not support BDB formats that are not an integral multiple of eight bits.

Note 2 to entry: There is no requirement that a BDB format be self-delimiting.

Note 3 to entry: Each part of the ISO/IEC 19794 series standardises one or more BDB formats. Vendor specific formats can also be specified and identified.

Note 4 to entry: Within BioAPI, the BDB is “opaque” to the application and is therefore sometimes referred to as an opaque biometric data block.

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4.12
Biometric Information Record
BIR
data structure containing one or more BDBs, together with information identifying the BDB formats, and possibly further information such as whether a BDB is signed or encrypted

Note 1 to entry: See ISO/IEC 19785-1.

Note 2 to entry: This document defines a BIR format (see 7.7) that supports only a single BDB. ISO/IEC 19785-1 defines a more general BIR format that supports multiple BDBs within the BIR, and the above definition is used in common by the two International Standards. When the term BIR is used in this document, it normally refers to the specific BIR format defined by BioAPI (see Annex B), not to an arbitrary BIR. The term BioAPI BIR is used where clarity is needed.

4.12.1
reference BIR
BIR whose BDB(s) contains one or more biometric templates

4.12.2
sample BIR
BIR whose BDB(s) contains only biometric samples that are not templates

4.13
biometric processing unit
BPU
entity that executes one or more subprocesses that perform a biometric verification at a uniform level of security

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Note 1 to entry: See ISO/IEC 24761.

Note 2 to entry: A sensor, a smart card, and a comparison device are examples of BPUs.

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https://standards.iteh.ai/catalog/standards/sist/20e9eb58-dc7b-4490-8bfb-b2a32dff762b/iso-iec-19784-1-2018

4.14
biometric sample
information obtained from a biometric sensor, either directly or after further processing

Note 1 to entry: See also raw biometric sample, intermediate biometric sample, and processed biometric sample.

4.14.1
biometric template
biometric sample or combination of biometric samples that is suitable for storage as a reference for future comparison

4.14.2
intermediate biometric sample
biometric sample obtained by processing a raw biometric sample, intended for further processing

4.14.3
processed biometric sample
biometric sample suitable for comparison

4.14.4
raw biometric sample
biometric sample obtained directly from a biometric sensor

Note 1 to entry: The formats for raw biometric samples are not currently standardised, and depend on the nature of the biometric device and the vendor of that device. They may in the future be standardised as part of the standardisation of specific biometric devices.

4.14.5
reference template
biometric template that has been stored

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4.15
biometric sensor
biometric hardware used to capture raw biometric samples from a subject

Note 1 to entry: The term 'biometric device' is used interchangeably with this term.

4.16
Biometric Service Provider
BSP
component that provides biometric services to an application through a defined interface by managing one or more BioAPI Units directly, or through interfaces to BioAPI Function Providers

4.17
biometrics
automated recognition of individuals based on their behavioural and biological characteristics

4.18
BPU IO Index
integer assigned to each biometric data stream between BPUs by the subject, such as software, which utilizes the function of the BPU so that the validator can reconstruct the data flow among BPUs

Note 1 to entry: See ISO/IEC 24761.

4.19
callback
mechanism by which a component that exposes an API invokes a function within a component that uses that API, where the address of that function has been previously passed as an input parameter of an API function call

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Note 1 to entry: This mechanism enables a BioAPI component to communicate with another BioAPI component other than by invoking an API function, usually in response to an event or interrupt.

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4.20
component registry
information maintained by the BioAPI Framework concerning the BioAPI components that are available on a biometric system

4.21
decision BIR (BioAPI 2.2)
BIR which contains decision in the BDB

4.22
encrypt
encryption
(reversible) transformation of data by a cryptographic algorithm to produce ciphertext, i.e. hide the information content (protect the confidentiality) of the data

Note 1 to entry: Encryption algorithms consist of two processes: encryption (or encipherment) which transforms plaintext into ciphertext, and decryption (or decipherment) which transforms ciphertext to plaintext.

Note 2 to entry: Encryption may be used for either security or privacy reasons.

4.23
enrollment
process of collecting one or more biometric samples from an individual, and the subsequent construction of a biometric reference template which can then be used to verify or determine the individual's identity

Note 1 to entry: The reference template would normally be stored by a biometric application, a BSP supporting an archive BioAPI Unit, or both.

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