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**AMENDMENT 2**
2015-04-15



# Information technology — Biometric data interchange formats —

## Part 1: **Framework**

## AMENDMENT 2: Framework for XML encoding

*Technologies de l'information — Formats d'échange de données biométriques —*

*Partie 1: Cadre*

*AMENDEMENT 2: Cadre pour le codage XML*

Reference number
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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# Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 37, *Biometrics*.

# Information technology — Biometric data interchange formats —

# Part 1: Framework

# AMENDMENT 2: Framework for XML encoding

*Add the following normative references to Clause 2.*

RFC 5141, *A Uniform Resource Name (URN) Namespace for the International Organization for Standardization (ISO)*

RFC 5234, *Augmented BNF for Syntax Specifications: ABNF*

*XML Schema Part 0: Primer*. W3C Recommendation, Second Edition, October 2004

*Insert the following text in the appropriate alphabetical order to Clause 4.*

ABNF Augmented BNF for Syntax Specifications

XML Extensible Markup Language

*Replace the heading title of Clause 12 from "Coding scheme for format types" to "Binary encoding scheme for format types".*

*Insert the following text at the end of 12.1.*

The record formats may have a binary encoding and an XML encoding. The binary encoding shall follow the description in Clause 12 of this part of ISO/IEC 19794. The XML encoding shall follow the description in Clause 13 of this part of ISO/IEC 19794.

*Insert the following clause after Clause 12.*

## 13 XML encoding scheme for format types

### 13.1 General

#### 13.1.1 Structure of XML Data Record

Each of the parts 2 through N of ISO/IEC 19794 may specify an XML data type and element names. The XML data type and element names shall be mapped to corresponding elements and data types in the binary format specified in the same part of ISO/IEC 19794, if any. The methodology and terms used for the XML encoding in the parts 2 through N of ISO/IEC 19794 shall conform to the description in this Clause. The syntax and semantics of XML schema used to describe biometric data interchange formats are defined in the XML Schema Part 0: Primer, W3C Recommendation, Second Edition, 28 October 2004.

All parts of ISO/IEC 19794 shall identify optional and mandatory elements — both for common and part-specific elements. An element is optional if the value of the minOccurs attribute is 0. An element

is required to appear if the value of the minOccurs attribute is 1 or more. The default value for the minOccurs attribute is 1 (see XML Schema Part 0).

When a type and/or element has multiple child elements with mixed bounds, elements with the possibility of multiple occurrences shall be encapsulated inside a wrapper element with maxOccurs="1" (which is the default value for the maxOccurs attribute).

EXAMPLE

```
<xs:complexType name="XyzDataType">
    <xs:sequence>
        <xs:element name="Version" type="cmn:VersionType"/>
        <xs:element name="RepresentationList">
            <xs:complexType>
                <xs:sequence>
                    <xs:element name="Representation" type="XyzRepresentationType"
                        maxOccurs="unbounded"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
```

All white space directives shall be omitted in XML Schema files through all parts.

### 13.1.2 XML Naming Conventions

Naming conventions for XML encoding of parts 2 through N of ISO/IEC 19794 are defined in this Clause. XML rules specified in this part of ISO/IEC 19794 align with those of W3C and IETF as appropriate.

Harmonisation with XML representations for biometric elements defined in ANSI/NIST-ITL 2 or in other XML schema definitions is seen as beneficial. Where possible, element and tag names should be aligned to map or external reference to ANSI/NIST or other regional namespaces, such as EU biometric data exchange XML schemas (e.g. "europa.eu/2008/pruem/dna/1.1"). If not possible, specific items and objects from external namespaces can still be used by means of XML mechanism "import" and "include".

The naming specification mechanism used in this document is in compliance with IETF/RFC 5141.

<URN> ::= "urn:" <NID> ":" <**NSS**>

The definition of a URN is intended to serve as persistent, location-independent, resource identifier, where <NID> is the Namespace Identifier, and <NSS> is the Namespace Specific String. In accordance with the standard development procedures within the framework of the ISO/IEC, the mechanism of an ISO URN Schema (RFC 5141) has been specified to define the syntax for URNs that identify documents developed by the ISO. In order to be in compliance with the most parts of a URN definition, only the phrase <**NSS**> in the definition of a URN has been further standardized in the RFC 5141.

**NSS** = std-nss

std-nss = "std:" docidentifier *supplement *docelement [**addition**]

An ISO/IEC JTC1/SC37 specific URN is derived from the object phrase "NSS" only. The mechanism used in the SC37 XML namespace defines the additional resources related to all Working Groups of ISO/IEC JTC1/SC37 by resolving identifiers for the object phrase <**addition**>.

The object <**addition**> has been defined in compliance with the ABNF specification [RFC 5234]:

addition = techdefined/isodefined

techdefined = ":tech" *techelement

techelement = sc37defined/sc27defined/sc17defined/scxxdefined/jtcdefined



 

```
isodefined      = <unspecified>
sc27defined     = <unspecified>
sc17defined     = <unspecified>
scxxdefined     = <unspecified>
jtcdefined      = <unspecified>
sc37defined     = 1*biomelement
biomelement     = 1*partname ":" [filetype]
partname        = frw/fmr/fsp/fir/fac/iir/sdi/fsk/vir/hnd/spd/vdi/dna/<unspecified>
filetype        = [fileorigin ":"] fileext
fileorigin      = "NIST" / "EU-decision" / <unspecified>
fileext         = "xsd" / "xml" / "xsl" / "wsdl" / "soap" / <unspecified> [":" fileversion]
fileversion     = "v" (versionno "." releaseno)
versionno       = DIGITS
releaseno       = DIGITS
DIGITS          = DIGIT *DIGIT
DIGIT           = %x30-39
ALPHA           = %x41-5A / %x61-7A ; A-Z / a-z
```

The long form of the abbreviations used in the above specification is listed below:

```
frw     := XML Framework
fmr     := Finger minutiae data (ISO/IEC 19794-2)
fsp     := Finger pattern spectral data (ISO/IEC 19794-3)
fir     := Finger image data (ISO/IEC 19794-4)
fac     := Face image data (ISO/IEC 19794-5)
iir     := Iris image data (ISO/IEC 19794-6)
sdi     := Signature/sign data (ISO/IEC 19794-7)
fsk     := Finger pattern skeletal data (ISO/IEC 19794-8)
vir     := Vascular image data (ISO/IEC 19794-9)
hnd     := Hand geometry silhouette data (ISO/IEC 19794-10)
spd     := Signature/sign processed dynamic data (ISO/IEC 19794-11)
vdi     := Voice data (ISO/IEC 19794-13)
dna     := DNA data (ISO/IEC 19794-14)
```

A URN identifying an ISO document can be transformed to a valid http URI by replacing the “std:” prefix with the domain name “standards.iso.org”, replacing all occurrences of “:” within the identifier with “/”, and converting characters to lowercase (see RFC 5141).

EXAMPLE 1

19794 part 1; edition 2; amendment 2 on XML encoding (document name):

standards.iso.org/iso-iec/19794/-1/ed-1/amd/2

EXAMPLE 2

19794 part 1, edition 2; amendment 2; clause C, using <addition> to denote the file extension “soap” (document and file name):

standards.iso.org/iso-iec/19794/-1/ed-2/amd/2/clause:C/tech/frw/soap

EXAMPLE 3

19794 part 1; corrigendum 3 (document name):

standards.iso.org/iso-iec/19794/-1/cor/3

EXAMPLE 4

19794 part 1; edition 2; amendment 2 on XML Encoding; Framework referring the XML file of version 1 and release 01 (document and file name):

standards.iso.org/iso-iec/19794/-1/ed-2/amd/2/frw/xml/v1.01

EXAMPLE 5

19794 part 14; edition 1, corrigendum 1 on DNA concerning NIST specific objects by using <addition> to denote the file extension “wsdl”, version 2 and release 01 (document and file name):

standards.iso.org/iso-iec/19794/-14/ed-1/cor/1/dna/NIST/wsdl/v2.01

EXAMPLE 6

19794 part 14; addendum 2 on DNA concerning EU specific objects by using <addition> to denote the file extension “xsd” of version 1 and release 1 (document and file):

standards.iso.org/iso-iec/19794/-14/add/2/dna/EU/xsd/v1.1

EXAMPLE 7

19794 part 1; edition 3; addendum 3 on common elements concerning NIST specific objects by using <addition> to denote the file extension “xml” of version 2x and release 01 (document and file name):

standards.iso.org/iso-iec/19794/-1/ed-3/add/3/NIST/xml/v2x.01

EXAMPLE 8

19794 part 1; edition 3; addendum 3 on common elements concerning NIST specific objects by using <addition> to denote the file extension “xml” of version 2x and release 01 (document and file name):

standards.iso.org/iso-iec/19794/-1/ed-3/add/3/NIST/xml/v2x.01

## 13.2 Common elements

All data types and element names of XML implementations that are common among parts 2 through N of ISO/IEC 19794 are listed in this Clause.

For XML encoding of a quality score the following mapping shall be used:

— If the quality score is not computed, then no quality information shall be encoded.



 

— If the quality score is 255, the element shall be encoded with the string element "QualityCalculationFailed". The content of the string is not defined by this standard. It may be empty or implementation-specific.

— If the quality score is in the range of 0 to 100, the element "Quality Score" shall be used.

Even though some types are not common across all parts of this standard, this XML framework will nevertheless define types that are common across multiple parts to promote harmonisation and consistent usage.

The object "CaptureDateTime" shall be mandatory for the specific binary encoding parts of ISO/IEC 19794, but optional for XML encoding parts, e.g. Voice and DNA.

The relationship between common binary and XML elements is reflected in Table 8.

**Table 8 — Mapping of common XML elements to binary ones**

| Binary Element Name | XML Element Name |
|---|---|
| Format Identifier | N.A. |
| Version Number | Version |
| Number of representations | N.A. |
| Certification flag | N.A. |
| Capture date and time | CaptureDateAndTime |
| Capture device technology identifier | CaptureDeviceTechnologyIdentifier |
| Capture device vendor identifier | DeviceModelId.Organization |
| Capture device type identifier | DeviceModelId.Id |
| Quality record | Quality |
| Quality score | Quality.Score |
| Quality algorithm vendor ID | Algorithm.Organization |
| Quality algorithm ID | Algorithm.Id |
| Certification record | CertificationIDList |
| Certification authority identifier | CertificationId.Organization |
| Certification scheme identifier | CertificationId.Id |

## 13.3 Prototypes

This Clause lists prototypes to be specialised in parts 2 through N of ISO/IEC 19794. The root element should be named after the title of the part, e.g., "FingerImage", "FingerMinutiae", or "DNA".

```
<xs:complexType name="XyzDataType">
    <xs:sequence>
        <xs:element name="Version" type="cmn:VersionType"/>
        <xs:element name="RepresentationList">
            <xs:complexType>
                <xs:sequence>
                    <xs:element name="Representation" type="XyzRepresentationType"
                        maxOccurs="unbounded"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>

<xs:complexType name="XyzRepresentationType">
    <xs:sequence>
        <xs:element name="CaptureDateTime" type="xs:dateTime"/>
        <xs:element name="CaptureDevice" type="XyzCaptureDeviceType"/>
```

```
        <xs:element name="QualityList minOccurs="0">
            <xs:complexType>
                <xs:sequence>
                    <xs:element name="Quality" type="cmn:QualityType"
                        maxOccurs="unbounded"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
        <xs:element name="XyzData" type="xs:base64Binary"/>
    </xs:sequence>
</xs:complexType>
```

*Insert the following clause after A.3.2.2.*

### A.3.2.3 Conformance testing methodology for biometric data XML documents

Each part of ISO/IEC 19794 defining an XML schema shall require conformance testing in terms of strict validation of the XML schema definition. Additionally, it shall contain a table specifying test assertions for further requirements that are not explicitly covered by the schema validation process. Each part may contain a normative annex that defines an XSLT (Extensible Stylesheet Language Transformations) stylesheet for use in testing the level-2 conformance of valid XML documents claimed to conform to that XML schema.

*Insert the following normative annex after Annex B.*

## Annex C
(normative)

## Common Element XML Schema

```
<?xml version="1.0" encoding="utf-8"?>
<!--is hereby granted, free of charge in perpetuity, to any person obtaining a copy of the
Schema, to use, copy, modify, merge distribute free of charge, copies of the Schema for
the purposes of developing, implementing, installing and using software based on Schema,
and to permit persons to whom the Schema is furnished to do so, subject to the following
conditions:SCHEMA IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED,
INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,FOR A PARTICULAR PURPOSE
AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY
CLAIM, DAMAGES OR LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING
FROM, OUT OF OR IN CONNECTION WITH THE SCHEMA OR THE USE OR OTHER IN THE SCHEMA. addition,
any modified copy of the Schema shall include the following notice: SCHEMA HAS BEEN
MODIFIED FROM THE SCHEMA DEFINED IN ISO/IEC 19794-1, AND SHOULD NOT BE INTERPRETED AS
COMPLYING WITH THAT STANDARD
-->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns="http://standards.iso.
org/iso-iec/19794/-1/ed-2/amd/2" targetNamespace="http://standards.iso.
org/iso-iec/19794/-1/ed-2/amd/2" elementFormDefault="qualified"
attributeFormDefault="unqualified">

    <xs:attribute name="SchemaVersion" type="xs:string"/>
    <xs:complexType name="VersionType">
        <xs:sequence>
            <xs:element name="Major" type="xs:unsignedInt"/>
            <xs:element name="Minor" type="xs:unsignedInt"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="RegistryIDType">
        <xs:sequence>
            <xs:element name="Organization" type="xs:unsignedShort"/>
            <xs:element name="Identifier" type="xs:unsignedShort"/>
        </xs:sequence>
    </xs:complexType>
```



 

```
    <xs:complexType name="QualityListType">
        <xs:sequence>
            <xs:element name="Quality" type="QualityType" maxOccurs="255"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="QualityType">
        <xs:sequence>
            <xs:element name="Algorithm" type="RegistryIDType"/>
            <xs:choice>
                <xs:element name="Score" type="QualityScoreType"/>
                <xs:element name="QualityCalculationFailed">
                    <xs:complexType/>
                </xs:element>
            </xs:choice>
        </xs:sequence>
    </xs:complexType>

    <xs:simpleType name="QualityScoreType">
        <xs:restriction base="xs:unsignedByte">
            <xs:minInclusive value="0"/>
            <xs:maxInclusive value="100"/>
        </xs:restriction>
    </xs:simpleType>

    <!-- CoordinateCartesian2D<Range>Type with the ranges short, unsigned short, int,
unsigned int, float and double-->

    <xs:complexType name="CoordinateCartesian2DShortType">
        <xs:sequence>
            <xs:element name="X" type="xs:short"/>
            <xs:element name="Y" type="xs:short"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian2DUnsignedShortType">
        <xs:sequence>
            <xs:element name="X" type="xs:unsignedShort"/>
            <xs:element name="Y" type="xs:unsignedShort"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian2DIntType">
        <xs:sequence>
            <xs:element name="X" type="xs:int"/>
            <xs:element name="Y" type="xs:int"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian2DUnsignedIntType">
        <xs:sequence>
            <xs:element name="X" type="xs:unsignedInt"/>
            <xs:element name="Y" type="xs:unsignedInt"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian2DFloatType">
        <xs:sequence>
            <xs:element name="X" type="xs:float"/>
            <xs:element name="Y" type="xs:float"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian2DDoubleType">
        <xs:sequence>
            <xs:element name="X" type="xs:double"/>
            <xs:element name="Y" type="xs:double"/>
        </xs:sequence>
    </xs:complexType>

    <!-- CoordinateCartesian3D<Range>Type with the ranges short, unsigned short, int,
```

```
unsigned int, float and double-->

    <xs:complexType name="CoordinateCartesian3DShortType">
        <xs:sequence>
            <xs:element name="X" type="xs:short"/>
            <xs:element name="Y" type="xs:short"/>
            <xs:element name="Z" type="xs:short"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian3DUnsignedShortType">
        <xs:sequence>
            <xs:element name="X" type="xs:unsignedShort"/>
            <xs:element name="Y" type="xs:unsignedShort"/>
            <xs:element name="Z" type="xs:unsignedShort"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian3DIntType">
        <xs:sequence>
            <xs:element name="X" type="xs:int"/>
            <xs:element name="Y" type="xs:int"/>
            <xs:element name="Z" type="xs:int"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian3DUnsignedIntType">
        <xs:sequence>
            <xs:element name="X" type="xs:unsignedInt"/>
            <xs:element name="Y" type="xs:unsignedInt"/>
            <xs:element name="Z" type="xs:unsignedInt"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian3DFloatType">
        <xs:sequence>
            <xs:element name="X" type="xs:float"/>
            <xs:element name="Y" type="xs:float"/>
            <xs:element name="Z" type="xs:float"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinateCartesian3DDoubleType">
        <xs:sequence>
            <xs:element name="X" type="xs:double"/>
            <xs:element name="Y" type="xs:double"/>
            <xs:element name="Z" type="xs:double"/>
        </xs:sequence>
    </xs:complexType>

    <!-- Coordinate Polar<Range>Type with the ranges short, unsigned short, int, unsigned
int, float and double-->

    <xs:complexType name="CoordinatePolarShortType">
        <xs:sequence>
            <xs:element name="Radius" type="xs:short"/>
            <xs:element name="Azimuth" type="xs:short"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinatePolarUnsignedShortType">
        <xs:sequence>
            <xs:element name="Radius" type="xs:unsignedShort"/>
            <xs:element name="Azimuth" type="xs:unsignedShort"/>
        </xs:sequence>
    </xs:complexType>

    <xs:complexType name="CoordinatePolarIntType">
        <xs:sequence>
            <xs:element name="Radius" type="xs:int"/>
            <xs:element name="Azimuth" type="xs:int"/>
```



 