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ISO/IEC 24727-3

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AMENDMENT 1
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Identification cards — Integrated circuit card programming interfaces —

Part 3: Application interface

AMENDMENT 1

Cartes d'identification — Interfaces programmables de cartes à puce —
Partie 3: Interface d'application

AMENDEMENT 1

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Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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.

Amendment 1 to ISO/IEC 24727-3:2008 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

ISO/IEC 24727-2 standardizes the use of ISO/IEC 7816-15 data structures as "discovery information" that is communicated throughout the ISO/IEC 24727 stack. This Amendment enhances the definition of the use of ISO/IEC 7816-15 to fully link the entities defined at the Service Access Layer (API) (e.g. Differential Identity, Authentication Protocol) with typical "on-card" entities such as keys, files and Access Control Rules. Examples are provided.

XML encodings have become more and more used in the field of IAS [Identity, Authentication and (digital) Signature] Identity Management and general networking communication. To enhance interoperability with existing networking systems and federated identification and authorization systems (e.g. SAML, OpenID, etc.) standardization of an XML representation of the API and data structures of ISO/IEC 24727-3 is essential.

This Amendment extends the scope of ISO/IEC 24727-3 in the following ways:

1. Make explicit (normative and informative elements, including examples) of the use of the ISO/IEC 7816-15-based Registry. XML representation of the ISO/IEC 24727-3 API including appropriate web service bindings specified as WSDL-structure.
2. Reaffirm that ASN.1 is the central definition of the API and data structures. All other bindings and representations are derived from ASN.1
3. ASN.1 and XML representations for ISO/IEC 24727-3 will reside in this part, which may necessitate movement of text/annexes from other parts of ISO/IEC 24727 (i.e. ISO/IEC 24727-2 and ISO/IEC 24727-4 and ISO/IEC 24727-5).
4. As a result of Amendments under development for other parts of ISO/IEC 24727, portions of this standard may be deleted and referenced.
5. Add to this standard the ISO/IEC 7816-13 application management and life cycle concepts.
6. Add a discovery mechanism to the API to indicate messaging is either ASN.1 or XML.
7. Enhance a Registry facility through which the SAL can record its use of the GCI and through which the GCI mechanisms can be conveyed to the SAL.
8. Consider enhancements to the API to resolve technical deficiencies.
9. Remove ambiguities by elaborating and re-specifying concepts that may not be clear in the current standard.

10. Incorporate concepts that are captured in other parts of ISO/IEC 24727 but are more relevant for ISO/IEC 24727-3.
11. Include C and Java bindings in a Normative Annex (C) and an Informative Annex(Java).
12. Pursue additional mechanisms for discovery and (card and application) capability description based e.g. on XML representations as part the development of a more comprehensive Registry. *This XML is restricted to a set of instructions that enable card recognition for legacy cards.*

Identification cards — Integrated circuit card programming interfaces —

Part 3: Application interface

AMENDMENT 1

Add the following new annexes after Annex C:

Annex D
(normative)

Web Services Interface Description

D.1 Contents of Annex D

- **Clause D.2** contains information for the connection establishment for web service based SAL-communication.
- **Clause D.3** contains an XML-based CardInfo-Structure, which facilitates the support of legacy cards.
- **Clause D.4** contains the XML-specification for the XML-based Service Access Layer Interface

D.2 Connection handling for web service based communication

This clause describes the connection handling for web service based communications in an ISO/IEC 24727-based environment.

D 2.1 General security requirements

The security requirements of ISO/IEC 24727 dictate that the TLS protocol in accordance with RFC 4346 shall be used.

Moreover, public server services shall have access to corresponding X.509 certificates.

When it comes to the security of the communication between the different modules realizing the ECC-3 stack consisting of Service Access Layer (SAL) and IFD Layer), however, X.509 certificates shall be used, whereby the associated private keys shall be adequately protected. Alternatively, anonymous TLS cipher suites, such as `TLS_DH_anon` from RFC 4346 or `TLS_ECDH_anon` from RFC 4492, shall be used, although appropriate security measures need to be taken in the operational environment in order to avert man-in-the-middle attacks while the connection is being established.

In both cases there shall be an exclusive binding of the communication context at application level to the TLS channel which has been established in this process. This communication context is established on connection to the IFD-Layer via the function `EstablishContext` and represented by the `ContextHandle`. When connecting to the SAL, this communication context corresponds to a connection to the card application established by means of `CardApplicationConnect`, which is represented by a `ConnectionHandle`.

As such, one single TLS channel shall be sufficient to establish communication between a SAL and the IFD layer — irrespective of the number of card terminals and connected cards — whereas a separate TLS channel shall be required for every connection to a card application for communication to take place between the identity layer or the application layer and the SAL.

D.2.2 Connections for SOAP binding

When using the SOAP binding, the connection shall be established simply by setting up a TLS-protected channel between the user of the web service (service consumer) and the provider of the web service (service provider) via which web service messages can henceforth be exchanged. In this case the service consumer and service provider take the roles of TLS/http client and TLS/http server, respectively.

D.2.3 Connections for PAOS binding

When using the PAOS binding, however, a more complex process shall be required to establish the connection as, in this case, the TLS/http server acts as the user of the web service (service consumer) with eService because the TLS/http client acts as the provider of the web service (service provider) and shall initiate the connection.

Moreover, in this case there are typically two different TLS channels, and appropriate cryptographic mechanisms shall be used to safeguard their logical relationship while the connection is established.

An example general connection sequence is illustrated in Figure D.1.

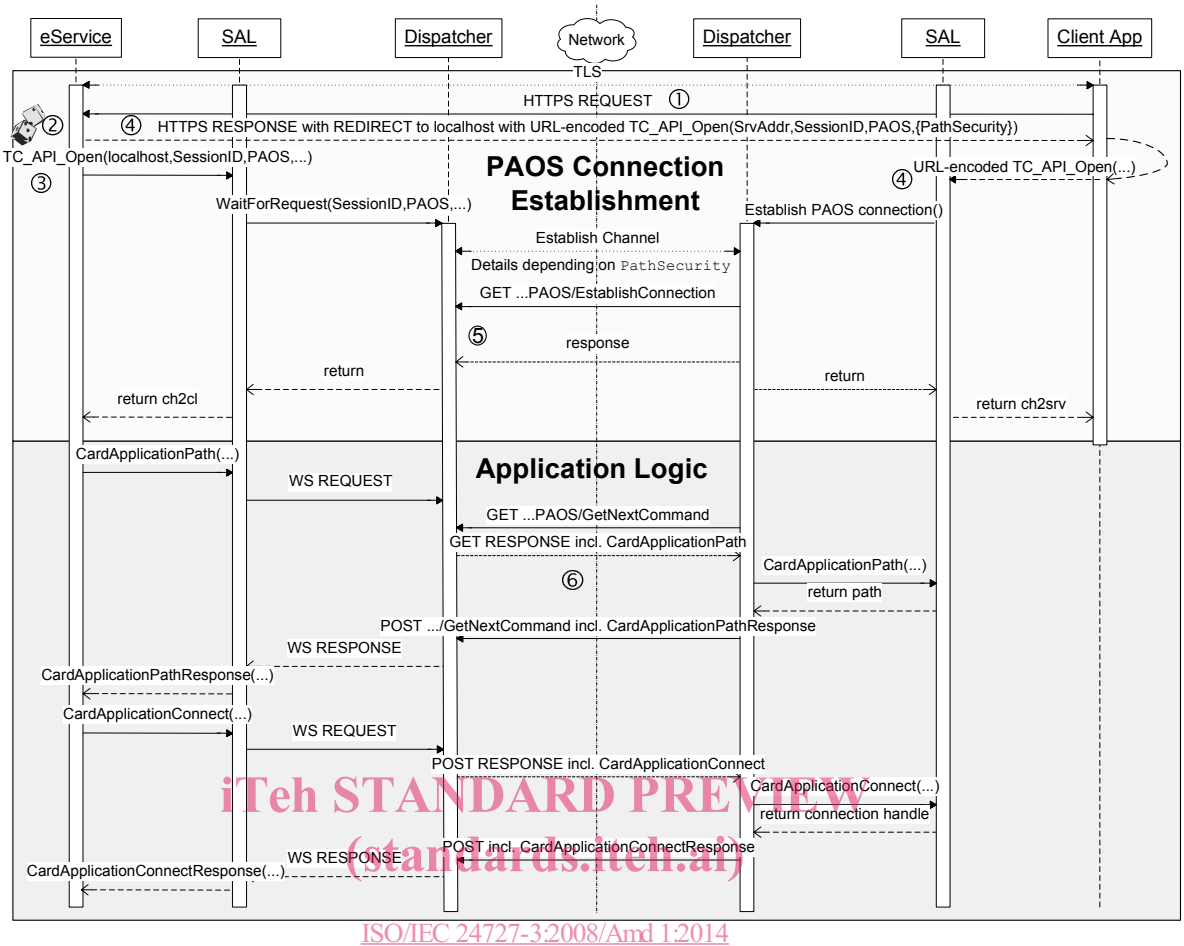

Figure D.1 — Example of a general connection process with PAOS binding

D.3 XML-based CardInfo-Structure for support of legacy cards

D.3.1 Introduction

In order to use the generic Service Access Layer (SAL) interface defined in this standard with legacy cards, it shall be necessary to provide a certain set of information, which allows to map the generic calls at the SAL to card-specific APDUs.

The XML-schema introduced in this clause defines a structure that shall both be used for the specification of card profiles *and* for the mapping of generic calls at the Service Access Interface to card-specific APDUs of legacy cards.

The rest of this annex is structured as follows: Clause D.3.2 provides an overview of the defined structure and explains the top-level element `<CardInfo>`. The following clauses D.3.3 through D.3.7 describe the various child-elements of `<CardInfo>`, Clause E.7 contains the complete XML-schema-definition

D.3.2 Overview

The `CardInfo` structure shall be used for the specification of card profiles *and* for the mapping of generic requests at the Service Access Layer to card-specific APDUs in case of legacy cards, which are not equipped with appropriate ACD and CCD structures according to ISO/IEC 24727-2.

Each card profile shall be described by a `<CardInfo>` element

```
<element name="CardInfo" type="iso:CardInfoType" />
```

of type `CardInfoType` which shall be defined as follows:

```
<complexType name="CardInfoType">
  <sequence>
    <element name="CardType" type="iso:CardTypeType" />
    <element name="CardIdentification" type="iso:CardIdentificationType" />
    <element name="CardCapabilities"
             type="iso:CardCapabilitiesType" maxOccurs="1" minOccurs="0" />
    <element name="ApplicationCapabilities"
             type="iso:ApplicationCapabilitiesType" maxOccurs="1" minOccurs="0" />
    <element name="Signature"
             type="ds:SignatureType" maxOccurs="unbounded" minOccurs="0" />
    </sequence>
    <attribute name="Id" type="ID" use="optional" />
  </complexType>
```

`<CardType> [required]`

Contains a unique identifier for the card type and optionally further links to specification documents.

`<CardIdentification> [required]`

Allows to determine the type of a given card by traversing an appropriate decision tree and checking whether the characteristic features are as expected.

`<CardCapabilities> [optional]`

Allows to specify the capabilities of the card. If the card is fully conformant to ISO/IEC 7816 this element MAY be omitted.

`<ApplicationCapabilities> [optional]`

Allows to specify the card-applications on the card and shall be used to realize the mapping from SAL-calls to card-specific APDUs. If the necessary information for this mapping is available on the card in adequate CIA-information structures according to ISO/IEC 7816-15 (see Clause 7.5) this element may be omitted.

`<Signature> [optional]`

Shall be used to protect the integrity and authenticity of (parts of) the `CardInfo`-element.

D.3.3 CardType

The `<CardType>` element in the `CardInfoType` is of type `CardTypeType` and contains a unique identifier for the card type and optionally further links to specification documents. It is specified as follows:

```
<complexType name="CardTypeType">
  <sequence>
    <element name="ProfilingInfo" maxOccurs="1" minOccurs="0">
      <complexType>
        <sequence>
          <element name="BasisSpecification" type="anyURI" />
          <element name="ProfilingRelation" type="iso:ProfilingType" />
        </sequence>
```

```
      </complexType>
    </element>
    <element name="ObjectIdentifier" type="anyURI" />
    <element name="SpecificationBodyOrIssuer"
             type="string" maxOccurs="1" minOccurs="0" />
    <element name="CardTypeName" type="string" maxOccurs="1" minOccurs="0" />
    <element name="Version" maxOccurs="1" minOccurs="0">
      <complexType>
        <sequence>
          <element name="Major" type="string" />
          <element name="Minor" type="string" maxOccurs="1" minOccurs="0" />
          <element name="SubMinor" type="string" maxOccurs="1" minOccurs="0" />
        </sequence>
      </complexType>
    </element>
    <element name="Status" type="string" maxOccurs="1" minOccurs="0" />
    <element name="Date" type="date" maxOccurs="1" minOccurs="0" />
    <element name="CardInfoRepository" type="anyURI" maxOccurs="1" minOccurs="0"/>
           <any namespace="##any" processContents="lax" minOccurs="0"/>
  </sequence>
  <attribute name="Id" type="ID" use="optional" />
</complexType>
```

This type defines the following elements and attributes:

`<ProfilingInfo> [optional]`

This element shall contain information about a basic specification (`<BasisSpecification>` element) which is extended, profiled or redefined (cf. `<ProfilingRelation>` element below) by the present `CardInfo` structure. Using this element it shall be possible to re-use existing `CardInfo`-structures in a modular approach.

`<ObjectIdentifier> [required]`

This element shall contain the unique identifier of the card type, which MAY be the object identifier of a profile defined in Part 4 of the present standard.

`<SpecificationBodyOrIssuer> [optional]`

This element may be used to specify the card issuer or the organization, which is responsible for the specification.

`<CardTypeName> [optional]`

This element may contain the name of the card type.

`<Version> [optional]`

This element may contain the version number of the card type.

`<Status> [optional]`

This element may contain information about the state of the present `CardInfo` file (e.g. ‘draft’).

`<Date> [optional]`

This element may contain the date of creation of the `CardInfo` file.

`<CardInfoRepository> [optional]`

This element may contain the address of a `CardInfo`-repository, which may provide related `CardInfo`-files.

Furthermore there may be some additional element, which structure is defined by some other specification.

The `<ProfilingRelation>` element is of type `ProfilingType` and describes the relation between the basic specification and the present `CardInfo` file.

```
<simpleType name="ProfilingType">
  <restriction base="string">
    <enumeration value="extends" />
    <enumeration value="redefines" />
  </restriction>
</simpleType>
```

The three cases have got the following meaning:

— `extends` – indicates that the present `CardInfo` file is just an extension of the basic specification. All definitions in the basic specification remain valid and the new specifications in the `CardInfo` file just extend them (e.g. a new card application).

— `redefines` – indicates that the elements of the `CardInfo` file overwrite the according elements of the basic specification. Elements of the basic specification not appearing in the `CardInfo` file remain valid.

D.3.4 CardIdentification

The `<CardIdentification>` element, which is part of the `CardInfoType`, allows to determine the type of a given card by traversing the decision tree and checking whether the characteristic features are as expected.

```
<complexType name="CardIdentificationType">
   <sequence>
       <element name="ATR" maxOccurs="unbounded" minOccurs="0"
           type="iso:ATRType" />
       <element name="ATS" type="iso:ATSType" maxOccurs="1"
           minOccurs="0" />
       <element name="CharacteristicFeature" maxOccurs="unbounded"
           minOccurs="0">
           <complexType>
               <sequence maxOccurs="unbounded" minOccurs="1">
                   <element name="CardCall"
                       type="iso:CardCallType" />
               </sequence>
           </complexType>
       </element>
       <any namespace="##any" processContents="lax" minOccurs="0"/>
   </sequence>
   <attribute name="Id" type="ID" use="optional" />
</complexType>
```

`<ATR> [optional, unbounded]`

For contact-based smart cards this element may contain information to the Answer To Reset[1] (ATR) of the card, allowing the realisation of a preselection of the card type. Further details are explained below.

`<ATS> [optional]`

In an analogous way this element may contain information to the Answer To Select of a contactless smart card, allowing the realisation of a preselection of the card type. Further details are explained below.

`<CharacteristicFeature> [optional, unbounded]`

This element may contain a list of card calls, which can be used to determine the card type. The elements of the list are of type `CardTypeType`. Further details are explained below.

Furthermore there may be some additional element, which structure is defined by some other specification.

The `<ATR>` element of type `ATRType` is part of the element `<CardIdentification>`.

```
<complexType name="ATRType">
  <sequence>
    <element name="TS" type="iso:ByteMaskType" maxOccurs="1" minOccurs="1" />
    <element name="T0" type="iso:ByteMaskType" maxOccurs="1" minOccurs="1" />
    <element name="InterfaceBytes">
      <complexType>
        <sequence>
          <element name="Tx1" type="iso:ATRInterfaceBytesType" />
          <element name="Tx2" type="iso:ATRInterfaceBytesType" />
          <element name="Tx3" type="iso:ATRInterfaceBytesType" />
          <element name="Tx4" type="iso:ATRInterfaceBytesType" />
        </sequence>
      </complexType>
    </element>
    <element name="HistoricalBytes" maxOccurs="1" minOccurs="0">
      <complexType>
        <sequence maxOccurs="15" minOccurs="0">
          <element name="Ti" type="iso:ByteMaskType" />
        </sequence>
      </complexType>
    </element>
    <element name="TCK" type="iso:ByteMaskType" maxOccurs="1" minOccurs="0" />
  </sequence>
</complexType>
```


`<TS> [required]`

The element `<TS>` describes the first byte of the communication. This element is as many others of type `ByteMaskType` which is explained below.

`<T0> [required]`

The element `<T0>` is of type `ByteMaskType`and describes the "format character" which shall indicate the amount of historical bytes and the presence of the first interface bytes (TA1, TB1, TC1 and TD1).

`<InterfaceBytes> [required]`

[1] Because there are several protocols for contact smart cards (e.g. T=0 and T=1) which can be supported by the same card it is possible that one card has several ATRs. All of these ATR elements could be used for a preselection of the card type (using a disjunction).

This element shall contain the interface bytes which are included in the ATR. The elements <Tx*i*>, *i*∈{1,2,3,4 } are of type ATRInterfaceBytesType.. This type is explained below.

<HistoricalBytes> [optional]

This element contains the historical bytes as a sequence of at most 15 bytes. Each element <Ti> is of type ByteMaskType(see below) which also describes the significant part of the byte to identify the card type.

<TCK> [optional]

This element of type ByteMaskType may contain the check sum of all bytes of the ATR beginning with T0.

The ByteMaskType consists of a hexadecimal value and a corresponding mask which results in the significant part of the value when a logical AND is performed on value and mask.

```
<complexType name="ByteMaskType">
  <sequence>
    <element name="Value" type="hexBinary" maxOccurs="1" minOccurs="1" />
    <element name="Mask" type="hexBinary" maxOccurs="1" minOccurs="1" />
  </sequence>
</complexType>
```


If the whole byte is significant the mask 'FF' has to be used. To get the first half byte the mask has to be 'F0', for the second half byte '0F'. If only the first bit is significant the mask would be '80' and so on.

The type ATRInterfaceBytesType is used by the elements <Tx*i*> of the element <InterfaceBytes>. This type consists of four elements <Tx*i*>, *x*∈{A,B,C,D}. Each of these elements is of type ByteMaskType (see above) which also describes the significant part of the byte.


```
<complexType name="ATRInterfaceBytesType">
  <sequence>
    <element name="TAi" type="iso:ByteMaskType" maxOccurs="1" minOccurs="0" />
    <element name="TBi" type="iso:ByteMaskType" maxOccurs="1" minOccurs="0" />
    <element name="TCi" type="iso:ByteMaskType" maxOccurs="1" minOccurs="0" />
    <element name="TDi" type="iso:ByteMaskType" maxOccurs="1" minOccurs="0" />
  </sequence>
</complexType>
```

The <ATS> element of type ATSType is part of the element <CardIdentification and describes the Answer To Select of contactless smart cards.

```
<complexType name="ATSType">
  <sequence>
    <element name="TL" type="iso:ByteMaskType" maxOccurs="1" minOccurs="1" />
    <element name="T0" type="iso:ByteMaskType" maxOccurs="1" minOccurs="1" />
    <element name="InterfaceBytes" type="iso:ATSInterfaceBytesType" />
    <element name="HistoricalBytes" maxOccurs="1" minOccurs="0">
      <complexType>
        <sequence maxOccurs="15" minOccurs="0">
          <element name="Ti" type="iso:ByteMaskType"/>
        </sequence>
      </complexType>
    </element>
    <element name="CRC1" type="iso:ByteMaskType" maxOccurs="1" minOccurs="1" />
    <element name="CRC2" type="iso:ByteMaskType" />
```

```
  </sequence>
</complexType>
```

<TL> [required]

The element <TL> contains the length of the ATS including the TL byte itself but excluding CRC1 and CRC2. This element is of type ByteMaskTypewhich also describes the significant part of the byte.

<T0> [required]

The element <T0> contains the Frame Size for proximity Card Integer (FSCI) and also indicates the presence of interface bytes in the ATS. This element is of type ByteMaskType which also describes the significant part of the byte.

<InterfaceBytes> [required]

This element contains the interface bytes which could be included in the ATS. The element is of type ATSInterfaceBytesType which is explained below.

<HistoricalBytes> [optional]

This element contains the historical bytes as a sequence of at most 15 bytes. Each element <Ti> is of type ByteMaskType which also describes the significant part of the byte to identify the card type.

<CRC1>, <CRC2> [required]

These two elements of type ByteMaskType can contain the check sum of all bytes of the ATS beginning with TL.

The following type ATSInterfaceBytesType is used by the element <InterfaceBytes> of the element <ATS>. This type consists of three elements <Tx1>, $x \in \{A,B,C\}$. Each of these elements is of type ByteMaskType which also describes the significant part of the byte.

```
<complexType name="ATSInterfaceBytesType">
  <sequence>
    <element name="TA1" type="iso:ByteMaskType" maxOccurs="1" minOccurs="0" />
    <element name="TB1" type="iso:ByteMaskType" maxOccurs="1" minOccurs="0" />
    <element name="TC1" type="iso:ByteMaskType" maxOccurs="1" minOccurs="0" />
  </sequence>
</complexType>
```

A list of elements of the type CardCallType is used to describe the characteristic features of the card in the <CardIdentification> element. While the CardCallType is defined in the protocol related schema definition it is explained here to ease reading.

```
<complexType name="CardCallType">
   <sequence>
       <element name="CommandAPDU" type="hexBinary" />
       <element name="ResponseAPDU" type="iso:ResponseAPDUType"
           maxOccurs="unbounded" minOccurs="1" />
   </sequence>
</complexType>
```

<CommandAPDU> [required]