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eCard-API-Framework – ISO 24727-3-Interface

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1 Overview of the eCard-API-Framework

The objective of the eCard-API-Framework is the provision of a simple and homogeneous interface to enable standardised use of the various smart cards (eCards) for different applications.

The eCard-API-Framework is sub-divided into the following layers:

- Application-Layer
- Identity-Layer
- Service-Access-Layer
- Terminal-Layer

The **Application-Layer** contains the various applications which use the eCard-API-Framework to access the eCards and their associated functions. Application-specific "convenience interfaces", in which the recurring invocation sequences may be encapsulated in application-specific calls, may also exist in this layer. However, these interfaces are currently *not* within the scope of the e-Card-API-framework.

The **Identity-Layer** comprises the eCard-Interface and the Management interface, and therefore functions for the use and management of electronic identities as well as for management of the eCard-API-Framework.

The *eCard-Interface* (refer to [TR-03112-2]) allows to request certificates as well as the encryption, signature and time-stamping of documents.

In the M*anagement-Interface* (refer to [TR-03112-3]), functions for updating the framework and the management of trusted identities, smart cards, card terminals, and default behaviour are available.

The **Service-Access-Layer** provides, in particular, functions for cryptographic primitives and biometric mechanisms in connection with cryptographic tokens, and comprises the ISO24727-3-Interface and the Support-Interface.

The *ISO24727-3-Interface* defined in the present document is a webservice-based implementation of the standard of the same name [ISO24727-3]. This interface contains functions to establish (cryptographically protected) connections to smart cards, to manage card applications, to read or write data, to perform cryptographic operations and to manage the respective key material (in the form of so-called "differential identities"). In the process, all functions which use or manage "differential identities" are parameterised by means of protocol-specific object identifiers so that the different protocols which are defined in the present document MAY be used with a standardised interface (refer to [TR-03112-7]).

The S*upport-Interface* (refer to [TR-03112-5]) contains a range of supporting functions.

The **Terminal-Layer** primarily contains the *IFD-Interface* (refer to [TR-03112-6]). This layer takes over the generalisation of specific card terminal types and various interfaces as well as communication with the smart card. For the user it is unimportant whether the card is addressed by PC/SC, a SICCT terminal or a proprietary interface, or whether it has contacts or is contact-less.

1.1 Key Words

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119]. The key word “CONDITIONAL” is to be interpreted as follows:

CONDITIONAL: The usage of an item is dependent on the usage of other items. It is therefore further qualified under which conditions the item is REQUIRED or RECOMMENDED.

1.2 XML-Schema

A XML-Schema is provided together with this Technical Guideline. In case of incongruencies, the specifications in this text take precedence. The graphical representations of the XML-Schema illustrate the schema. Note that the text of this Guideline might further restrict the presence or mulitplicity of elements as compared to the schema definition.

2 Overview of the ISO24727-3-Interface

The ISO24727-3-Interface provides a generic interface for all card-based functions of the various eCards. The ISO24727-3-Interface provides the following function groups:

- Card Application Service Access
- Connection Service
- Card Application Service
- Named data service
- Cryptographic service
- Authorization service

2.1 Card Application Service Access

- The `Initialize` function is executed when the ISO24727-3-Interface is invoked for the first time. The interface is initialised with this function.
- The `Terminate` function is executed when the ISO24727-3-Interface is terminated. This function closes all processes.
- The `CardApplicationPath` function determines the path between a client application and a card application.

2.2 Connection Service

- The `CardApplicationConnect` function establishes an unauthenticated connection between the client application and the card application.
- The `CardApplicationDisconnect` function terminates the connection between the client application and the card application.
- The `CardApplicationStartSession` function starts a session between the client application and the card application.
- The `CardApplicationEndSession` function closes a session between the client application and the card application.

2.3 Card Application Service

- The `CardApplicationList` function returns the available card applications of an eCard as a list.
- The `CardApplicationCreate` function creates a new card application.
- The `CardApplicationDelete` function deletes a card application on an eCard.
- The `CardApplicationServiceList` function returns a list of the available services of a card application on an eCard.

- The `CardApplicationServiceCreate` function creates a new service for the card application on an eCard.
- The `CardApplicationServiceLoad` function loads executable code, which can be executed within a service of a card application on the eCard.
- The `CardApplicationServiceDelete` function deletes a service in a card application on an eCard.
- The invocation parameters of a service of a card application can be determined with the `CardApplicationServiceDescribe` function.
- The `ExecuteAction` function permits the execution of an action of a service which has been loaded into a card application on an eCard with the `CardApplicationServiceLoad` function.

2.4 Named data service

- The `DataSetList` function supplies a list of data sets in a card application on an eCard. A data set can contain other data sets and/or a series of data structures for interoperability (DSI) and MAY, for example, be implemented as a directory file (DF) or an elementary file (EF).
- The `DataSetCreate` function creates a new data set in a selected card application on an eCard.
- The `DataSetSelect` function selects a data set of a card application on an eCard.
- The `DataSetDelete` function deletes a data set of a card application on an eCard.
- The `DSIList` function returns a list of data structures for interoperability (DSIs) in the currently selected data set of a card application.
- The `DSICreate` function creates a DSI in the currently selected data set of a card application.
- The `DSIDelete` function deletes a DSI in the currently selected data set of a card application.
- The `DSIWrite` function writes specific content into a DSI in a currently selected data set of an application.
- The `DSIRead` function reads the content of a DSI in the currently selected data set of a card application.

2.5 Cryptographic service

The detailed functionality of the cryptographic service is determined by the protocol of the differential identity employed. Various protocols and especially the Generic Cryptography protocol are defined in [TR-03112-7].

- The `GetRandom` function returns a random number which can be used, for example, for authentication.
- The `VerifySignature` function checks a digital signature.
- The `VerifyCertificate` function validates a certificate.
- The `Sign` function generates a signature for a communicated binary message.
- The `Encipher` function encrypts a transmitted plain text.
- The `Decipher` function decrypts a transmitted cipher text.

- The `Hash` function calculates the hash value of a transmitted message.

2.6 Differential identity service

The detailed functionality of the `DIDCreate`, `DIDGet`, `DIDUpdate` and `DIDAuthenticate` functions is determined by the protocol (also refer to [TR-03112-7]) of the employed differential identity.

- The `DIDList` function returns a list of the existing differential identities (DIDs) in the card application of an eCard.
- The `DIDCreate` function creates a new differential identity in a card application of an eCard.
- The `DIDGet` function determines the publicly accessible information (e.g. key reference) of a differential identity in a card application of an eCard.
- The `DIDUpdate` function generates a new key (marker) for a differential identity in a card application of an eCard.
- The `DIDDelete` function deletes a given differential identity in a card application of an eCard.
- Using one or more differential identities, the `DIDAuthenticate` function executes an authentication protocol which is implicitly specified by these identities.

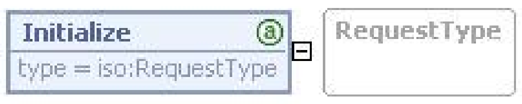
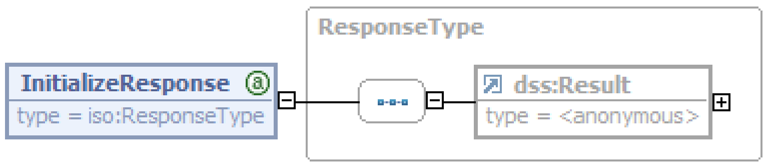
2.7 Authorization service

- The `ACLList` function returns the currently defined access control rules for accessing a card application.
- The `ACLModify` function permits modification of a certain access control rule for access to a card application.

3 Specification of the ISO24727-3-Interface

3.1 Card Application Service Access

3.1.1 Initialize

Name	**`Initialize`**
Description	The `Initialize` function is executed when the ISO24727-3-Interface is invoked for the first time. The interface is initialised with this function.
Invocation parameters	 Invocation of the `Initialize` function.
Return	 ResponseType InitializeResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `Initialize` function.

Name	**Description**
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

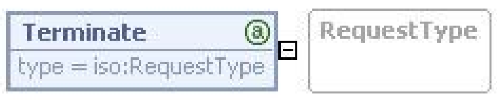
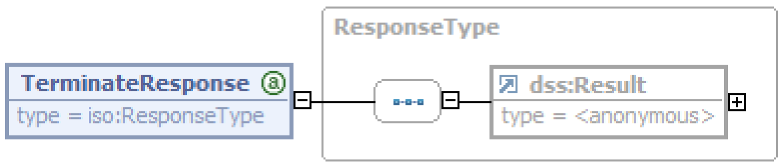
Status information and errors in `Initialize` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

Name	**Error codes**
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/dp#communicationFailure • /resultminor/al/common#incorrectParameter
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	
Postcondition	The other functions of the ISO24727-3-Interface are initialised and can then be invoked.
Note	

3.1.2 Terminate

Name	**`Terminate`**

Description	The Terminate function is executed when the ISO24727-3-Interface is terminated. This function closes all established connections and open sessions.
Invocation parameters	 Invocation of the Terminate function.
Return	 ResponseType TerminateResponse type = iso:ResponseType dss:Result type = <anonymous> Response of the Terminate function.

Name	**Description**
dss:Result	Contains the status information and the errors of an executed action. This element is described in more detail below.

Status information and errors in Terminate (also refer to [TR-03112-1] Sections 4.1 and 4.2).

Name	**Error codes**
ResultMajor	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning
ResultMinor	• /resultminor/sal#warningConnectionDisconnected • /resultminor/al/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/dp#communicationFailure
ResultMessage	MAY contain more detailed information on the error which occurred if required.

Precondition	Initialisation with the Initialize function was necessary.
Postcondition	All established connections and open sessions are closed with this function. No functions other than Initialize can be invoked.
Note	

3.1.3 CardApplicationPath

Before the CardApplicationPath function is explained in more detail, the structure of possible paths to a card application will be examined more closely. As shown in Figure 1, the path from a client application to a card application MAY comprise the following elements:

- ChannelHandle – for addressing a remote framework
- ContextHandle – for addressing a specific IFD layer instance

- `IFDName` – for addressing a specific card terminal which is connected to the IFD layer
- `SlotIndex` – for addressing a specific slot in a card terminal with several slots
- `ApplicationIdentifier` – for addressing a card application on an eCard.

A so-called "Dispatcher" is provided in each eCard-API instance which forwards messages to the local layers or also to a remote eCard-API-Framework. The communication channel between the local "Dispatcher" and the remote "Dispatcher" can be protected by suitable security mechanisms defined in more detail by the `PathSecurity` element.

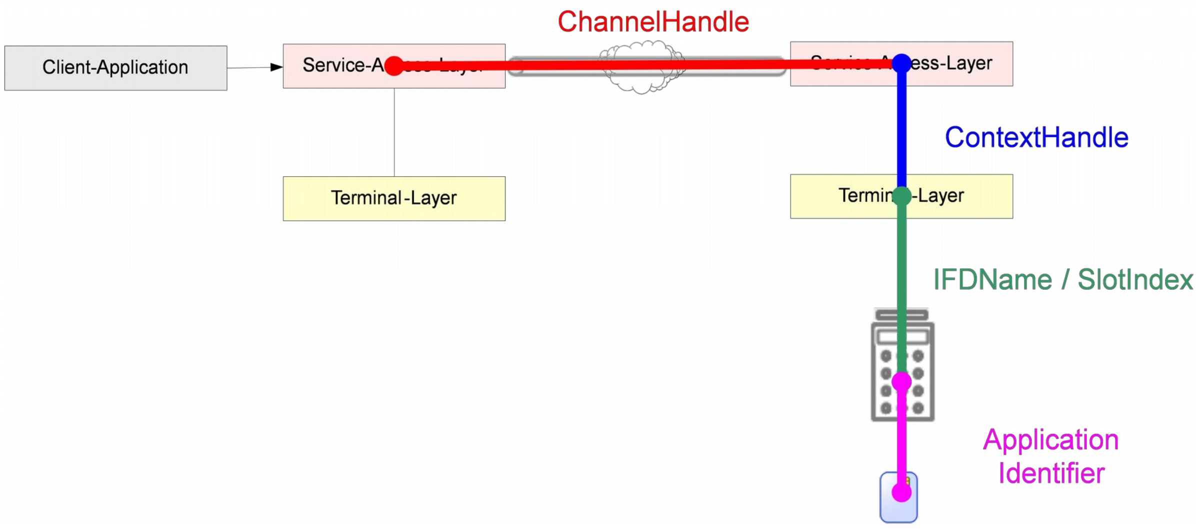
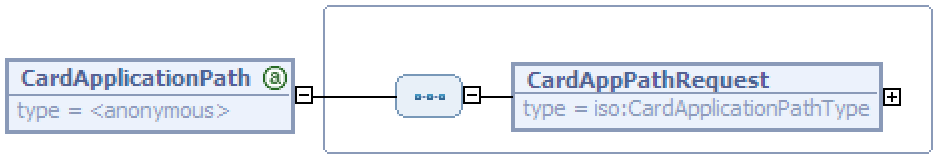
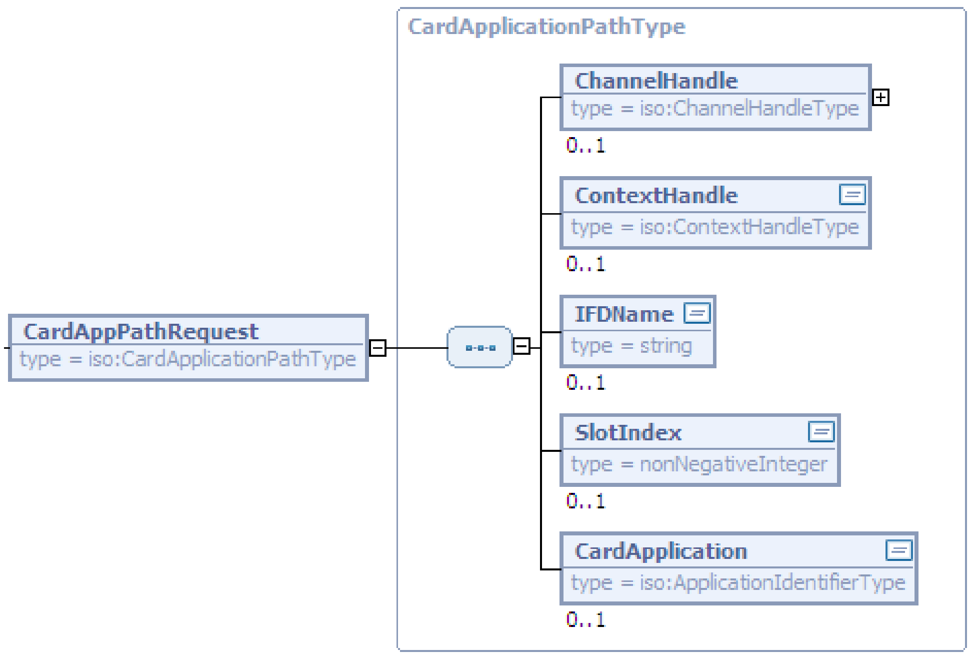


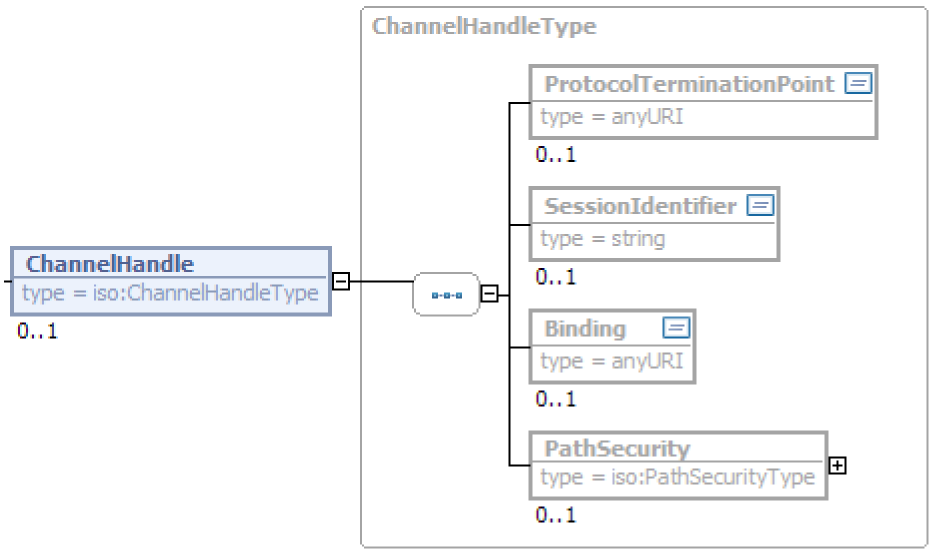
Figure 1: Structure of the path to card application

Name	**`CardApplicationPath`**	
Description	The `CardApplicationPath` function determines a path between the client application and a card application.	
Invocation parameters	 CardApplicationPath type = <anonymous> CardAppPathRequest type = iso:CardApplicationPathType Invocation of the `CardApplicationPath` function with which the path between the client application and a card application can be determined.	
	Name	**Description**
	`CardApplPathRequest`	This parameter can be used to limit the space of the possible paths between the client application and the card application. If no restrictions are made, all available paths to the stated card application are returned. If no card application is specified, paths to all available cards (alpha-card applications) and unused card terminal slots are returned.


CardApplicationPathType
CardAppPathRequest
type = iso:CardApplicationPathType
ChannelHandle
type = iso:ChannelHandleType
0..1
ContextHandle
type = iso:ContextHandleType
0..1
IFDName
type = string
0..1
SlotIndex
type = nonNegativeInteger
0..1
CardApplication
type = iso:ApplicationIdentifierType
0..1

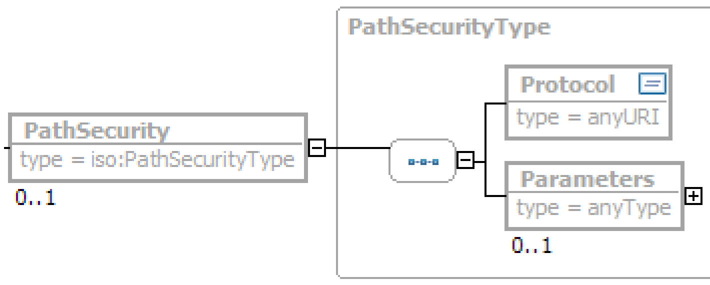
The `CardAppPathRequest` element is of the type `CardApplicationPathType` and is transferred when `CardApplicationPath` is invoked.

Name	**Description**
`ChannelHandle`	This parameter MAY specify the addressed "Dispatcher" and state which additional communication parameters (e.g. which webservice binding, which security protocol) should be used for communication. If the parameter is stated here, only paths with corresponding parameters (e.g. specific address of the communication end point) are returned.
`ContextHandle`	This parameter, which is returned by the `EstablishContext` function (also refer to [TR-03112-6]), permits to filter for a specific IFD-Layer context. If this parameter is stated here, only paths with the stated `ContextHandle` are returned. Otherwise paths with any `ContextHandle` are returned. As in a typical scenario only few `ContextHandles` are existing, this parameter SHOULD NOT be used when invoking `CardApplicationPath`.
`IFDName`	This parameter, which is returned by the `ListIFDs` function (also refer to [TR-03112-6]), addresses a specific terminal. If this parameter is stated here, only paths to the stated terminal are returned. Otherwise paths to any terminals are returned.

	`SlotIndex`	This parameter, which is returned in the `IFDCapabilities` element in the `GetIFDCapabilities` function (also refer to [TR-03112-6]), addresses a specific slot in a terminal. If this parameter is stated here, only paths to the stated slot of a terminal are returned. Otherwise paths to any slots are returned.
	`CardApplication`	This parameter addresses a specific card application on the card specified by the other parameters. If this parameter is stated here, only paths to card applications with the stated application identifier are determined. Otherwise paths to all available alpha-card applications are returned.
	 ChannelHandleType ProtocolTerminationPoint type = anyURI 0..1 SessionIdentifier type = string 0..1 Binding type = anyURI 0..1 PathSecurity type = iso:PathSecurityType 0..1 ChannelHandle type = iso:ChannelHandleType 0..1 The `ChannelHandle` element is an optional part of the `CardApplicationPathType` and is used to address a remote framework.	
	Name	**Description**
	`ProtocolTermination Point`	MAY contain the address of a specific eCard-API-Framework, whereby URLs according to [RFC1738] and telephone numbers according to [RFC3966] are provided in particular. If this element is missing, paths for the local framework as well as all other frameworks with which a connection has been established with `CardApplicationConnect` or `EstablishContext` are returned.

	SessionIdentifier	MAY be used to assign various invocations to a specific session context. If this parameter is stated here, only paths with the stated SessionIdentifier are returned. Otherwise paths with any SessionIdentifier are returned. This parameter SHOULD therefore NOT be used for invocation of CardApplicationPath.
	Binding	MAY state which webservice binding should be used for invocation. The following bindings are currently provided for this purpose: • http://schemas.xmlsoap.org/soap/http - SOAP via HTTP according to [SOAPv1.1], Section 6 • urn:liberty:paos:2006-08 – Reverse http Binding for SOAP (PAOS) according to [PAOSv2.0] • urn:liberty:paos:2003-08 – Reverse http Binding for SOAP (PAOS) according to [PAOSv1.1] If this element is missing when CardApplicationPath is invoked, paths with any bindings are returned. In other invocations this element need not be stated if the standard binding http://schemas.xmlsoap.org/soap/http is to be used.
	PathSecurity[1]	The security mechanism with which the communication channel between the local "Dispatcher" and the remote "Dispatcher" should be protected can be stated with the PathSecurity element. See below for details. If the parameter is stated here, only paths with the respective security mechanism are returned.

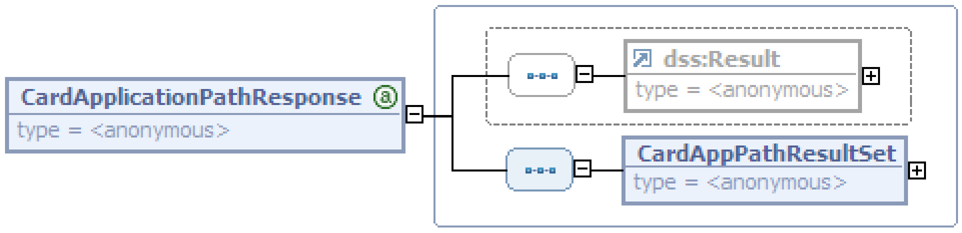
1 Note that the PathSecurity-element in [ISO24727-3] is erroneously not part of the ChannelHandleType, but directly part of the CardApplicationPathType. As this seemingly minor change leads to problems with protected Remote-ICC-Stack scenarios, the specification of the eCard-API-Framework and [CEN15480-3] consciously keeps the PathSecurity-element as part of the ChannelHandleType. This change will be proposed for a forthcoming amendment of [ISO24727-3].

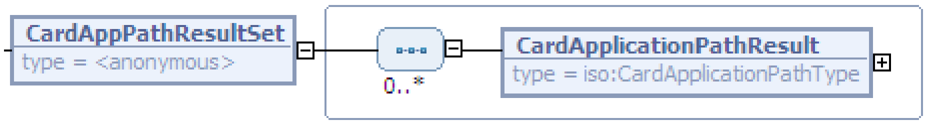


The `PathSecurity` element is an optional part of the `CardApplicationPathType`.

Name	**Description**
`Protocol`	States the protocol used for securing the connection between the local and remote "dispatchers". Please refer to Section 2 of [TR-03112-7] for issues related to the establishment of secure connections between distributed systems.
`Parameters`	MAY contain other parameters if required.

Return





Return of the `CardApplicationPath` function.

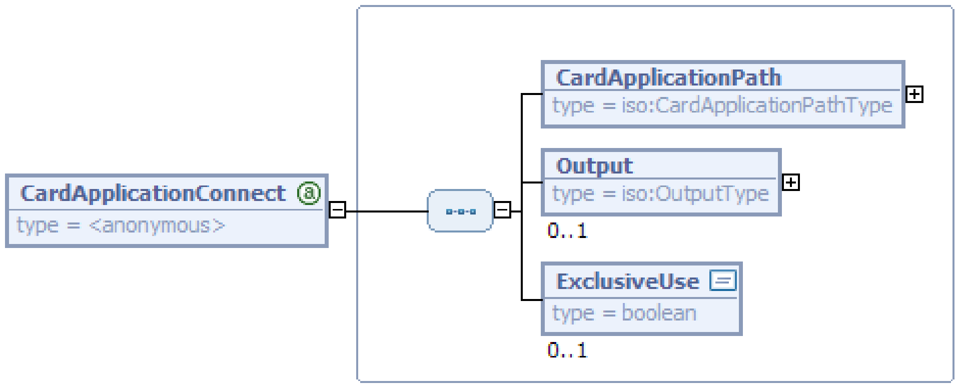
Name	**Description**
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
`CardAppPathResultSet`	Contains the paths between the client application and a card application determined during invocation or – if a path is returned without a `CardApplication` – a free slot of a connected terminal. Each `CardApplicationPathResult` element is of the type `CardApplicationPathType` described in more detail above (refer to page14).

	Status information and errors in `CardApplicationPath` (also refer to [TR-03112-1] Sections 4.1 and 4.2). **Name** / **Error codes** `ResultMajor`: • /resultmajor#ok • /resultmajor#error • /resultmajor#warning `ResultMinor`: • /resultminor/al/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#tooManyResults • /resultminor/dp#communicationFailure `ResultMessage`: MAY contain more detailed information on the error which occurred if required.
Precondition	
Postcondition	
Note	An implementation of the eCard-API-Framework SHOULD maintain a list of the currently valid `ContextHandle`s, to determine the available terminals and their slots with `ListIFDs` and `GetIFDCapabilities`. If a card is captured in a slot this SHOULD be detected by an appropriate background process and a connection is established to this card with `Connect` (also refer to [TR-03112-6]) which is represented with a `SlotHandle`. Subsequently the type of each connected card (also refer to Annex A) as well as a list of the card applications available on this card is determined to provide a response to an enquiry for a specific `CardApplicationPath`.

3.2 Connection Services

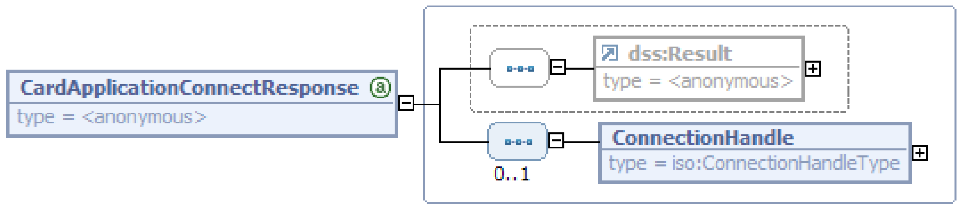
3.2.1 CardApplicationConnect

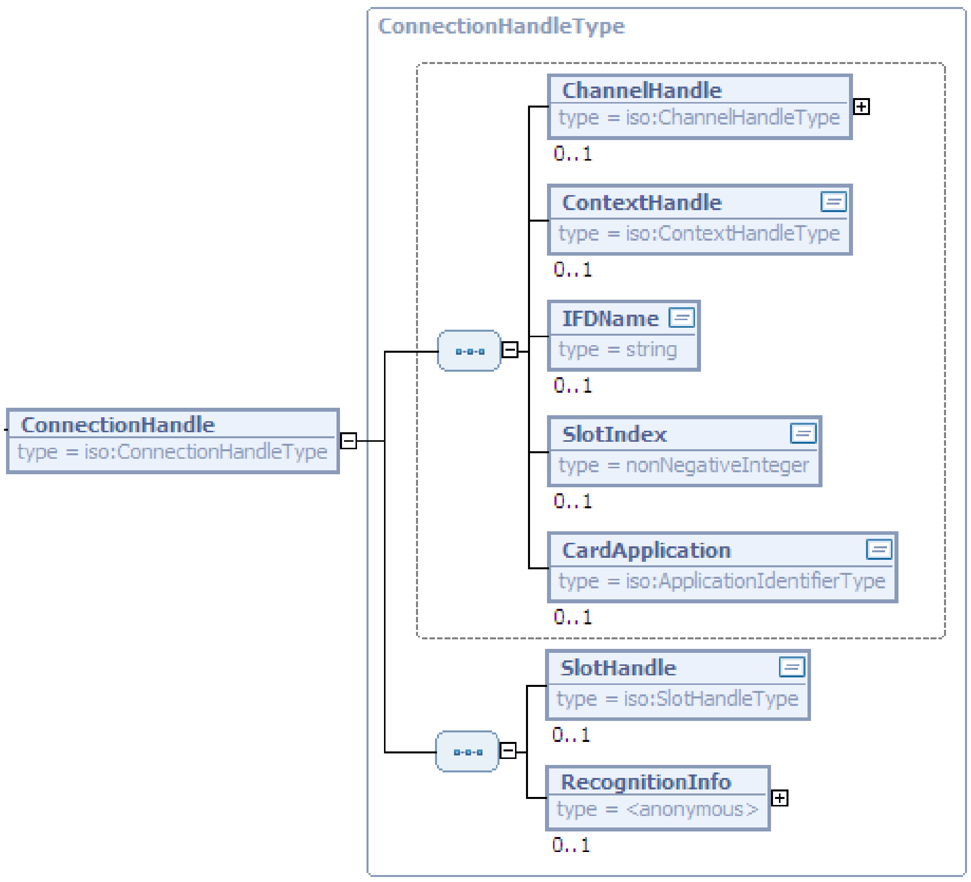
Name	**`CardApplicationConnect`**
Description	The `CardApplicationConnect` function establishes an unauthenticated connection between the client application and the card application.

Invocation parameters	 CardApplicationConnect type = <anonymous> CardApplicationPath type = iso:CardApplicationPathType Output type = iso:OutputType 0..1 ExclusiveUse type = boolean 0..1 Invocation of the `CardApplicationConnect` function.	
	Name	**Description**

	`CardApplicationPath`	The `CardApplicationPath` element contains the path to the card application to which a connection is to be established and is of the type `CardApplicationPathType` which was explained previously (refer to page 14). Which child elements of `CardApplicationPath` are required and recommended depends on the use case under consideration and one may distinguish the following scenarios: 1. If the local eCard-API-Framework is addressed, one MAY omit the `ProtocolTerminationPoint` or `ChannelHandle` parameter respectively. 2. If the local eCard-API-Framework actively establishes a channel to a remote framework the `ProtocolTerminationPoint` parameter MUST be present. 3. In both cases above it is RECOMMENDED to include the `ContextHandle`, `IFDName`, `SlotIndex` and `CardApplication`-parameters to avoid ambiguities. If the provided path fragments are valid for more than one card application the eCard-API-Framework SHALL return any of the possible choices. 4. If the local eCard-API-Framework however waits for incoming requests, which may use the PAOS-binding, the `SessionIdentifier`-parameter MUST be present and it is RECOMMENDED to include the `Binding`-parameter and omit all other parameters.
	`Output`[2]	By using the output element a corresponding message (e.g. "Please insert eCard") can be output if necessary – i.e. if there is no card available in the card terminal slot. The structure of the `OutputType` is explained in [TR-03112-6].

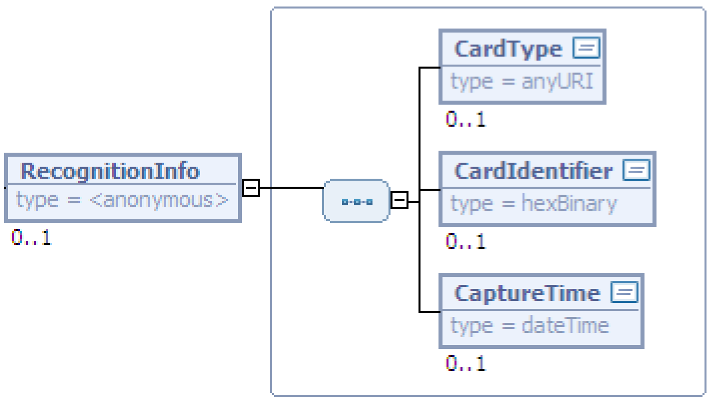
2 Note that this element is missing in the current version of [ISO24727-3]. Because of the additional `Output`-element it is not necessary for a typical client-application do get in contact with the IFD-Layer directly, Therefore the specification of the eCard-API-Framework and [CEN15480-3] consciously add this optional element. This change will be proposed for a forthcoming amendment of [ISO24727-3].

	`ExclusiveUse`	If the element has the value `TRUE`, this means that the card (application) should be used exclusively. As a result no other client application is able to access the card application until the function `CardApplicationDisconnect` has been invoked. If this element is missing, the default value `FALSE` is implicitly assumed.
Return	 CardApplicationConnectResponse type = <anonymous> dss:Result type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType 0..1 Return of the `CardApplicationConnect` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	`ConnectionHandle`	Contains a handle with which the established connection to a card application is addressed. This handle is of type `ConnectionHandleType` which is derived from the `CardApplicationPathType` (also refer to page 14) by extension of the elements `SlotHandle` and `RecognitionInfo`.



The `ConnectionHandle` is returned when `CardApplicationConnect` is invoked and represents a connection to a card application. In addition to the elements from the `CardApplicationPathType` (also refer to page 14), the two elements `SlotHandle` and `RecognitionInfo` are also returned.

Name	**Description**
`SlotHandle`	With the `SlotHandle` the connection to the eCard established with `Connect` (also refer to [TR-03112-6]) is addressed. If the card recognition procedure is automatically performed after connecting to a card and it is determined that the card type of the connected card is unknown (see description of `CardType`-parameter below), the SAL SHOULD automatically use `Disconnect` (also refer to [TR-03112-6]) to avoid interferences with other software products and hence the `SlotHandle` SHOULD be omitted in this case.
`RecognitionInfo`	The `RecognitionInfo` element contains additional information which is determined during recognition of the card type (also refer to Annex A) and which can be used by a client application to differentiate between the various cards which are accessible by the system. See below for details.



The `RecognitionInfo` element is part of `ConnectionHandle` (see above) and MAY contain information, which was gathered during the card recognition procedure.

Name	Description
`CardType`	Contains the unique identifier for the recognised card type (also refer to Annex A). If the card recognition procedure succeeds this element MUST be included and contain the unique identifier of the recognized card type. If the card recognition procedure has been performed, but it was not possible to determine the card type this SHOULD be indicated by the value http://www.bsi.bund.de/cif/unknown in the `CardType`-element. In this case the `CardIdentifier`-element SHOULD contain the ATR or ATS of the card, if it exists.
`CardIdentifier`	MAY contain the unique identifier of the connected card, if the card type features a unique identifier (ICCSN, PAN etc.).[3] If the `CardType`-element has the value http://www.bsi.bund.de/cif/unknown, the `CardIdentifier`-element SHOULD contain the ATR or ATS of the card, if it exists.
`CaptureTime`	MAY contain the time at which the card was recognised.

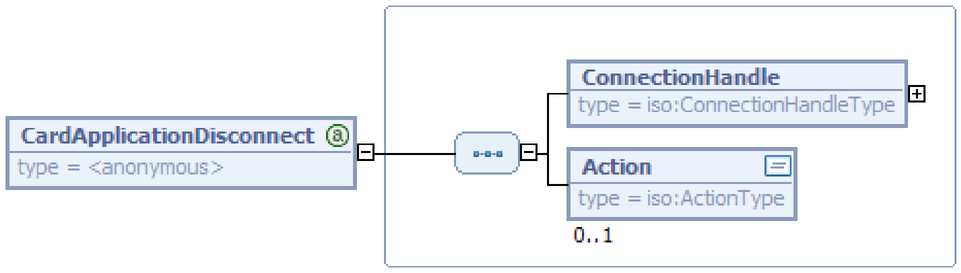
3 In case of the German eHealth-card for example, the `CardIdentifier`-element will contain the 10 byte long value (without tag and length) of the data object DO_ICCSN, which is stored in EF.GDO (cf. [eGK-2], Section 6.2.5).

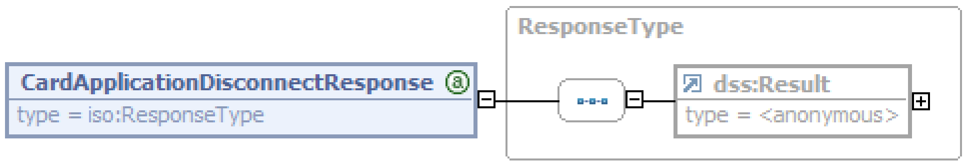
Status information and errors in `CardApplicationConnect` (also refer to [TR-03112-1] Section 4.1 and 4.2).

Name	Error codes
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/sal#exclusiveNotAvailable • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	The stated path to the card application MUST at least contain the REQUIRED elements (see specification of `CardApplicationPath`-parameter on page 20).
Postcondition	A connection to the card application has been established. This means that a corresponding `SlotHandle` has been created with `Connect` (also refer to [TR-03112-6]) and the card application was selected.
Note	Determination of the `RecognitionInfo` MAY already be performed during automatic registration of the card, for example after return of `Wait` (also refer to [TR-03112-6]) and the establishment of a connection with `Connect`. If the connection to the card is requested to be exclusive and there was previously only a non-exclusive connection to the card, this connection is disconnected with `Disconnect` and re-established with `Connect` with the parameter `Exclusive = True`. In this case repeated recognition of the card type MAY be omitted.

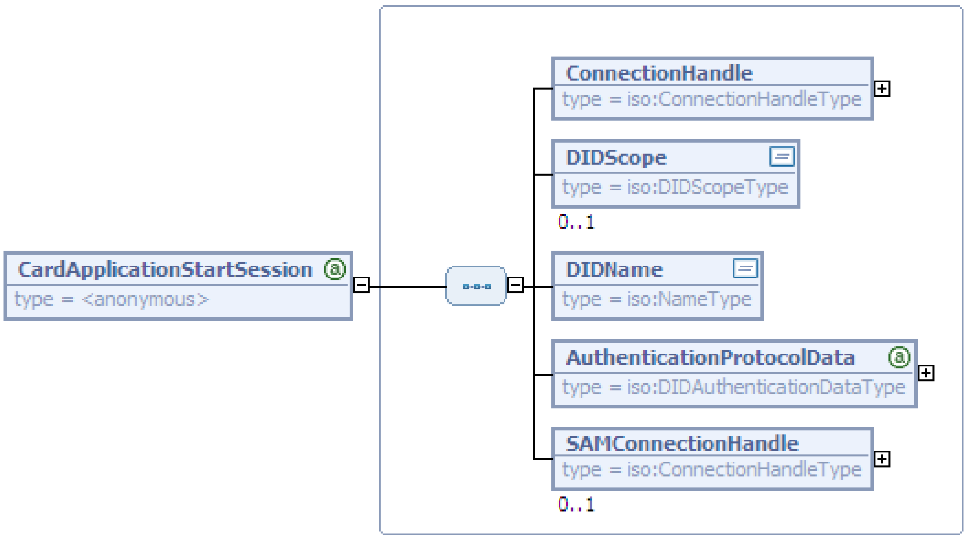
3.2.2 CardApplicationDisconnect

Name	**`CardApplicationDisconnect`**
Description	The `CardApplicationDisconnect` function terminates the connection to a card application.
Invocation parameters	 CardApplicationDisconnect type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType Action type = iso:ActionType 0..1 Invocation of `CardApplicationDisconnect`. **Name** | **Description**

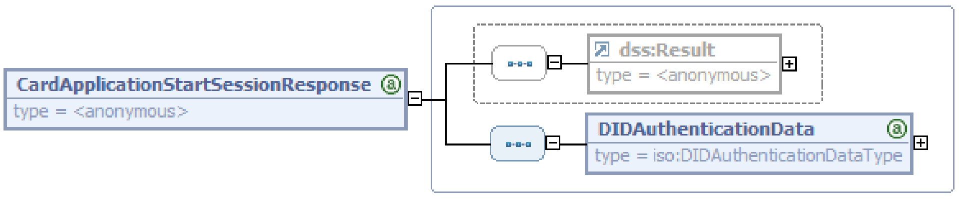
	`ConnectionHandle`	Contains a handle with which the established connection to a card application is addressed (also refer to page 22).
	`Action`	Optional parameter which states an action which is to be performed additionally. This parameter is of type `ActionType`[4] and identical to the `Action` parameter in the `Disconnect` function (also refer to [TR-03112-6]).
Return	 ResponseType CardApplicationDisconnectResponse type = iso:ResponseType dss:Result type = <anonymous> Return of `CardApplicationDisconnect`.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	Status information and errors in `CardApplicationDisconnect` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning
	`ResultMinor`	• /resultminor/sal#warningSessionEnded • /resultminor/sal/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition	The logical connection to the card application was terminated. `Disconnect` was invoked in particular (also refer to [TR-03112-6]), whereby the `SlotHandle` as part of the `ConnectionHandle` has lost its validity.	
Note		

4 Note that the type of the `Action`-parameter in [ISO24727-3] is named `ReaderAction`, which is not defined in [ISO24727-4]. Therefore the specification of the eCard-API-Framework and [CEN15480-3] use the `ActionType`. This change will be proposed for a forthcoming defect report of [ISO24727-3].

3.2.3 CardApplicationStartSession

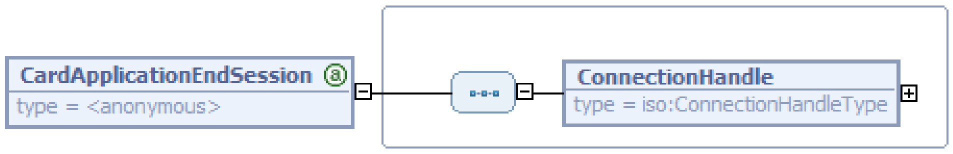
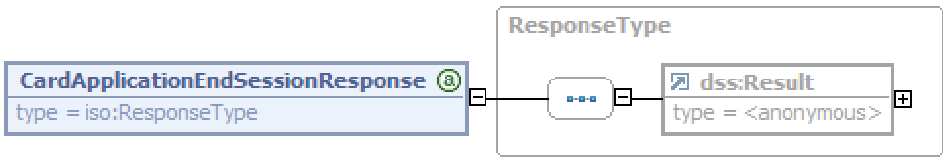
Name	**`CardApplicationStartSession`**
Description	This `CardApplicationStartSession` function starts a session between the client application and the card application.
Invocation parameters	 CardApplicationStartSession type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DIDScope type = iso:DIDScopeType 0..1 DIDName type = iso:NameType AuthenticationProtocolData type = iso:DIDAuthenticationDataType SAMConnectionHandle type = iso:ConnectionHandleType 0..1 Invocation of the `CardApplicationStartSession` function.

Name	**Description**
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
`DIDScope`	Is an optional parameter which resolves any ambivalence regarding `DIDName` if necessary. It is only stated if there is a global and local DID with the name `DIDName`.
`DIDName`	Contains the name of the differential identity in this card application which is to be used for establishing the session.
`AuthenticationProtocolData`	Protocol data which are transferred when `CardApplicationStart Session` is invoked. The `DIDAuthenticationDataType` is defined as an open type depending on a `Protocol` attribute so that the detailed structure of this parameter can be defined within the framework of the protocol specification (also refer to [TR-03112-7]).

	SAMConnectionHandle	Contains a handle with which the connection to a card application which is assigned to the eCard-API-Framework (e.g. in a security access module) is addressed.
Return	 CardApplicationStartSessionResponse type = <anonymous> dss:Result type = <anonymous> DIDAuthenticationData type = iso:DIDAuthenticationDataType Response of the CardApplicationStartSession function.	
	Name	**Description**
	dss:Result	Contains the status information and the errors of an executed action. This element is described in more detail below.
	DIDAuthenticationData	Protocol data which are returned when CardApplicationStartSession is returned. The DIDAuthenticationDataType is defined as an open type in dependence on a Protocol attribute so that the detailed strucure of this parameter can be defined within the framework of the protocol specification (also refer to [TR-03112-7]).
	Status information and errors in CardApplicationStartSession (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	ResultMajor	• /resultmajor#ok • /resultmajor#error • /resultmajor#nextRequest
	ResultMinor	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.

	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition	A session to the stated card application has been established. The details (e.g. whether secure messaging is performed) are contained in the protocol specification (also refer to [TR-03112-7]).	
Note		

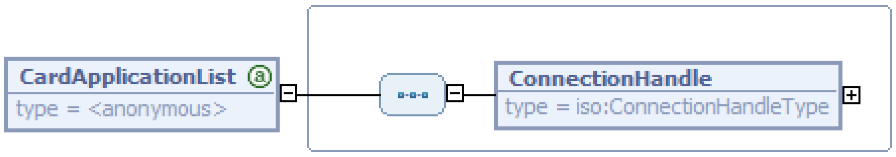
3.2.4 CardApplicationEndSession

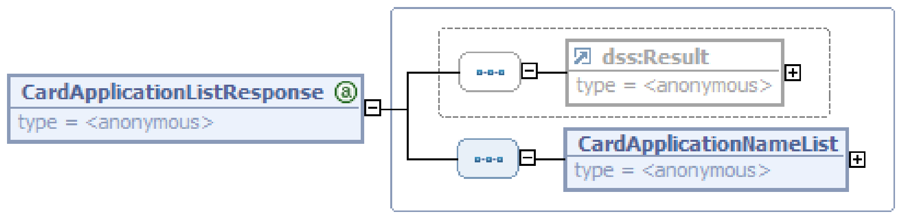
Name	**`CardApplicationEndSession`**	
Description	The `CardApplicationEndSession` function closes the session between the client application and the card application.	
Invocation parameters	 CardApplicationEndSession type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType Invocation of `CardApplicationEndSession`.	
	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed.
Return	 ResponseType CardApplicationEndSessionResponse type = iso:ResponseType dss:Result type = <anonymous> Return of `CardApplicationEndSession`.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

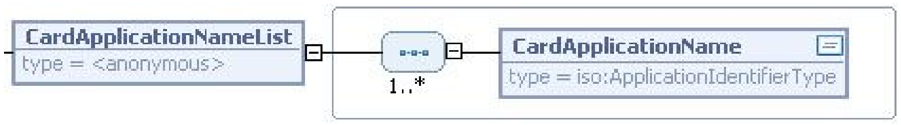
	Status information and errors in `CardApplicationEndSession` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#noActiveSession • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	Using `CardApplicationConnect` and `CardApplicationStartSession`, a session to a card application has been established.	
Postcondition	The secure session to the card application is terminated, but the `ConnectionHandle` generated with `CardApplicationConnect` remains valid until `CardApplicationDisconnect` has been invoked.	
Note		

3.3 Card Application Services

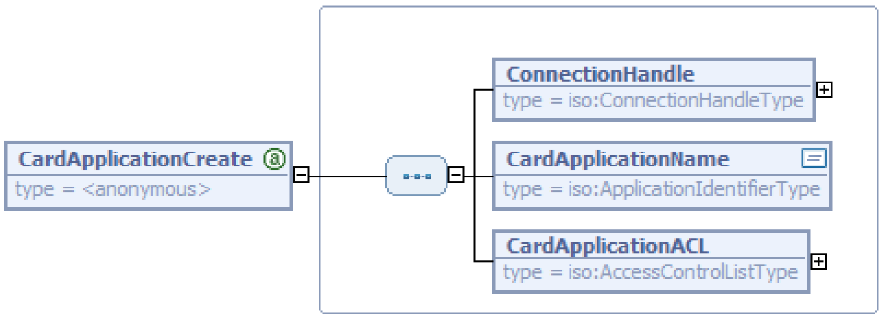
3.3.1 CardApplicationList

Name	**`CardApplicationList`**	
Description	The `CardApplicationList` function returns a list of the available card applications on an eCard.	
Invocation parameters	 CardApplicationList type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType Invocation of the `CardApplicationList` function.	
	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).

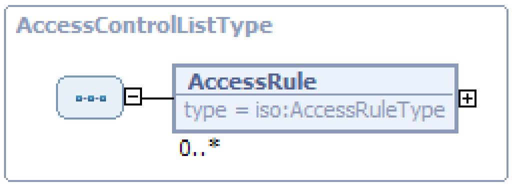
Return	 CardApplicationListResponse
	type = <anonymous>
	dss:Result
	type = <anonymous>
	CardApplicationNameList
	type = <anonymous> Return of the CardApplicationList function.	

	Name	**Description**
	dss:Result	Contains the status information and the errors of an executed action. This element is described in more detail below.
	CardApplicationNameList	Contains a list of the names for the existing card applications (see below for details).
	 CardApplicationNameList type = <anonymous> 1..* CardApplicationName type = iso:ApplicationIdentifierType Part of CardApplicationNameList (see above).	
	Name	**Description**
	CardApplicationName	Name (application identifier) of the available card applications.
	Status information and errors in CardApplicationList (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	ResultMajor	• /resultmajor#ok • /resultmajor#error
	ResultMinor	• /resultminor/al/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
	ResultMessage	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to the alpha card application has been established with CardApplicationConnect.	
Postcondition		
Note	The list of card applications MAY be derived from the contents of the EF.DIR (also refer to [ISO7816-4]), the application capability description (also refer to [ISO24727-2]) or the CardInfo file.	

3.3.2 CardApplicationCreate

Name	**CardApplicationCreate**
Description	A new card application is created on an eCard with the CardApplicationCreate function.
Invocation parameters	 CardApplicationCreate type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType CardApplicationName type = iso:ApplicationIdentifierType CardApplicationACL type = iso:AccessControlListType Invocation of CardApplicationCreate.

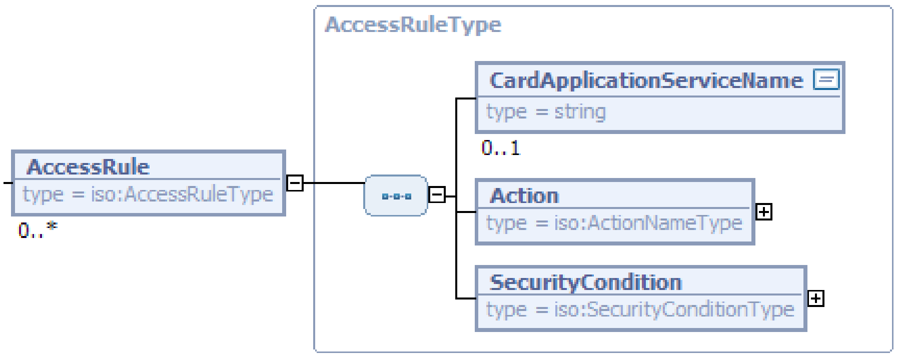
Name	**Description**
ConnectionHandle	Contains a handle with which the connection to a card application is addressed (also refer to page 22). This MUST be the alpha card application of the card.
CardApplicationName	Contains the name of the card application to be created in the form of an application identifier.
CardApplicationACL	Is of type AccessControlListType and contains the access rules for the services and actions in this card application (see below for details).



Elements of the AccessControlListType are used in CardApplicationCreate, DataSetCreate and DIDCreate and in the CardInfo structure.

Name	**Description**

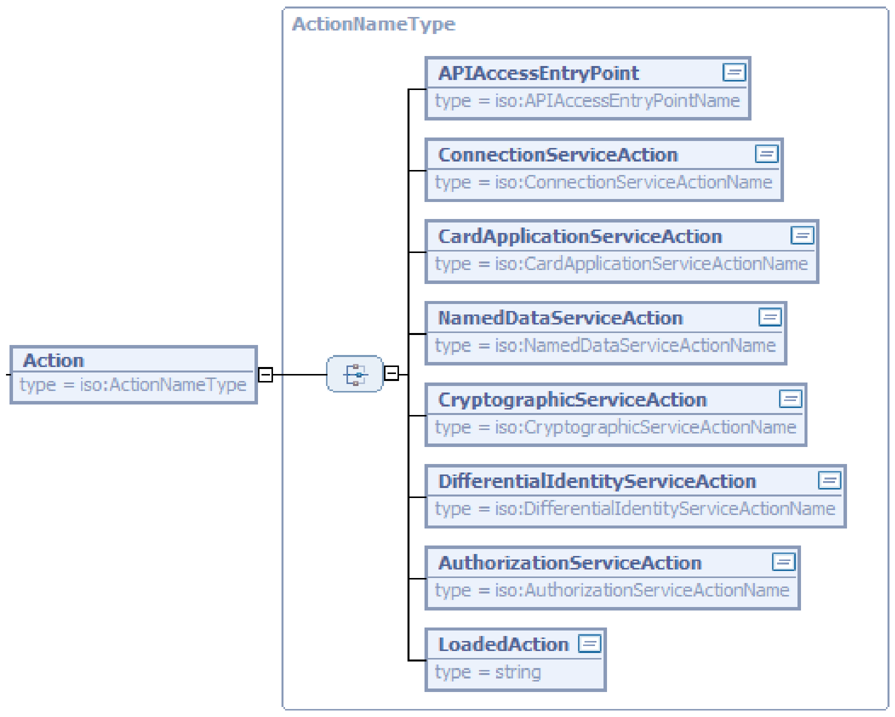
	`AccessRule`	An element of type `AccessControlListType` contains a sequence of `AccessRule` elements (see below for details). It is important to note that the `AccessControlType` is used for three different target objects: • Card applications and the services they contain, • DataSets and • Differential Identities


AccessRuleType
CardApplicationServiceName
type = string
0..1
AccessRule
type = iso:AccessRuleType
0..*
Action
type = iso:ActionNameType
SecurityCondition
type = iso:SecurityConditionType

The `AccessRule` element is part of the `AccessControlListType` and contains an access control rule for a card application service, a `DataSet` or a `DID`.

Name	**Description**
`CardApplication ServiceName`[5]	MAY contain the name of the card application service, whereby this information is not essential for services which have been standardised within the framework of [ISO24727-3].
`Action`	Contains the action which is to be performed on the target object (card application, DataSet or DID) (see below for details).
`SecurityCondition`	Contains the security conditions for access to the respective target object (card application, DataSet or DID) (see below for details).

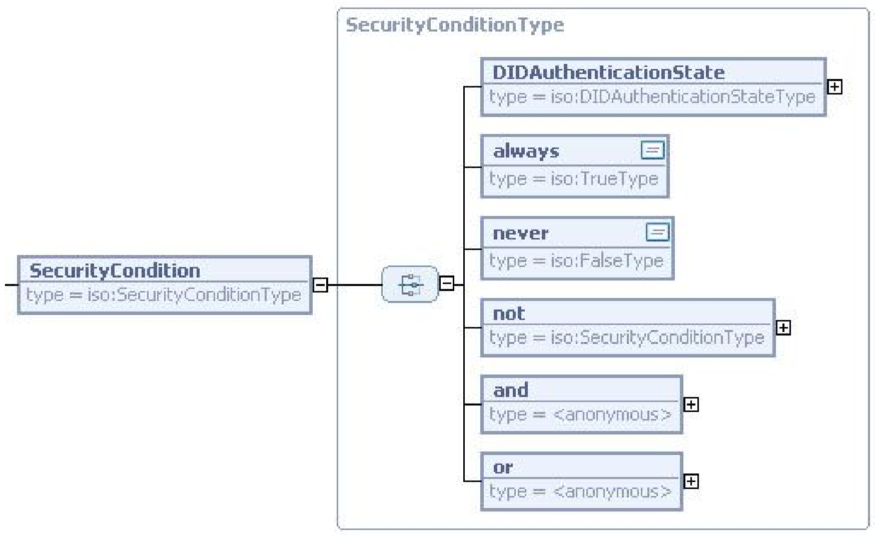
5 Note that the current version of [ISO24727-3] erroneously only allows the predefined card application service names and hence it would not be possible to define new card application services, which would render the `CardApplicationServiceCreate`-function (cf. Section 3.3.5) useless. Therefore the present specification and [CEN15480-3] consciously define the `CardApplicationServiceName`-parameter as string. This change will be proposed for a forthcoming defect report of [ISO24727-3].


ActionNameType
Action
type = iso:ActionNameType
APIAccessEntryPoint
type = iso:APIAccessEntryPointName
ConnectionServiceAction
type = iso:ConnectionServiceActionName
CardApplicationServiceAction
type = iso:CardApplicationServiceActionName
NamedDataServiceAction
type = iso:NamedDataServiceActionName
CryptographicServiceAction
type = iso:CryptographicServiceActionName
DifferentialIdentityServiceAction
type = iso:DifferentialIdentityServiceActionName
AuthorizationServiceAction
type = iso:AuthorizationServiceActionName
LoadedAction
type = string

The `Action` element is part of the `AccessRule` element (refer to page 32).

Name	**Description**
`APIAccessEntryPoint`	States the name of a function from section 3.1.
`ConnectionService Action`	States the name of a function from section 3.2.
`CardApplication Action`	States the name of a function from section 3.3.
`NamedDataService Action`	States the name of a function from section 3.4.
`CryptographicService Action`	States the name of a function from section 3.5.
`DifferentialIdentity ServiceAction`	States the name of a function from section 3.6.
`AuthorizationService Action`	States the name of a function from section 3.7.
`LoadedAction`[6]	States the name of an additionally loaded function.

6 Note that the current version of [ISO24727-3] erroneously does not allow a non-standardized loaded action to appear in this parameter, which would allow that only the actions already standardized in [ISO24727-3] could be loaded with the `CardApplicationServiceLoad`-function (cf. Section 3.3.6), which would render this function almost useless. Therefore the present specification and [CEN15480-3] consciously add the `LoadedAction`-alternative. This change will be proposed for a forthcoming defect report of [ISO24727-3].



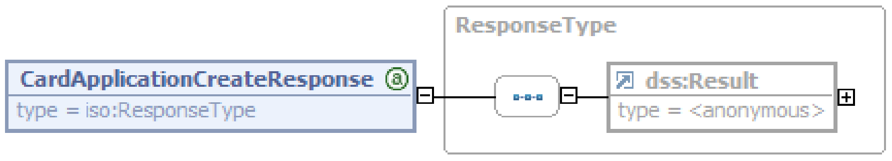
The `SecurityCondition` element is part of the `AccessRule` element and can contain any Boolean expression, which consists of the terminal elements `DIDAuthenticationState`, `always` or `never`, which MAY be combined using the operators `not`, `and` and `or`.

As a general rule, access which is not explicitly permitted is forbidden. Therefore explicit statement of a SecurityCondition with `never` MAY be omitted.

Name	Description
`DIDAuthenticationState`	Contains at least the name of a DID (`DIDName`) and the required Boolean authentication condition (`DIDState`). In addition, `DIDScope` and a `DIDStateQualifier`[7] MAY be present, which resolve ambiguity if required. The `DIDStateQualifier` is typically used in certificate-based authentication processes and contains the "Certificate Holder Authorization (Template)", which states the rights of the certificate holder.
`always`	States that access is always permitted.
`never`	States that access is never permitted.
`not`	Is used to negate an expression shown as a `SecurityCondition`.
`and`	Is used to conjunctively link several expressions shown as a `SecurityCondition`.

7 Note that the current version of [ISO24727-3] erroneously does not contain the optional `DIDStateQualifier`. Because this element is necessary in certificate-based authentication scenarios the present specification and [CEN15480-3] consciously add this alternative. This change will be proposed for a forthcoming defect report of [ISO24727-3].

	`or`	Is used to disjunctively link several expressions shown as a `SecurityCondition`.

Return	 CardApplicationCreateResponse type = iso:ResponseType ResponseType dss:Result type = <anonymous> Return of `CardApplicationCreate`.

Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

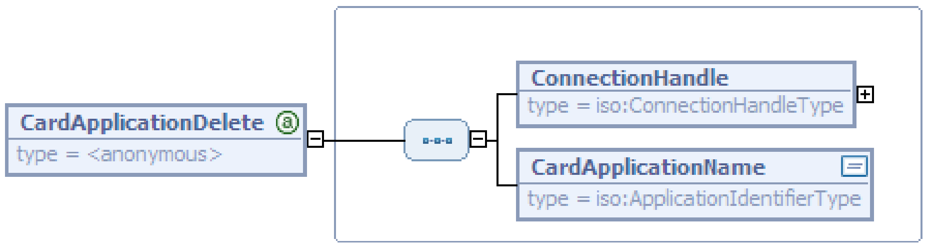
Status information and errors in `CardApplicationCreate` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

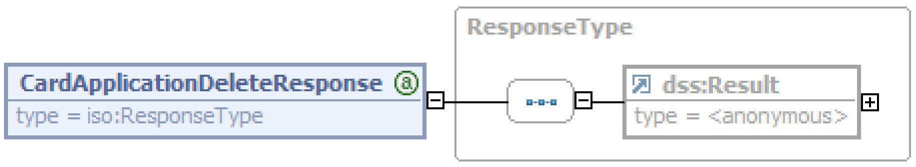
Name	Error codes
`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#nameExists • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNot Satisfied • /resultminor/sal#prerequisiteNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	`CardApplicationConnect` was used to establish a connection to the "alpha card application" (or the master file).
Postcondition	The "alpha card application" remains selected.
Note	Creation of a new card application results in changes to EF.DIR, the card capability description according to section 6.1 of [ISO24727-2], the [ISO7816-15] structures on the card and/or the corresponding `CardInfo` file.

3.3.3 CardApplicationDelete

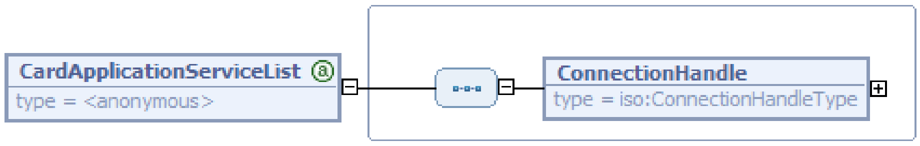
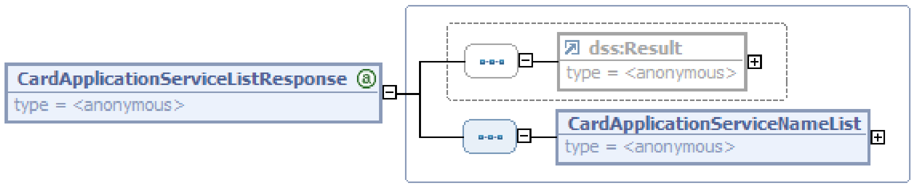
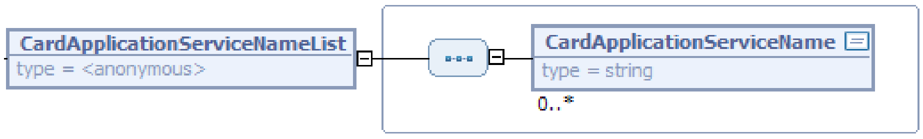
Name	**`CardApplicationDelete`**
Description	The `CardApplicationDelete` function deletes a card application as well as all corresponding data sets, DSIs, DIDs and services.

Invocation parameters	 CardApplicationDelete
	type = <anonymous>
	ConnectionHandle
	type = iso:ConnectionHandleType
	CardApplicationName
	type = iso:ApplicationIdentifierType Invocation of the `CardApplicationDelete` function.	

	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	`CardApplicationName`	Contains the name of the card application, which is to be deleted.
Return	 ResponseType CardApplicationDeleteResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `CardApplicationDelete` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	Status information and errors in `CardApplicationDelete` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning
	`ResultMinor`	• resultminor/sal# warningConnectionDisconnected • /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#prerequisiteNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

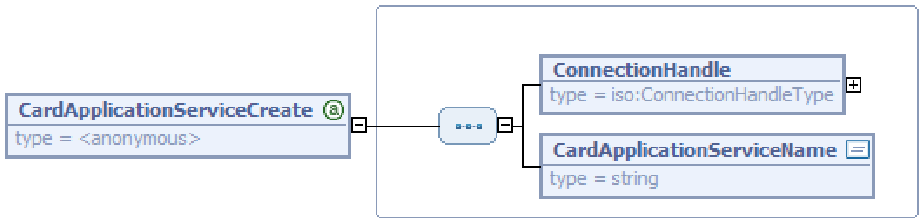
Precondition	A connection to the alpha card application (or master file) or the card application which is to be deleted has been established with `CardApplicationConnect`.
Postcondition	The card application (incl. its services, data sets and DIDs) was deleted. Any existing connections to the deleted card application are terminated.
Note	Deletion of a card application results in changes to EF.DIR, the card capability description according to section 6.1 of [ISO24727-2], the [ISO7816-15] structures on the card and/or the corresponding `CardInfo` file.

3.3.4 CardApplicationServiceList

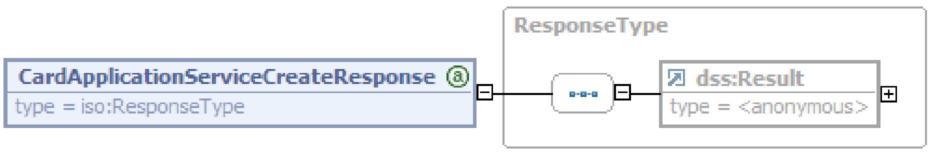
Name	**`CardApplicationServiceList`**
Description	The `CardApplicationServiceList` function returns a list of all available services of a card application.
Invocation parameters	 CardApplicationServiceList type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType Invocation of the `CardApplicationServiceList` function. **Name** **Description** `ConnectionHandle` Contains a handle with which the connection to a card application is addressed.
Return	 CardApplicationServiceListResponse type = <anonymous> dss:Result type = <anonymous> CardApplicationServiceNameList type = <anonymous> Return of the `CardApplicationServiceList` function. **Name** **Description** `dss:Result` Contains the status information and the errors of an executed action. This element is described in more detail below. `CardApplicationService NameList` Contains a list of the names of all services contained in the card application (see below for details).  CardApplicationServiceNameList type = <anonymous> CardApplicationServiceName type = string 0..* The `CardApplicationServiceNameList` element is part of the return of `CardApplicationServiceList`. **Name** **Description**

	`CardApplication ServiceName`[8]	Contains the name of the card application service, whereby only additional services which are not specified in [ISO24727-3] are contained in the list.
	Status information and errors in `CardApplicationServiceList` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition		
Note	The available services in a card application are contained in the application capability description (also refer to [ISO24727-2]) or the `CardInfo` file.	

3.3.5 CardApplicationServiceCreate

Name	**`CardApplicationServiceCreate`**	
Description	The `CardApplicationServiceCreate` function creates a new service in the card application.	
Invocation parameters	 CardApplicationServiceCreate type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType CardApplicationServiceName type = string Invocation of the `CardApplicationServiceCreate` function.	
	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	`CardApplicationService Name`[9]	Contains the name of the card application service which is to be created.

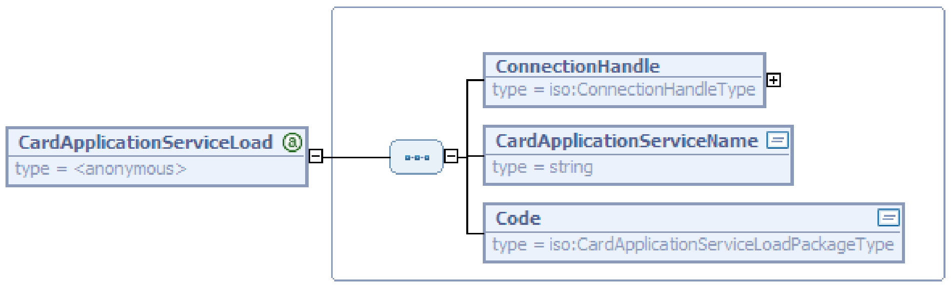
8 See footnote on page 32.
9 See footnote on page 32.

Return	 CardApplicationServiceCreateResponse type = iso:ResponseType ResponseType dss:Result type = <anonymous> Return of the `CardApplicationServiceCreate` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	Status information and errors in `CardApplicationServiceCreate` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#nameExists • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNot Satisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition	The new service has been created in the card application.	
Note	The newly added service MUST be supplemented in the application capability description (also refer to [ISO24727-2]) or the `CardInfo` file.	

3.3.6 CardApplicationServiceLoad

Name	**`CardApplicationServiceLoad`**
Description	Code for a specific card application service was loaded into the card application with the aid of the `CardApplicationServiceLoad` function.

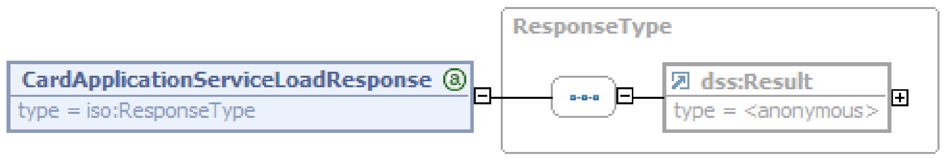
Invocation parameters


CardApplicationServiceLoad
type = <anonymous>
ConnectionHandle
type = iso:ConnectionHandleType
CardApplicationServiceName
type = string
Code
type = iso:CardApplicationServiceLoadPackageType

Invocation of the `CardApplicationServiceLoad` function.

Name	Description
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
`CardApplicationServiceName`[10]	Contains the name of the card application service with which the corresponding code should be loaded into the card application.
`Code`	Contains the executable code for the stated card application service.

Return



Return of the `CardApplicationServiceLoad` function.

Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

Status information and errors in `CardApplicationServiceLoad` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

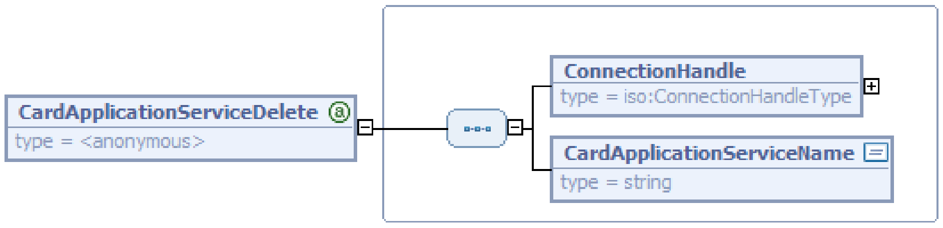
Name	Error codes
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure

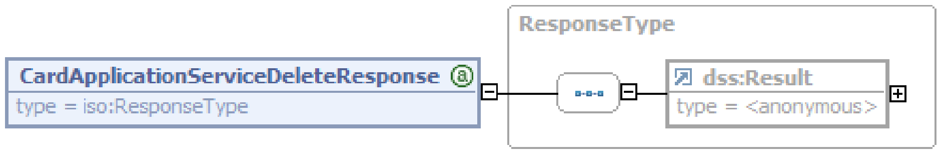
10 See footnote on page 32.

	ResultMessage	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with CardApplicationConnect. The corresponding service already exists in the card application.	
Postcondition		
Note	It must be noted that re-loading of card application services can involve additional risks which require additional security measures on the card and/or in the organisational environment of the eCard-API-Framework. Such security measures are, however, are beyond the scope of this document.	

3.3.7 CardApplicationServiceDelete

Name	**CardApplicationServiceDelete**	
Description	The CardApplicationServiceDelete function deletes a card application service in a card application.	

Invocation parameters	 CardApplicationServiceDelete
	type = <anonymous>
	ConnectionHandle
	type = iso:ConnectionHandleType
	CardApplicationServiceName
	type = string Invocation of the CardApplicationServiceDelete function.	

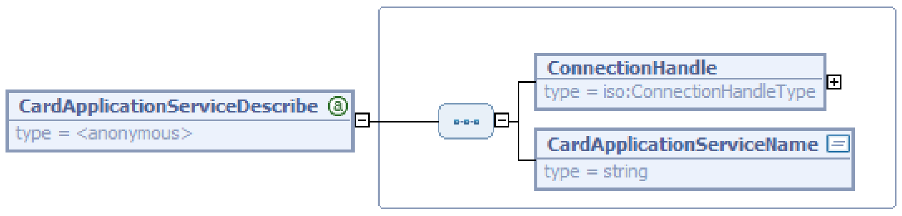
	Name	**Description**
	ConnectionHandle	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	CardApplication ServiceName[11]	Contains the name of the card application service which is to be deleted.
Return	 ResponseType CardApplicationServiceDeleteResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the CardApplicationServiceDelete function.	
	Name	**Description**
	dss:Result	Contains the status information and the errors of an executed action. This element is described in more detail below.

11 See footnote on page 32.

	Status information and errors in `CardApplicationServiceDelete` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition	The card application service has been deleted.	
Note	The deleted service MUST be removed from the application capability description (also refer to [ISO24727-2]) or the `CardInfo` file.	

3.3.8 CardApplicationServiceDescribe

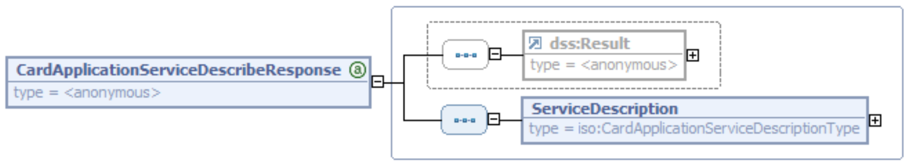
Name	**`CardApplicationServiceDescribe`**	
Description	The `CardApplicationServiceDescribe` function can be used to request an URI, an URL or a detailed description of the selected card application service.	

Invocation parameters	 CardApplicationServiceDescribe
	type = <anonymous>
	ConnectionHandle
	type = iso:ConnectionHandleType
	CardApplicationServiceName
	type = string Invocation of the `CardApplicationServiceDescribe` function.	

	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	`CardApplication ServiceName`[12]	Contains the name of the card application service for which the interface description should be determined.

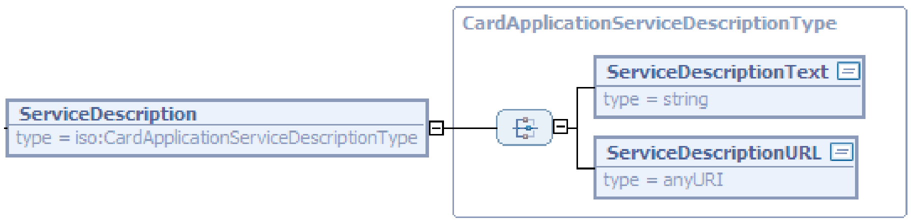
12 See footnote on page 32.

Return parameters


CardApplicationServiceDescribeResponse
type = <anonymous>
dss:Result
type = <anonymous>
ServiceDescription
type = iso:CardApplicationServiceDescriptionType

Return of the `CardApplicationServiceDescribe` function.

Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
`ServiceDescripton`	Contains the description of the interface for use of the stated card application service (see below for details).



The `ServiceDescripton` element is part of the return of `CardApplicationServiceDescribe` (see above).

Name	Description
`ServiceDescriptionText`	Interface description of the card application service.
`ServiceDescriptionURL`	URL from which the interface description of the card application service may be downloaded.

Status information and errors in `CardApplicationService Describe` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

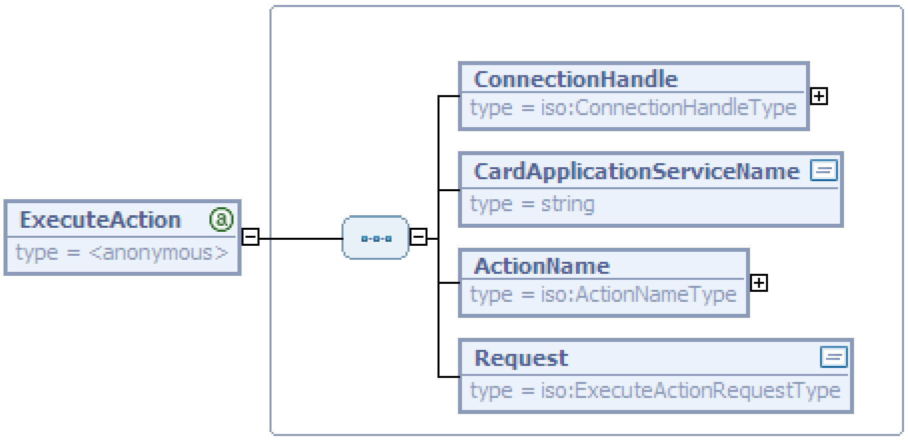
Name	Error codes
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNot Satisfied • /resultminor/dp#communicationFailure
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

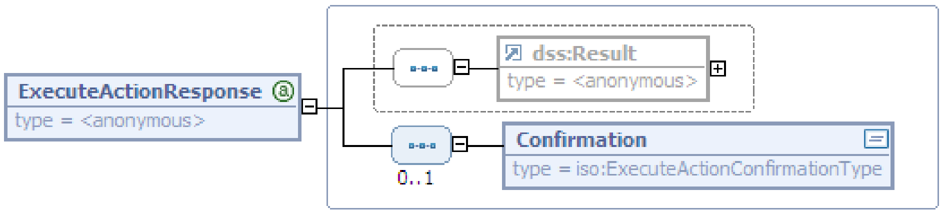
Precondition	A connection to a card application has been established with

	CardApplicationConnect.
Postcondition	
Note	The interface description is contained in the application capability description (also refer to [ISO24727-2]) or the CardInfo file.

3.3.9 ExecuteAction

Name	**ExecuteAction**
Description	The ExecuteAction function permits use of additional card application services by the client application which are not explicitly specified in [ISO24727-3] but which can be implemented by the eCard with additional code.

Invocation parameters	 ExecuteAction
	type = <anonymous>
	ConnectionHandle
	type = iso:ConnectionHandleType
	CardApplicationServiceName
	type = string
	ActionName
	type = iso:ActionNameType
	Request
	type = iso:ExecuteActionRequestType Invocation of the ExecuteAction function.

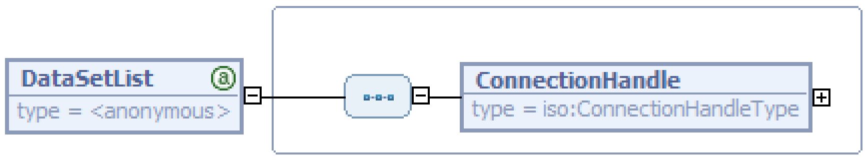
	Name | **Description**
	ConnectionHandle | Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	CardApplication ServiceName[13] | Contains the name of the card application service in which a function should be invoked.
	ActionName | States which function should be invoked.
	Request | Contains the required invocation parameters.
Return	 ExecuteActionResponse type = <anonymous> dss:Result type = <anonymous> Confirmation type = iso:ExecuteActionConfirmationType 0..1 Return of the ExecuteAction function.
	Name | **Description**

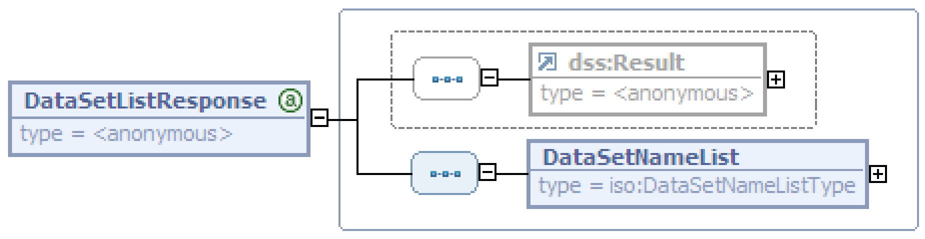
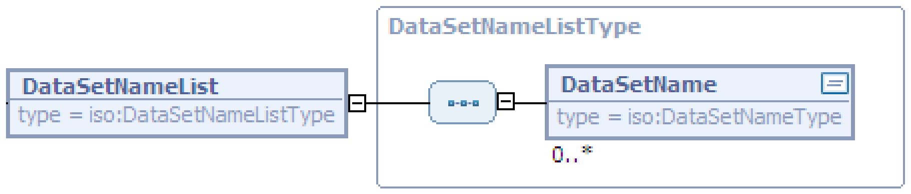
13 See footnote on page 32.

	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	`Confirmation`	Contains the data returned by the card application service.
	Status information and errors in `ExecuteAction` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`. The service with executable code is contained in the card application.	
Postcondition		
Note		

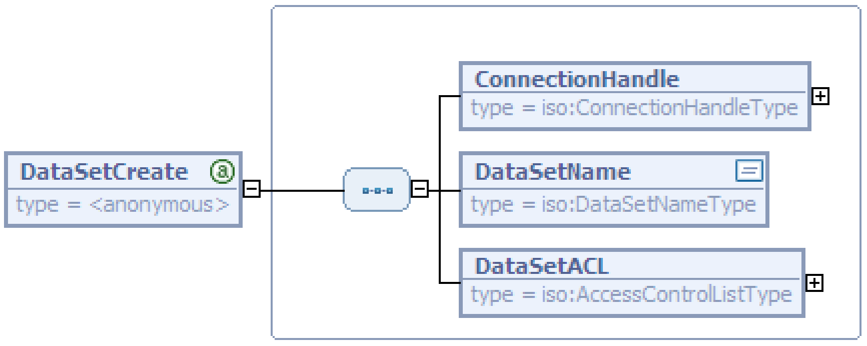
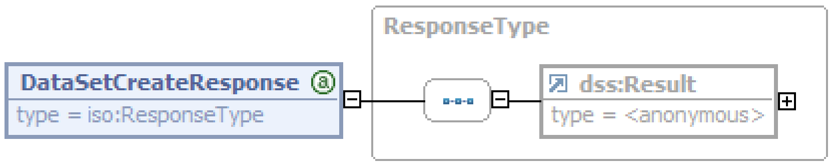
3.4 Named Data Services

3.4.1 DataSetList

Name	**`DataSetList`**	
Description	The `DataSetList` function returns the list of the data sets in the card application addressed with the `ConnectionHandle`.	
Invocation parameters	 DataSetList type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType Invocation of the `DataSetList` function.	
	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).

Return	 DataSetListResponse type = <anonymous> dss:Result type = <anonymous> DataSetNameList type = iso:DataSetNameListType Return of the `DataSetList` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	`DataSetNameList`	Contains a list of the names of data sets and, if applicable, additional information on the data set (see below for details).
	 DataSetNameList type = iso:DataSetNameListType DataSetNameListType DataSetName type = iso:DataSetNameType 0..* The `DataSetNameList` element is part of `DataSetListResponse`.	
	Name	**Description**
	`DataSetName`	States the name of the data set.
	Status information and errors in `DataSetList` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition		
Note	The list of the data sets is contained in the application capability description (also refer to [ISO24727-2]), in a [ISO7816-15] structure on the card or the `CardInfo` file.	

3.4.2 DataSetCreate

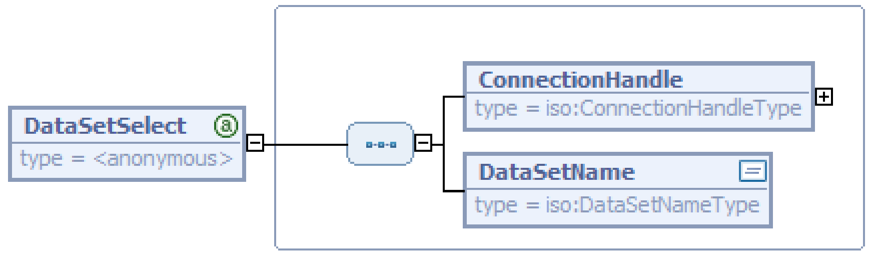
Name	**DataSetCreate**
Description	The `DataSetCreate` function creates a new data set in the card application addressed with the `ConnectionHandle` (or otherwise in a previously selected data set if this is implemented as a DF).
Invocation parameters	 DataSetCreate type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DataSetName type = iso:DataSetNameType DataSetACL type = iso:AccessControlListType Invocation of the `DataSetCreate` function.
	Name / **Description**
	`ConnectionHandle`: Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	`DataSetName`: Contains the name of the new data set which is to be created.
	`DataSetACL`: Contains access control information for the new data set which is to be created. Details on the `AccessControlListType` are given on page 31.
Return	 ResponseType DataSetCreateResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `DataSetCreate` function.
	Name / **Description**
	`dss:Result`: Contains the status information and the errors of an executed action. This element is described in more detail below.

	Status information and errors in `DataSetCreate` (also refer to [TR-03112-1] Sections 4.1 and 4.2.

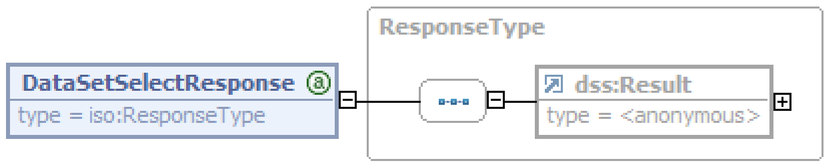
Name	**Error codes**
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#nameExists • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	A connection to a card application has been established with `CardApplicationConnect`.
Postcondition	There is a newly created data set in the connected card application and this data set is automatically selected.
Note	The newly created data set MUST be noted in the application capability description (also refer to [ISO24727-2]), in a [ISO7816-15] structure on the card or the `CardInfo` file.

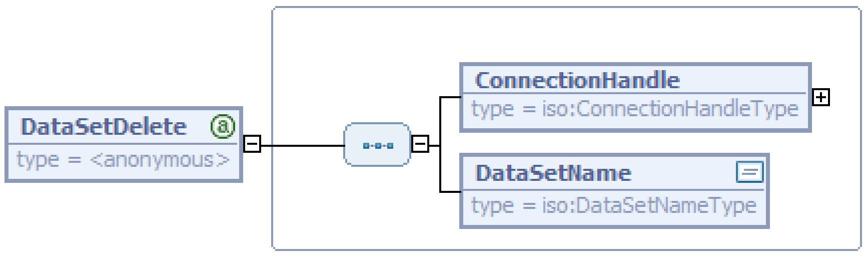
3.4.3 DataSetSelect

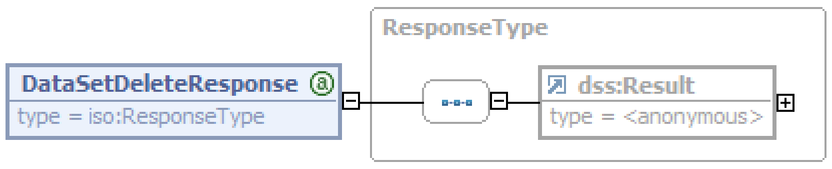
Name	**`DataSetSelect`**
Description	The `DataSetSelect` function selects a data set in a card application.
Invocation parameters	 Invocation of the `DataSetSelect` function.

Name	**Description**
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
`DataSetName`	Contains the name of the data set which is to be selected.

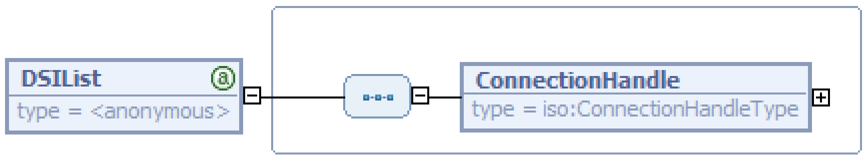
Return	 ResponseType DataSetSelectResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `DataSetSelect` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	Status information and errors in `DataSetSelect` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition	The stated data set has been selected.	
Note		

3.4.4 DataSetDelete

Name	**`DataSetDelete`**	
Description	The `DataSetDelete` function deletes a data set of a card application on an eCard.	
Invocation parameters	 DataSetDelete type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DataSetName type = iso:DataSetNameType Invocation of the `DataSetDelete` function.	
	Name	**Description**

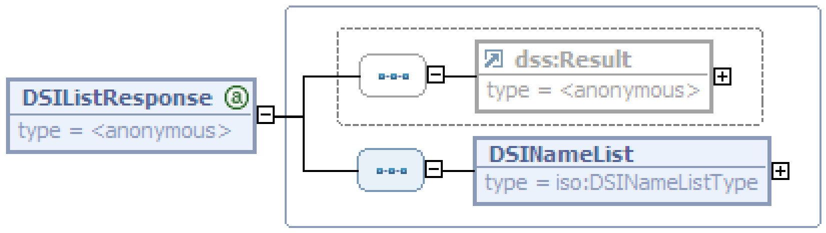
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	`DataSetName`	Contains the name of the data set.
Return	 ResponseType DataSetDeleteResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `DataSetDelete` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	Status information and errors in `DataSetDelete` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition	The respective data set is deleted.	
Note		

3.4.5 DSIList

Name	**`DSIList`**
Description	The function `DSIList` supplies the list of the DSI (Data Structure for Interoperability) which exist in the selected data set.
Invocation parameters	 DSIList type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType Invocation of the `DSIList` function.

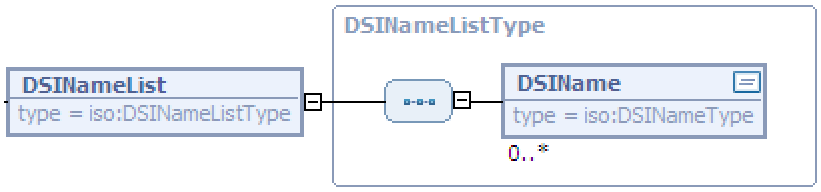
	Name	Description
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed.

Return



Return of the `DSIList` function.

Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
`DSINameList`	Contains the list of the names of the existing DSIs. See below for details.



The `DSINameList element` is part of `DSIListResponse`.

Name	Description
`DSIName`	States the name of the DSI.

Status information and errors in `DSIList` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

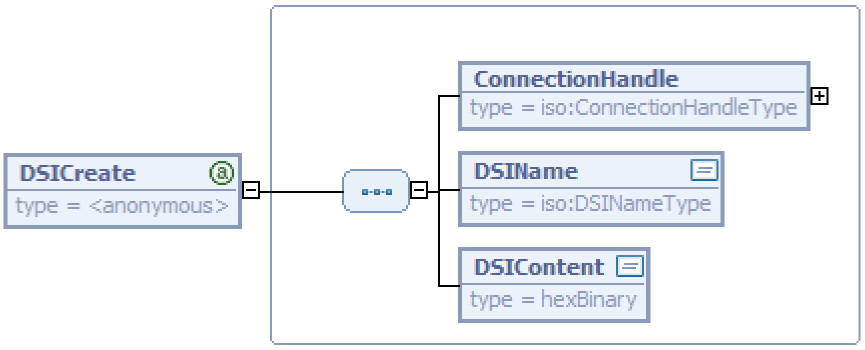
Name	Error codes
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#prerequisitesNotSatisfied • /resultminor/dp#communicationFailure
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

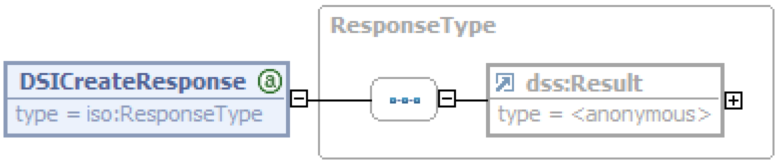
Precondition	A connection to a card application has been established with `CardApplicationConnect`.
Postcondition	

Note	It can be seen which data sets exist in a card application by inspecting the application capability description (also refer to [ISO24727-2]), a suitable [ISO7816-15] structure on the card or the `CardInfo` file.

3.4.6 DSICreate

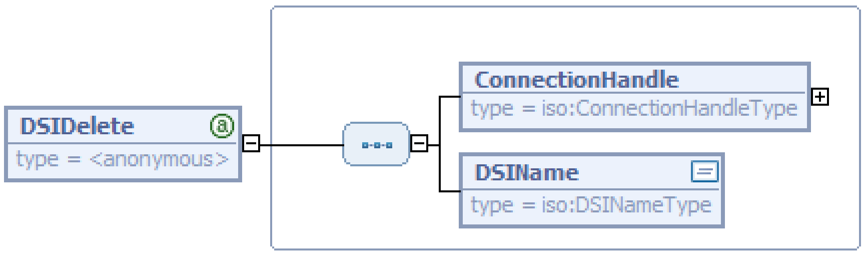
Name	**`DSICreate`**	
Description	The `DSICreate` function creates a DSI (Data Structure for Interoperability) in the currently selected data set.	

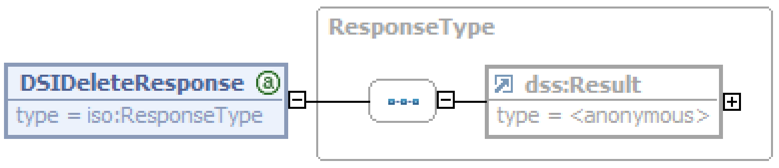
Invocation parameters	 DSICreate
	type = <anonymous>
	ConnectionHandle
	type = iso:ConnectionHandleType
	DSIName
	type = iso:DSINameType
	DSIContent
	type = hexBinary Invocation of the `DSICreate` function.	

	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed.
	`DSIName`	Contains the name of the DSI which is to be created.
	`DSIContent`	Contains the content of the DSI which is to be created.
Return	 ResponseType DSICreateResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `DSICreate` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

	Status information and errors in `DSICreate` (also refer to [TR-03112-1] Sections 4.1 and 4.2). **Name** / **Error codes** `ResultMajor`: • /resultmajor#ok • /resultmajor#error `ResultMinor`: • /resultminor/al/common#incorrectParameter • /resultminor/sal#nameExists • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#prerequisitesNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure `ResultMessage`: MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`. In addition a data set has been selected with `DataSetSelect`.
Postcondition	A DSI has been created in the data set, if the request was succesful.
Note	The list of the data sets is contained in the application capability description (also refer to [ISO24727-2]), in a [ISO7816-15] structure on the card or the `CardInfo` file.

3.4.7 DSIDelete

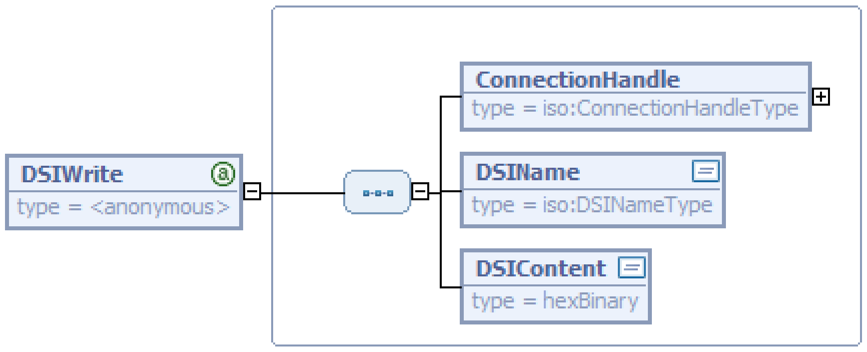
Name	**`DSIDelete`**
Description	The `DSIDelete` function deletes a DSI (Data Structure for Interoperability) in the currently selected data set.
Invocation parameters	 DSIDelete type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DSIName type = iso:DSINameType Invocation of the `DSIDelete` function. **Name** / **Description** `ConnectionHandle`: Contains a handle with which the connection to a card application is addressed (also refer to page 22). `DSIName`: Contains the name of the DSI to be deleted.

Return	 ResponseType DSIDeleteResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `DSIDelete` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	Status information and errors in `DSIDelete` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#prerequisitesNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`. In addition a data set was selected with `DataSetSelect`.	
Postcondition	The DSI has been deleted.	
Note	The list of the data sets is contained in the application capability description (also refer to [ISO24727-2]), in a [ISO7816-15] structure on the card or the `CardInfo` file.	

3.4.8 DSIWrite

Name	**`DSIWrite`**
Description	The `DSIWrite` function changes the content of a DSI (Data Structure for Interoperability).

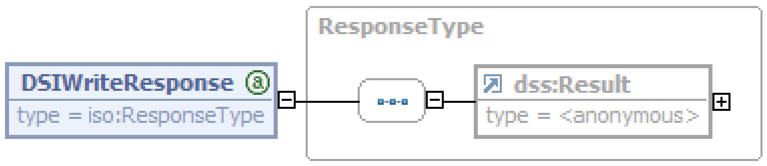
Invocation parameters



Invocation of the `DSIWrite` function.

Name	Description
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
`DSIName`	Contains the name of the DSI.
`DSIContent`	Contains the content of a DSI.

Return



Return of the `DSIWrite` function.

Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

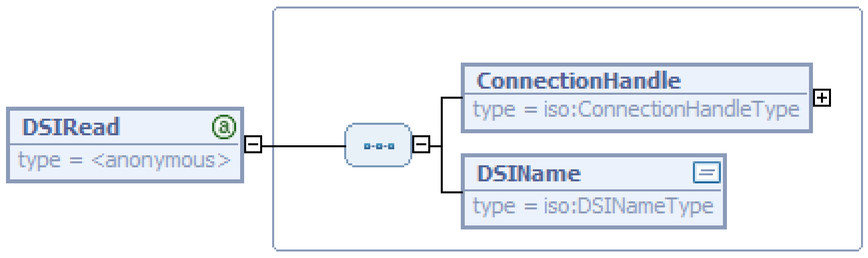
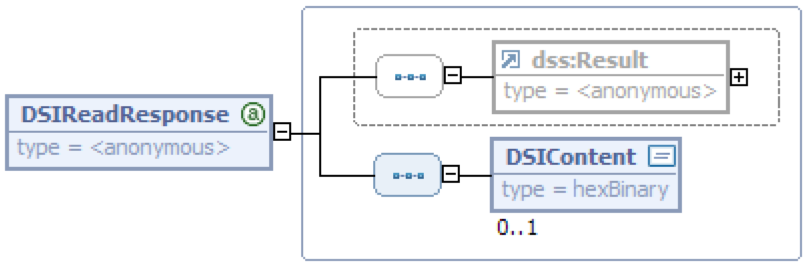
Status information and errors in `DSIWrite` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

Name	Error codes
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#prerequisitesNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	A connection to a card application has been established with

	CardApplicationConnect. In addition a data set was selected with DataSetSelect. The DSI has been created.	
Postcondition	The content of the DSI has been updated.	
Note		

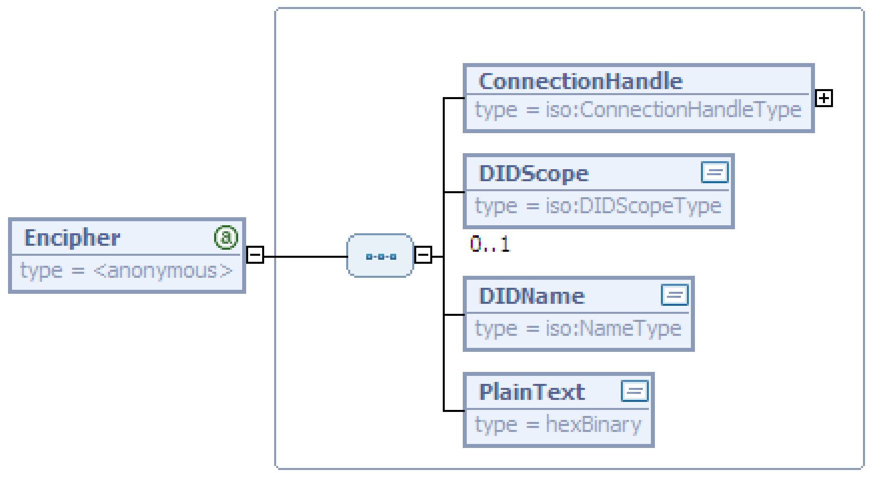
3.4.9 DSIRead

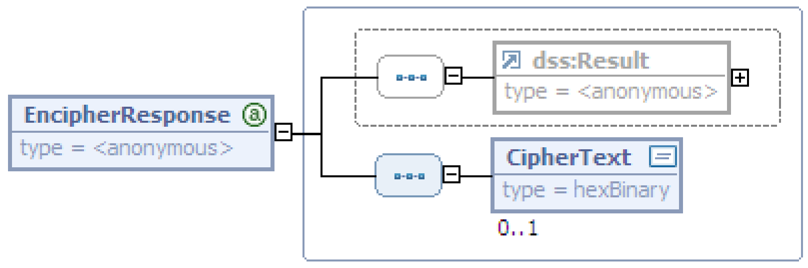
Name	**DSIRead**	
Description	The DSIRead function reads out the content of a specific DSI (Data Structure for Interoperability).	
Invocation parameters	 DSIRead type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DSIName type = iso:DSINameType Invocation of the DSIRead function.	
	Name	**Description**
	ConnectionHandle	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	DSIName	Contains the name of the DSI of which the content is to be read out.
Return	 DSIReadResponse type = <anonymous> dss:Result type = <anonymous> DSIContent type = hexBinary 0..1 Return of the DSIRead function.	
	Name	**Description**
	dss:Result	Contains the status information and the errors of an executed action. This element is described in more detail below.
	DSIContent	Contains the content of the DSI if it was possible to read it.

	Status information and errors in `DSIRead` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#prerequisitesNotSatisfied • /resultminor/dp#communicationFailure
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`. In addition a data set was selected with `DataSetSelect`.	
Postcondition		
Note		

3.5 Crypto Services

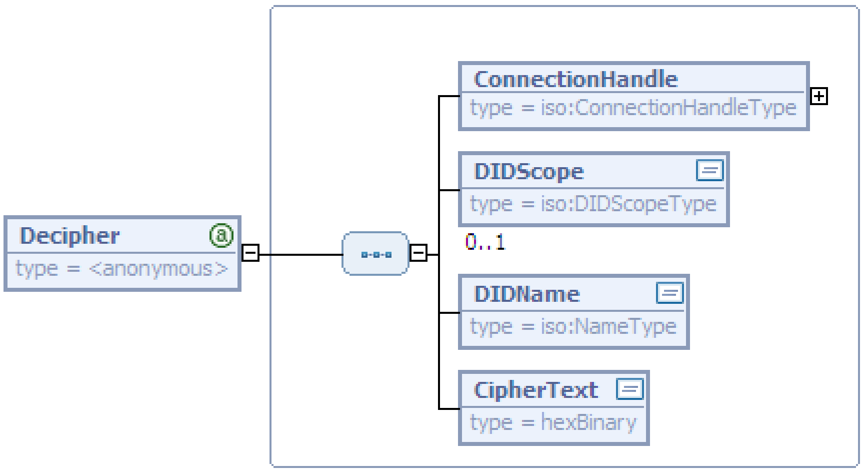
3.5.1 Encipher

Name	**`Encipher`**
Description	The `Encipher` function encrypts a transmitted plain text. The detailed behaviour of this function depends on the protocol of the DID. Refer to [TR-03112-7] for protocol specifications and in particular the specification of the "Generic cryptography" protocol in Section 3.5 of [TR-03112-7].
Invocation parameters	 Encipher type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DIDScope type = iso:DIDScopeType 0..1 DIDName type = iso:NameType PlainText type = hexBinary Invocation of the `Encipher` function.

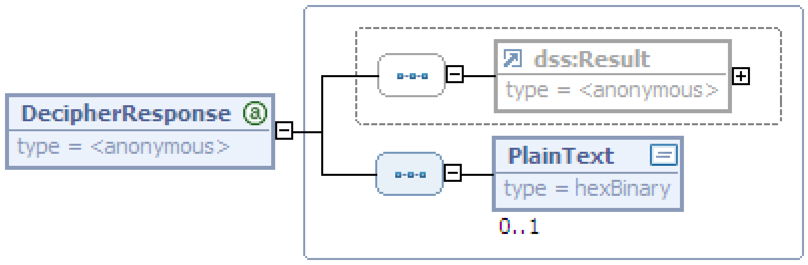
	Name	Description
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed.
	`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
	`DIDName`	Contains the name of the DID which is used for encryption.
	`PlainText`	Contains the plain text which is to be encrypted.
Return	 EncipherResponse type = <anonymous> dss:Result type = <anonymous> CipherText type = hexBinary 0..1 Return of the `Encipher` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	`CipherText`	Contains the cipher text if it was possible to encrypt the plain text.
	Status information and errors in `Encipher` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	A connection to a card application has been established with `CardApplicationConnect`.
Postcondition	
Note	

3.5.2 Decipher

Name	**`Decipher`**
Description	The `Decipher` function decrypts a given cipher text. The detailed behaviour of this function depends on the protocol of the DID. Refer to [TR-03112-7] for protocol specifications and in particular the specification of the “Generic cryptography” protocol in Section 3.5 of [TR-03112-7].
Invocation parameters	 Decipher type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DIDScope type = iso:DIDScopeType 0..1 DIDName type = iso:NameType CipherText type = hexBinary Invocation of the `Decipher` function.

Name	**Description**
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page ConnectionHandle).
`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
`DIDName`	Contains the name of the DID which is to be used for decryption.
`CipherText`	Contains the cipher text which is to be decrypted.

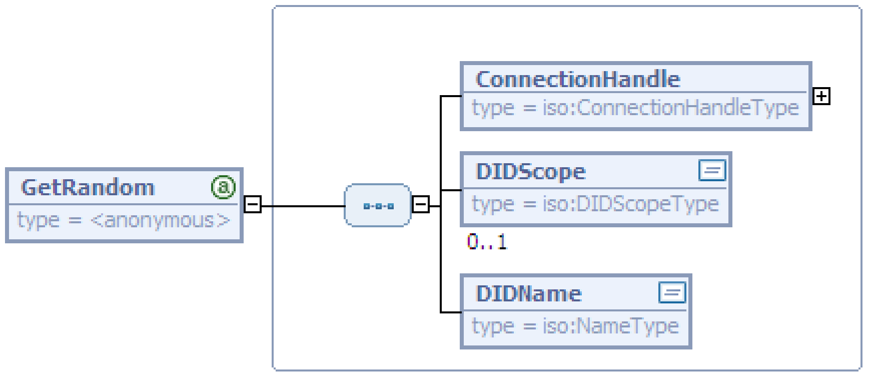
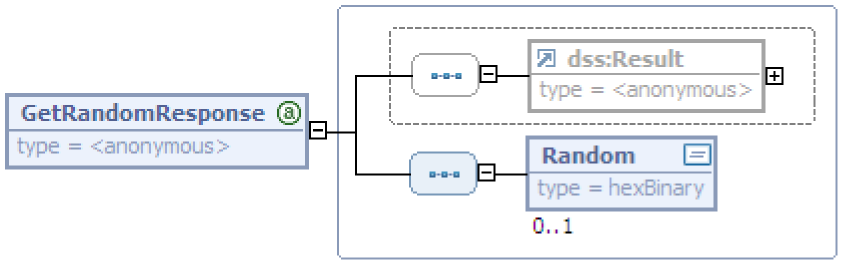
Return	 DecipherResponse type = <anonymous> dss:Result type = <anonymous> PlainText type = hexBinary 0..1 Return of the `Decipher` function.

Name	**Description**

	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	`PlainText`	Contains the plain text if decryption was possible.
	Status information and errors in `Decipher` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition		
Note	If additional authentication steps are necessary for access to the stated DID, these MAY be implicitly initiated.	

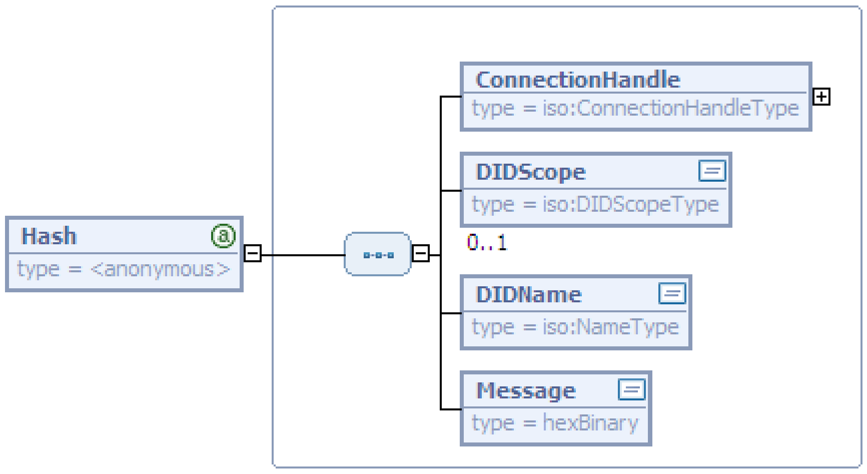
3.5.3 GetRandom

Name	**`GetRandom`**
Description	The `GetRandom` function returns a random number which is suitable for authentication with the DID addressed with `DIDName`. The detailed behaviour of this function depends on the protocol of the DID. Refer to [TR-03112-7] for protocol specifications.

Invocation parameters	 GetRandom type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DIDScope type = iso:DIDScopeType 0..1 DIDName type = iso:NameType Invocation of the `GetRandom` function.	
	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed.
	`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
	`DIDName`	Contains the name of the differential identity (unique with respect to the scope) which determines the details of the random number generation.
Return	 GetRandomResponse type = <anonymous> dss:Result type = <anonymous> Random type = hexBinary 0..1 Return of the `GetRandom` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	`Random`	Contains the returned random number if it was possible to generate a number.

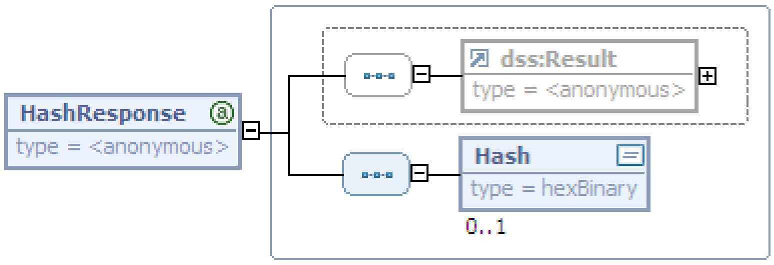
	Status information and errors in `GetRandom` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition		
Note		

3.5.4 Hash

Name	**`Hash`**
Description	The `Hash` function calculates the hash value of a transmitted message. The detailed behaviour of this function depends on the protocol of the DID. Refer to [TR-03112-7] for protocol specifications and in particular the specification of the "Generic cryptography" protocol in Section 3.5 of [TR-03112-7].
Invocation parameters	 Hash type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DIDScope type = iso:DIDScopeType 0..1 DIDName type = iso:NameType Message type = hexBinary Invocation of the `Hash` function.

	Name	Description
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
	`DIDName`	Contains the name of the DID which should be used to create the hash value.
	`Message`	Contains the message for which the hash value is to be calculated.

Return



Return of the `Hash` function.

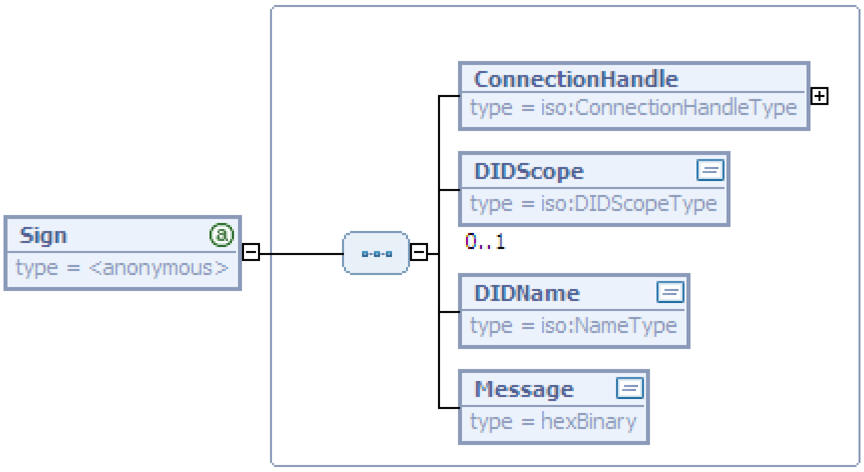
Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
`Hash`	Contains the calculated hash value if it was possible to calculate a value.

Status information and errors in `Hash` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

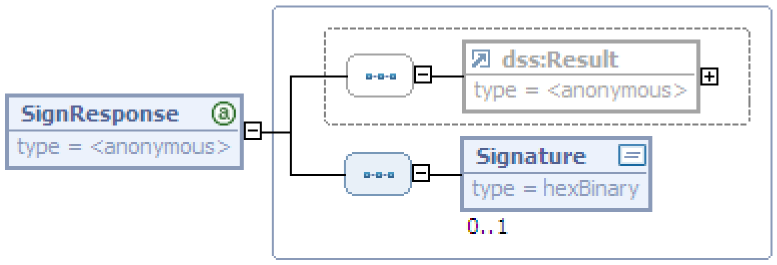
Name	Error codes
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	A connection to a card application has been established with `CardApplicationConnect`.
Postcondition	
Note	

3.5.5 Sign

Name	**`Sign`**
Description	The `Sign` function signs a transmitted message. The detailed behaviour of this function depends on the protocol of the DID. Refer to [TR-03112-7] for protocol specifications and in particular the specification of the "Generic cryptography" protocol in Section 3.5 of [TR-03112-7].
Invocation parameters	 Sign type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DIDScope type = iso:DIDScopeType 0..1 DIDName type = iso:NameType Message type = hexBinary Invocation of the `Sign` function.

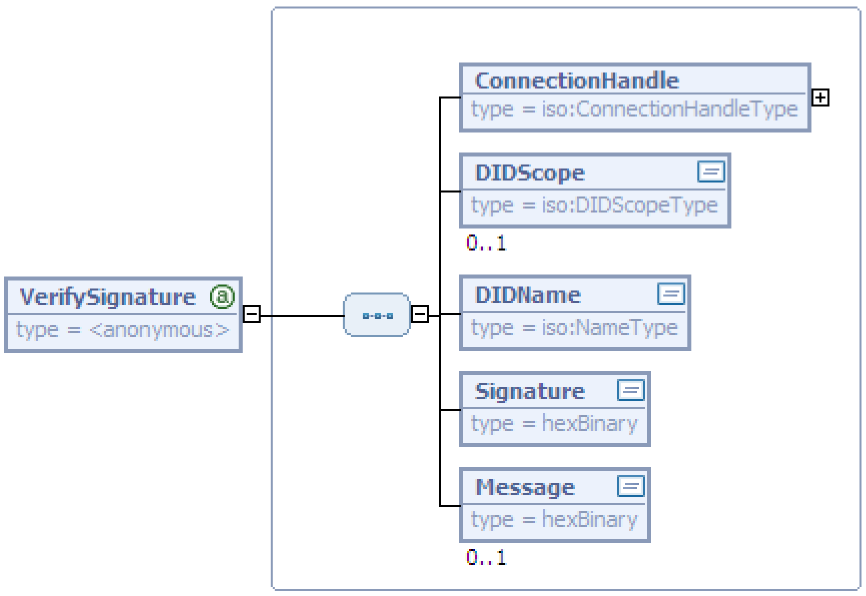
Name	Description
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
`DIDName`	Contains the name of the differential identity with which the transmitted message should be signed.
`Message`	Contains the data which are to be signed. It MAY be determined with the respective protocol specifications whether a hash value has to be calculated on the basis of the data and which padding process is to be used (also refer to [TR-03112-7]).

Return	 SignResponse type = <anonymous> dss:Result type = <anonymous> Signature type = hexBinary 0..1 Return of the `Sign` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	`Signature`	Contains the signature if successful.
	Status information and errors in `Sign` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition		
Note		

3.5.6 VerifySignature

Name	**`VerifySignature`**
Description	The `VerifySignature` function verifies a digital signature. The detailed behaviour of this function depends on the protocol of the DID. Refer to [TR-03112-7] for protocol specifications and in particular the specification of the "Generic cryptography" protocol in Section 3.5 of [TR-03112-7].

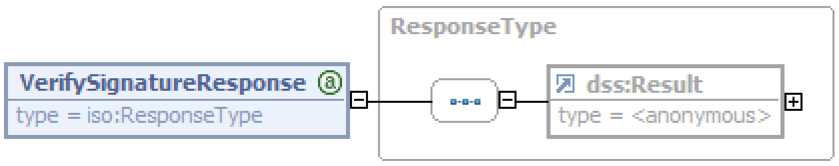
Invocation parameters



Invocation of the `VerifySignature` function.

Name	Description
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
`DIDName`	Contains the name of the differential identity to be used for verifying the signature.
`Signature`	Contains the signature which is to be verified.
`Message`	Contains the signed message if not already contained in the signature.

Return



Return of the `VerifySignatureResponse` function.

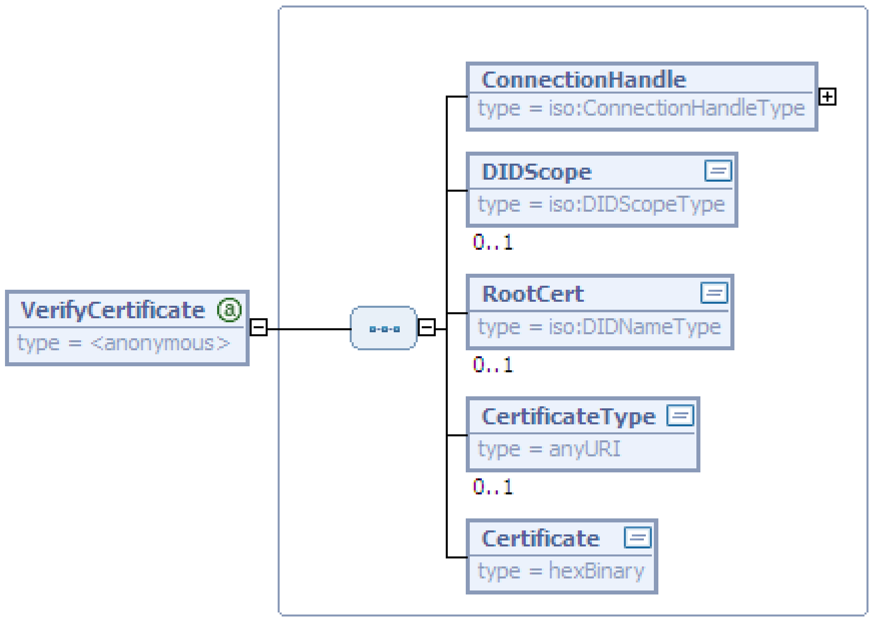
Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

	Status information and errors in `VerifySignature` (also refer to [TR-03112-1] Sections 4.1 and 4.2). **Name** / **Error codes** `ResultMajor`: • /resultmajor#ok • /resultmajor#error `ResultMinor`: • /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist. `ResultMessage`: MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.
Postcondition	
Note	

3.5.7 VerifyCertificate

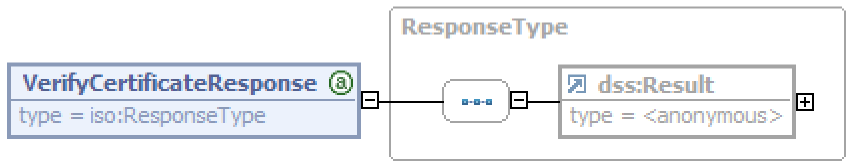
Name	**`VerifyCertificate`**
Description	The `VerifyCertificate` function validates a given certificate. The detailed behaviour of this function depends on the protocol of the DID. Refer to [TR-03112-7] for protocol specifications and in particular the specification of the "Generic cryptography" protocol in Section 3.5 of [TR-03112-7].

Invocation parameters



Invocation of the `VerifyCertificate` function.

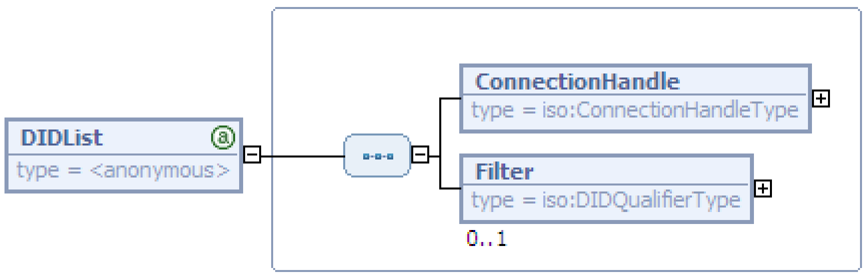
Name	**Description**
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
`RootCert`	Optionally contains a reference to the root key with which the certificate is to be verified. If this root key is provided on the card and can be selected with the CAR data object in the transferred CV certificate, explicit statement of the root key MAY be omitted.
`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
`CertificateType`	MAY state the type of the certificate which is to be verified. Especially the following certificate types are defined: • urn:ietf:rfc:3280 – for X.509 public key certificates in accordance with [RFC3280] • urn:ietf:rfc:3281 – for X.509-based attribute certificates in accordance with [RFC3281] • urn:iso:std:iso-iec:7816:-8:tech:certificate:<*aid*>:<*cpi*> - for a card variable certificate according to [ISO7816-8], whereby <*aid*> contains the application identifier of a registered card application and <*cpi*> a corresponding certificate profile identifier (tag '5F29').
`Certificate`	Contains the certificate which is to be verified.

Return	 ResponseType VerifyCertificateResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `VerifyCertificate` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	Status information and errors in `VerifyCertificate` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#invalidKey • /resultminor/sal#invalidSignature • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition		
Note		

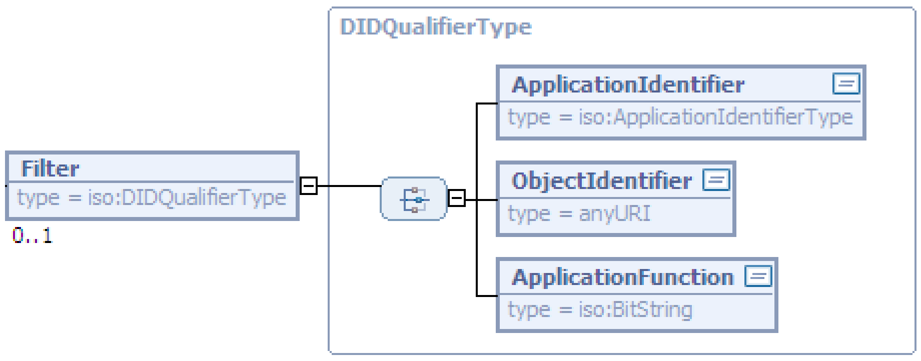
3.6 Differential Identity Services

3.6.1 DIDList

Name	**`DIDList`**

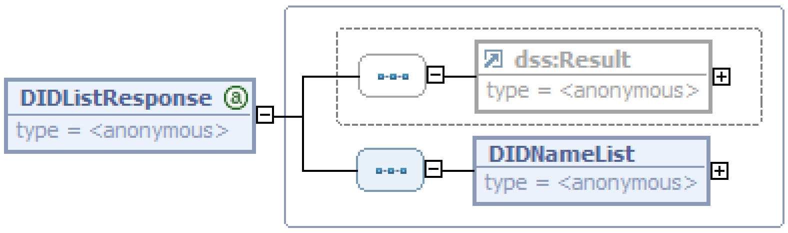
Description	The DIDList function returns a list of the existing DIDs in the card application addressed by the ConnectionHandle or the ApplicationIdentifier-element within the Filter.
Invocation parameters	 DIDList type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType Filter type = iso:DIDQualifierType 0..1 Invocation of the DIDList function.

Name	**Description**
Connection Handle	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
Filter	With the optional Filter element it is possible to control what kind of DIDs are to be returned. The detailed structure of the Filter-element is explained below.

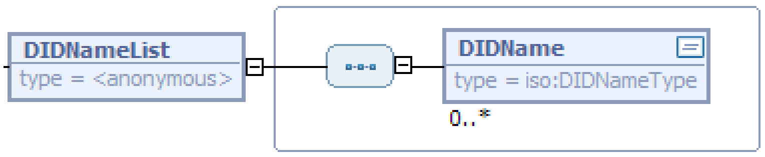


The Filter-element MAY be part of DIDList and allows to filter what kind of DIDs are to be listed.

Name	**Description**
ApplicationIdentifier	Allows specifying an application identifier. If this element is present all DIDs within the specified card application are returned no matter which card application is currently selected.
ObjectIdentifier	Allows specifying a protocol OID (cf. [TR-03112-7]) such that only DIDs which support a given protocol are listed.
ApplicationFunction	Allows filtering for DIDs, which support a specific cryptographic operation. The bit string is coded as the SupportedOperations-element in [ISO7816-15].

Return	 DIDListResponse type = <anonymous> dss:Result type = <anonymous> DIDNameList type = <anonymous> Return of the DIDList function.

Name	**Description**
dss:Result	Contains the status information and the errors of an executed action. This element is described in more detail below.
DIDNameList	Contains the list of the names of the differential identities as specified by the Filter-element.



DIDNameList is part of DIDListResponse.

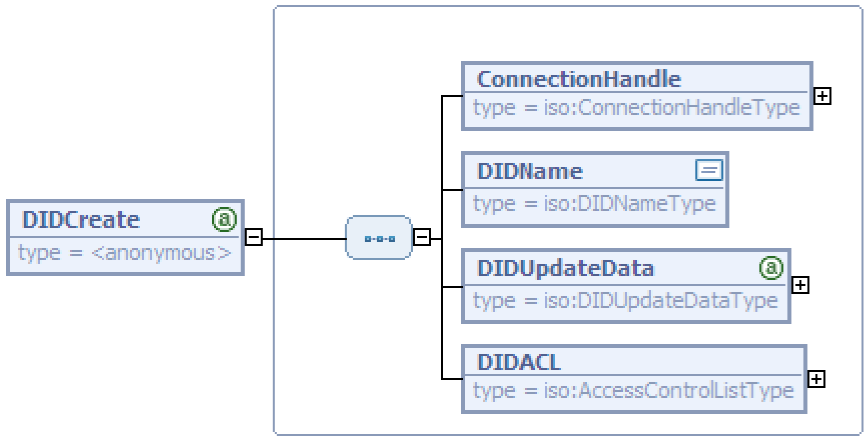
Name	**Description**
DIDName	Contains the name of the differential identity.

Status information and errors in DIDList (also refer to [TR-03112-1] Sections 4.1 and 4.2).

Name	**Error codes**
ResultMajor	• /resultmajor#ok • /resultmajor#error
ResultMinor	• /resultminor/al/common#incorrectParameter • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
ResultMessage	MAY contain more detailed information on the error which occurred if required.

Precondition	A connection to a card application has been established with CardApplicationConnect.
Postcondition	
Note	The DIDs in a card application are contained in the application capability description (also refer to [ISO24727-2]), in a [ISO7816-15] structure on the card or the CardInfo file.

3.6.2 DIDCreate

Name	**`DIDCreate`**
Description	The `DIDCreate` function creates a new differential identity in the card application addressed with `ConnectionHandle`.
Invocation parameters	 Invocation of the `DIDCreate` function.

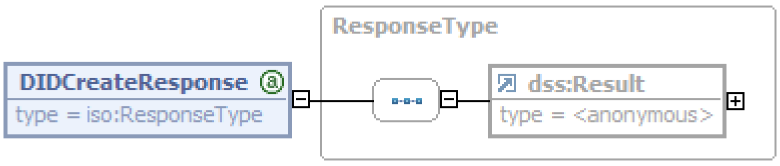
DIDCreate
type = <anonymous>
ConnectionHandle
type = iso:ConnectionHandleType
DIDName
type = iso:DIDNameType
DIDUpdateData
type = iso:DIDUpdateDataType
DIDACL
type = iso:AccessControlListType

Name	**Description**
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (refer to page 22).
`DIDName`	Contains the name of the differential identity.
`DIDUpdateData`	Contains information which is necessary for generating a DID with the protocol stated as an attribute. The `DIDUpdateDataType` serves as a generic template for the definition of `DIDUpdateData`-elements for specific authentication protocols (refer to [TR-03112-7]). This type is defined as follows:

```
<complexType name="DIDUpdateDataType"
abstract="true">
    <complexContent>
       <extension base="anyType">
<attribute name="Protocol" type="anyURI"
use="required"/>
       </extension>
    </complexContent>
</complexType>
```

The detailed structure depends on the authentication protocol (refer to [TR-03112-7]).

`DIDACL`	Contains an access control list for the DID. Further details on the `AccessControlListType` are given on page 31.

Return	 ResponseType DIDCreateResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `DIDCreate` function.

Name	**Description**
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

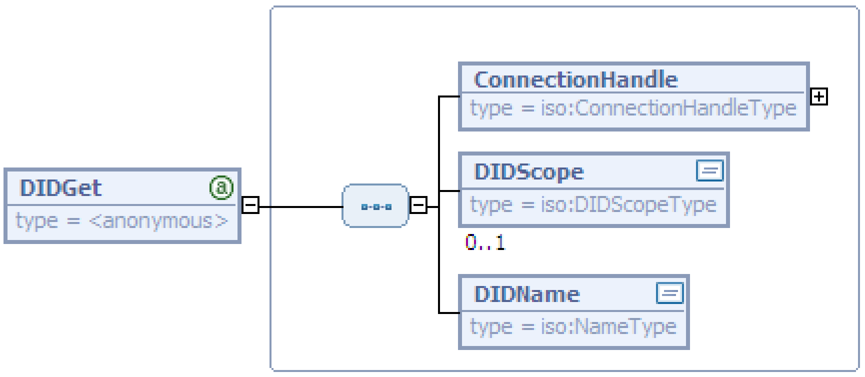
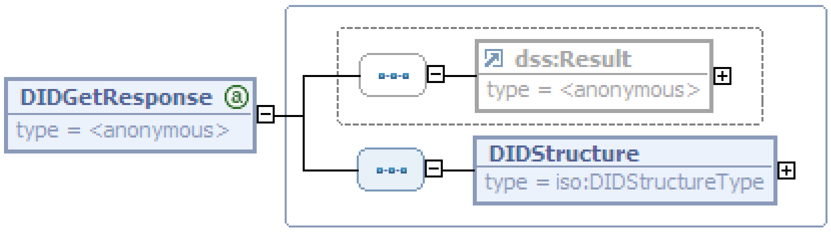
Status information and errors in `DIDCreate` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

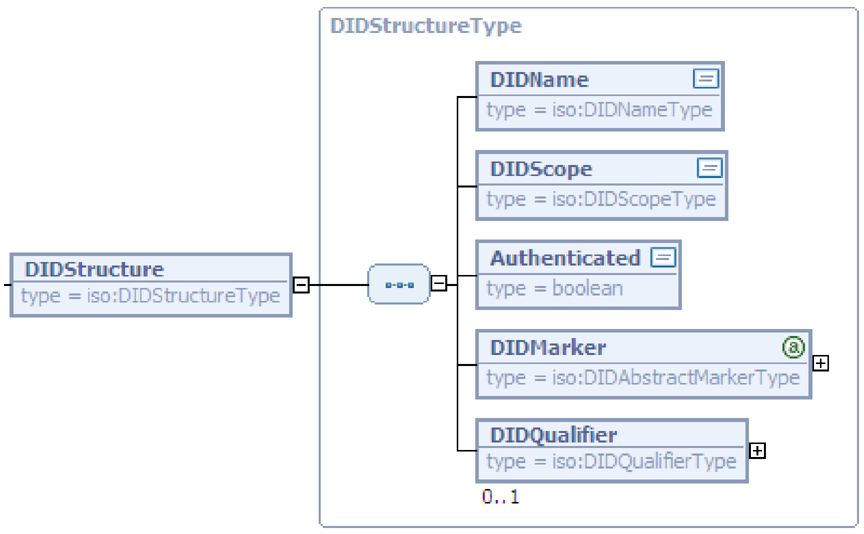
Name	**Error codes**
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#nameExists • /resultminor/sal#protocolNotRecognized • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	A connection to a card application has been established with `CardApplicationConnect`.
Postcondition	The corresponding differential identity is available on the eCard.
Note	The newly created DID MUST be noted in the application capability description (also refer to [ISO24727-2]), in a [ISO7816-15] structure on the card or the `CardInfo` file. With this function no optional `DIDScope` parameter is provided intentionally. Only one DID can be created in the currently selected card application. The "alpha card application" must therefore be selected to create a global DID. Information on whether this is a global or local DID is given implicitly by the card application. DIDs in the "alpha card application" are global – DIDs in other card applications are local.

3.6.3 DIDGet

Name	**`DIDGet`**
Description	The public information for a DID is read with the `DIDGet` function.

Invocation parameters	 DIDGet type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DIDScope type = iso:DIDScopeType 0..1 DIDName type = iso:NameType Invocation of the `DIDGet` function.	
	Name	**Description**
	`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
	`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
	`DIDName`	Contains the name of the DID for which the available information should be read from the eCard.
Return	 DIDGetResponse type = <anonymous> dss:Result type = <anonymous> DIDStructure type = iso:DIDStructureType Return of the `DIDGet` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	`DIDStructure`	Contains the publicly available information for this DID. The structure of the `DIDStructure` is explained below.



The `DIDStructure`-element is part of `DIDGetResponse` and contains the recoverable information of a DID.

Name	Description
`DIDName`	Is the name of the DID, which is used to address the DID within the calls defined in this document.
`DIDScope`	Indicates whether the scope of the DID is `local` or `global`. The `DIDScopeType` is defined as follows: `<simpleType name="DIDScopeType">` `<restriction base="string">` `<enumeration value="local" />` `<enumeration value="global" />` `</restriction>` `</simpleType>` If the scope is `local` the DID may only be accessed within its specific card application. If the sope is `global` the DID is part of the alpha-card-application and may be accessed in all card applications of a given eCard.
`Authenticated`	Indicates whether the DID is currently authenticated.

	DIDMarker	Contains the characteristic information of a DID. The DIDAbstractMarkerType serves as a generic template for the definition of Marker-elements for specific authentication protocols (refer to [TR-03112-7]). This type is defined as follows:
		`<complexType name="DIDAbstractMarkerType"`
		`abstract="true">`
		`    <complexContent>`
		`      <extension base="anyType">`
		`<attribute name="Protocol" type="anyURI"`
		`use="required"/>`
		`      </extension>`
		`    </complexContent>`
		`</complexType>`
		The required Protocol-attribute[14] specifies the authentication protocol of the DID and the concrete specification of the child elements of DIDMarker depends on the individual protocol specifications (refer to [TR-03112-7]). Note that the protocol identifies the used cryptographic protocol including the used commands as well as the secure messaging to be used after successful completion of the cryptographic protocol.

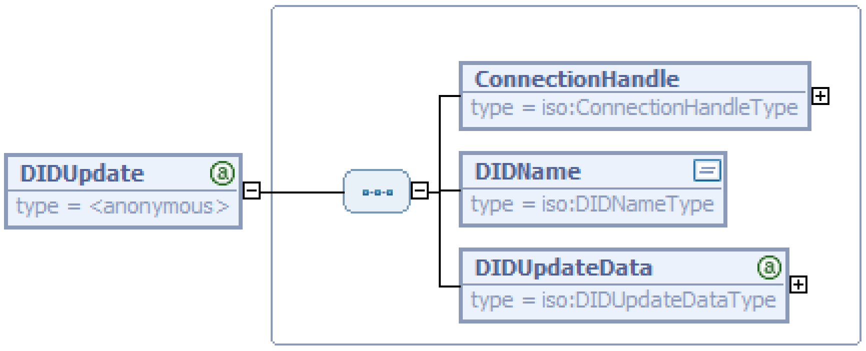
	DIDQualifier	The DIDQualifier MAY be part of a DID, if and only if the protocol specification (refer to [TR-03112-7]) defines the precise semantic of the DIDQualifier for a specific authentication protocol. The structure of the DIDQualifierType is defined on page 70.
	Status information and errors in DIDGet (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	ResultMajor	• /resultmajor#ok • /resultmajor#error
	ResultMinor	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
	ResultMessage	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with CardApplicationConnect.	

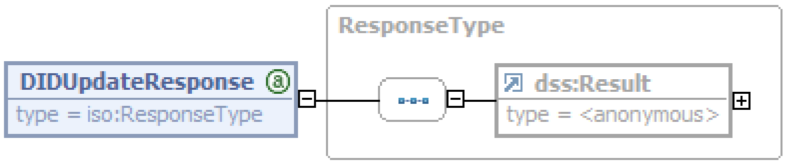
14 Note that the Protocol-attribute is mandatory and hence there is no need for an explicit Protocol-element as in [ISO24727-3].

Postcondition	
Note	The information about a DID which can be determined with `DIDGet` is stated in the application capability description (also refer to [ISO24727-2]), in a [ISO7816-15] structure on the card or the `CardInfo` file.

3.6.4 DIDUpdate

Name	**`DIDUpdate`**
Description	The `DIDUpdate` function creates a new key (marker) for the DID addressed with `DIDName`.

Invocation parameters	 DIDUpdate
	type = <anonymous>
	ConnectionHandle
	type = iso:ConnectionHandleType
	DIDName
	type = iso:DIDNameType
	DIDUpdateData
	type = iso:DIDUpdateDataType Invocation of the `DIDUpdate` function.

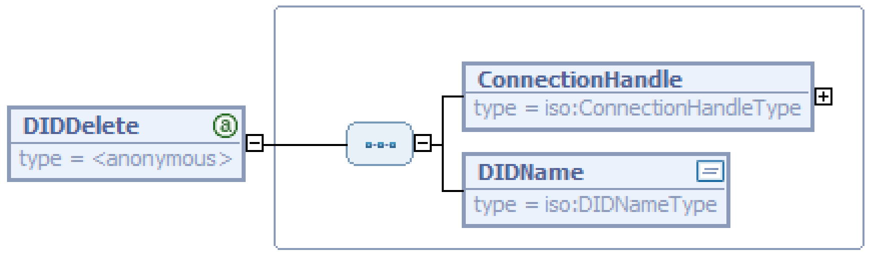
	Name / **Description**
	`ConnectionHandle`: Contains a handle with which the connection to a card application is addressed.
	`DIDName`: Contains the name of the DID for which a new key (marker) is to be generated or transferred.
	`DIDUpdateData`: Contains the data necessary for renewing the DID. The structure of the generic `DIDUpdateDataType` template is shown on page 72. The details of the `DIDUpdataData`-element depend on the protocol under consideration (also refer to [TR-03112-7]).
Return	 ResponseType DIDUpdateResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `DIDUpdate` function.
	Name / **Description**
	`dss:Result`: Contains the status information and the errors of an executed action. This element is described in more detail below.

	Status information and errors in `DIDUpdate` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

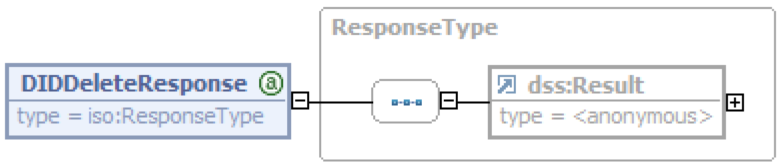
Name	**Error codes**
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	A connection to a card application has been established with `CardApplicationConnect`.
Postcondition	The key material of the stated differential identity was renewed.
Note	If the information of the `DIDMarker` or `DIDQualifier` structure is changed when the DID is renewed, the application capability description (also refer to [ISO24727-2]), the [ISO7816-15] structure on the card or the `CardInfo` file MUST be updated accordingly. With this function no optional `DIDScope` parameter is provided intentionally. Only a DID in the currently selected card application MAY be renewed. The "alpha card application" MUST therefore be selected to renew a global DID.

3.6.5 DIDDelete

Name	**`DIDDelete`**
Description	The `DIDDelete` function deletes the DID addressed with `DIDName`.
Invocation parameters	 DIDDelete type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType DIDName type = iso:DIDNameType Invocation of the `DIDDelete` function.

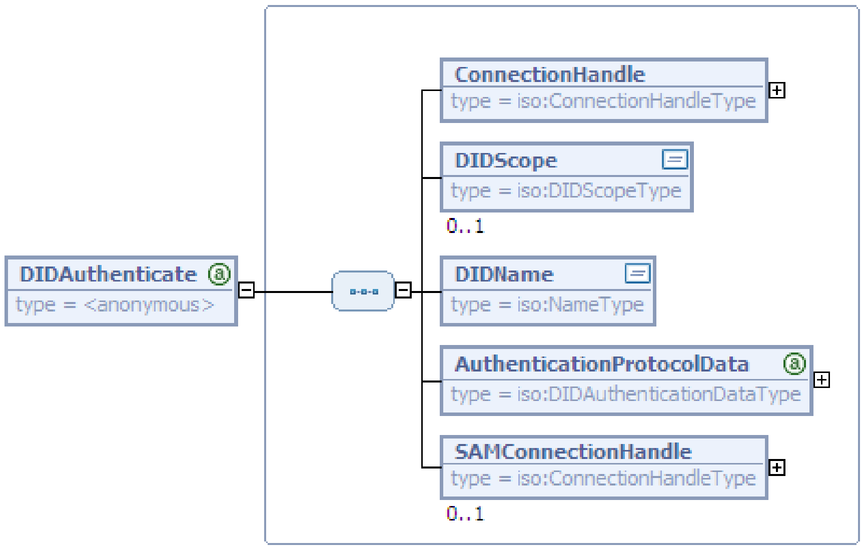
Name	**Description**
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).

	`DIDName`	Contains the name of the DID which is to be deleted.
Return	 ResponseType DIDDeleteResponse type = iso:ResponseType dss:Result type = <anonymous> Return of the `DIDDelete` function.	
	Name	**Description**
	`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
	Status information and errors in `DIDDelete` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition	The DID has been deleted.	
Note	The information about the DID MUST be deleted in the application capability description (also refer to [ISO24727-2]), the [ISO7816-15] structure on the card or the `CardInfo` file. With this function no optional `DIDScope` parameter is provided intentionally. It is only possible to delete DIDs in the currently selected card application. If a global DID is to be selected, the "alpha card application" MUST be selected.	

3.6.6 DIDAuthenticate

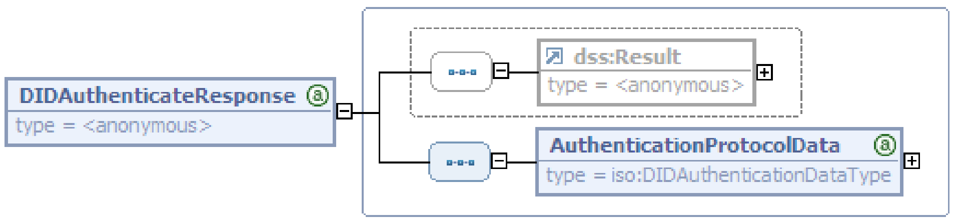
Name	**`DIDAuthenticate`**
Description	The `DIDAuthenticate` function can be used to execute an authentication protocol using a DID addressed by `DIDName`.

Invocation parameters



Invocation of the `DIDAuthenticate` function.

Name	Description
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page 22).
`DIDScope`	Resolves any ambiguity between local and global DIDs with the same name.
`DIDName`	Contains the name of the DID which is to be used for authentication. The authentication protocol to be used is determined by the mandatory `Protocol`-attribute element in the `AuthenticationProtocolData`-element below, which corresponds to the `Protocol`-attribute in the `DIDMarker`-element of the `DIDStructure`-element (also refer to page 76).

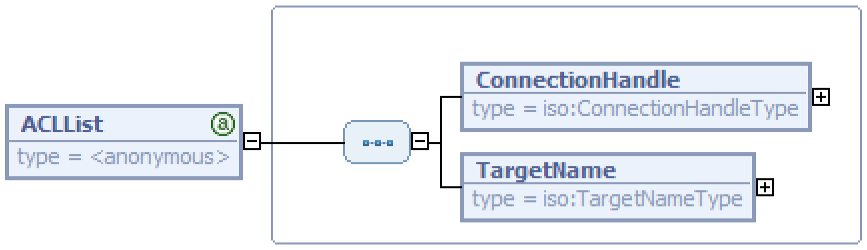
	AuthenticationProtocolData	Contains the data necessary for the respective authentication protocol. The structure of the DIDAuthenticationDataType is specified on the basis of the protocol (also refer to [TR-03112-7]). The DIDAuthenticationDataType serves as a generic template for the definition of protocol specific authentication protocol data elements (refer to [TR-03112-7]). This type is defined as follows: `<complexType name="DIDAbstractMarkerType" abstract="true">` `<complexContent>` `<extension base="anyType">` `<attribute name="Protocol" type="anyURI" use="required"/>` `</extension>` `</complexContent>` `</complexType>` The required Protocol-attribute specifies the authentication protocol of the DID; the concrete specification of the child elements of AuthenticationProtocolData depends on the individual protocol specifications (refer to [TR-03112-7]). Note that the protocol identifies the used cryptographic protocol including the used commands as well as the secure messaging to be used after successful completion of the cryptographic protocol.
	SAMConnection Handle	MAY address a connection to a card application, which serves as Security Access Module (SAM). The detailed role of the SAM within the authentication protocol MUST be defined within the specification of the authentication protocol.
Return	 DIDAuthenticateResponse type = <anonymous> dss:Result type = <anonymous> AuthenticationProtocolData type = iso:DIDAuthenticationDataType Return of the DIDAuthenticate function.	
	Name	**Description**
	dss:Result	Contains the status information and the errors of an executed action. This element is described in more detail below.

	`AuthenticationProtocolData`	Contains the data necessary for the respective authentication protocol. The structure of the `DIDAuthenticationDataType` is explained. Details depend on the authentication protocol (refer to [TR-03112-7]).
	Status information and errors in `DIDAuthenticate` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#nextRequest
	`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#protocolNotRecognized • /resultminor/sal#inappropriateProtocolForAction • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure In addition, other protocol specific error messages MAY exist.
	`ResultMessage`	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with `CardApplicationConnect`.	
Postcondition	The respective security condition is set on the eCard after successful authentication.	
Note		

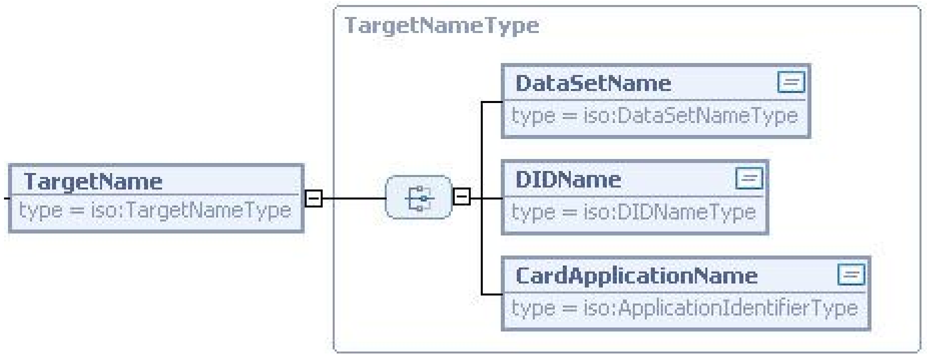
3.7 Authorization service

3.7.1 ACLList

Name	**`ACLList`**
Description	The `ACLList` function returns the access control list for the stated target object (card application, data set, DID).

Invocation parameters	
	 ACLList type = <anonymous> ConnectionHandle type = iso:ConnectionHandleType TargetName type = iso:TargetNameType Invocation of the `ACLList` function[15].

Name	**Description**
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed (also refer to page [TR-03112-7]).
`TargetName`	Contains the name of the target object (card application, data set, DID) of which the access control list should be returned. See below for details.

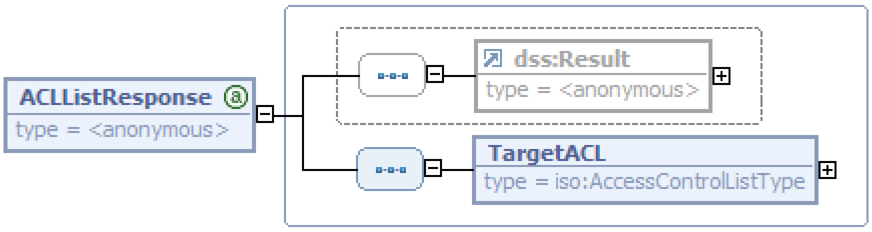

TargetNameType
DataSetName
type = iso:DataSetNameType
DIDName
type = iso:DIDNameType
CardApplicationName
type = iso:ApplicationIdentifierType
TargetName
type = iso:TargetNameType

The `TargetName` element is part of `ACLList` and `ACLModify` element.

Name	**Description**
`DataSetName`	Contains the name of the data set.
`DIDName`	Contains the name of the DID.
`CardApplicationName`	Contains the name of the card application in the form of an application identifier.

15 Note that `ACLList` in [ISO24727-3] has an additional parameter `TargetType`. However this parameter is superfluous, because the type of the target is unambiguously implied by the internal structure of the `TargetName`-parameter. This change will be proposed for a forthcoming defect report of [ISO24727-3].

Return parameters



Return of the `ACLList` function.

Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.
`TargetACL`	Contains the access control list for the required target object. Details on the `AccessControlListType` are given on page 31.

Status information and errors in `ACLList` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

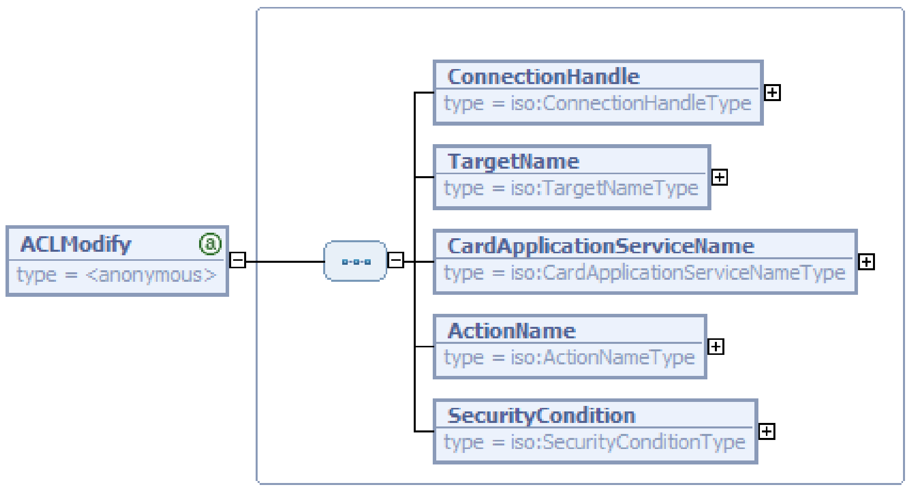
Name	Error codes
`ResultMajor`	• /resultmajor#ok • /resultmajor#error
`ResultMinor`	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/dp#communicationFailure
`ResultMessage`	MAY contain more detailed information on the error which occurred if required.

Precondition	A connection to a card application has been established with `CardApplicationConnect`.
Postcondition	
Note	The access control information is contained in the application capability description (also refer to [ISO24727-2]), the [ISO7816-15] structure on the card or the `CardInfo` file.

3.7.2 ACLModify

Name	**`ACLModify`**
Description	An access rule in the access control list is modified with the `ACLModify` function.

Invocation parameters

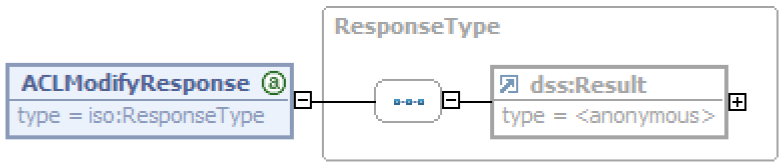


ACLModify
type = <anonymous>
ConnectionHandle
type = iso:ConnectionHandleType
TargetName
type = iso:TargetNameType
CardApplicationServiceName
type = iso:CardApplicationServiceNameType
ActionName
type = iso:ActionNameType
SecurityCondition
type = iso:SecurityConditionType

Invocation of `ACLModify`[16].

Name	Description
`ConnectionHandle`	Contains a handle with which the connection to a card application is addressed.
`TargetName`	Contains the name of the target object (card application, data set, DID) of which the access control list should be modified (refer to page 83 for details.
`CardApplicationServiceName`[17]	Contains the service name of a card application.
`ActionName`	Contains the name of the action for which the access rules should be modified (for details refer to page 31).
`SecurityCondition`	Contains the security condition for the access rule to be modified (for details refer to page 31).

Return parameters



Return of the `ACLModify` function.

Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

16 Note that `ACLModify` in [ISO24727-3] has an additional parameter `TargetType`. However this parameter is superfluous, because the type of the target is unambiguously implied by the internal structure of the `TargetName`-parameter. This change will be proposed for a forthcoming defect report of [ISO24727-3].

17 See footnote on page 32.

	Status information and errors in ACLModify (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	ResultMajor	• /resultmajor#ok • /resultmajor#error
	ResultMinor	• /resultminor/al/common#incorrectParameter • /resultminor/sal#namedEntityNotFound • /resultminor/sal#notInitialized • /resultminor/sal#securityConditionNotSatisfied • /resultminor/sal#insufficientResources • /resultminor/dp#communicationFailure
	ResultMessage	MAY contain more detailed information on the error which occurred if required.
Precondition	A connection to a card application has been established with CardApplicationConnect.	
Postcondition	The access control information for the stated target object has been changed.	
Note	The modified access control information must be updated in the application capability description (also refer to [ISO24727-2]), the [ISO7816-15] structure on the card or the CardInfo file.	

4 CardInfoFiles

A general requirement for an implementation of the [ISO24727-3] interface is that generic function invocations on the service access interface ("action request" in Figure 2) must be mapped to card-specific commands (APDUs which are sent in Figure 2 as "generic requests" to the generic card interface defined in [ISO24727-2]).

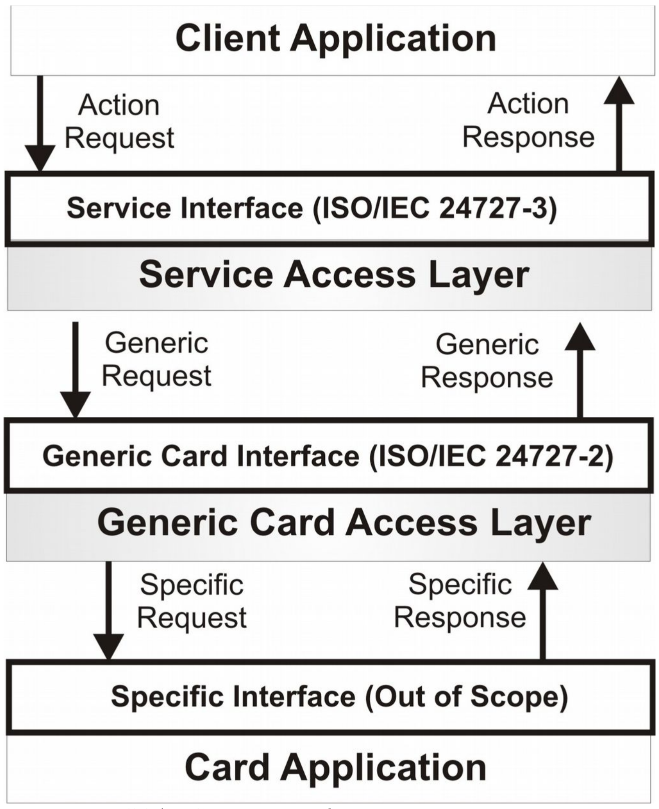


Figure 2: ISO/IEC 24727-Architecture

For example, when the `Sign` function is invoked (refer to Figure 3 and Section 3.5.5) it is necessary to determine the specific key reference (and if necessary the algorithm identifier) from the transferred `DIDName` which must be used in a `MANAGE SECURITY ENVIRONMENT` command before the signature can be generated with the `PSO:COMPUTE DIGITAL SIGNATURE` command.

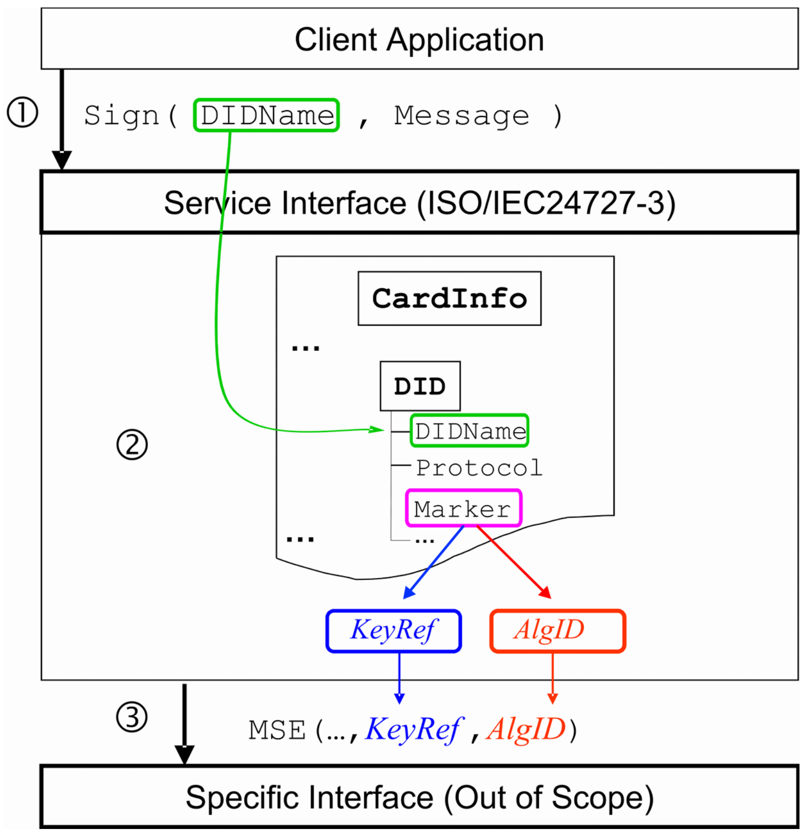


Figure 3: Mapping of SAL-function "Sign" to APDUs

There are three basic options to realize this mapping:

1. The mapping rule is encoded for a specific card in the source code of the smart card middleware and fixed at compilation time.
2. The information required for the mapping is available on the card – e.g. in form of the application capability description (ACD) in accordance with [ISO24727-2] and/or a cryptographic information application (CIA) in accordance with [ISO7816-15] – and is read from there and used for the mapping.
3. The information required for the mapping is not available on the card and is supplied to the smart card middleware as structured information in the form of XML-based `CardInfo` files.

As the executable code must be adapted for each new card requiring support in the first approach and it may therefore be necessary to re-evaluate the smartcard middleware, this strategy MUST NOT be used for the implementation of the eCard-API-Framework.

The second alternative has the general advantage that the necessary information is provided on the card directly and does not have to be supplied to a middleware solution in another manner. For this reason this version has also been taken for standardisation of [ISO24727-2] and SHOULD be supported by the eCard-API-Framework in the long term to ensure international interoperability. Unfortunately this approach is not suitable for almost all cards of importance for the eCard-strategy (e.g. electronic health card and almost all signature cards), as these cards do not feature either an ACD or a comprehensive CIA. For this reason in particular the third version MUST be implemented promptly – at least as long as the necessary information is not available on the cards in the form of ACD and/or CIA structures – when the eCard-API-Framework is implemented.

To ease the joint implementation of the second and the third strategy, the common features and differences are considered more closely to make use of any synergies during implementation of both alternatives.

In both versions the information necessary for depiction of the generic invocations on specific card APDUs must be determined (i.e. especially the description of the `ApplicationCapabilities` as in Annex A.6 or the application capability description of Section 6.2 of [ISO24727-2]). While with the second version this information must be extracted in a comparatively complex manner from a CIA structure in accordance with [ISO7816-15], with the third version they are directly available as an XML structure in the form required by [ISO24727-3]. During the implementation of both versions it is therefore conceivable that internal objects for card applications (services, differential identities, data sets etc.) are aligned with [ISO24727-3]-type structures and that these can be alternatively "filled" by the `CardCapabilities` structure (also refer to Annex A.5) and the `ApplicationCapabilities` structure (also refer to section 4.5) or by the analysis of the ACD and CIA structures (also refer to [ISO24727-2]).

As in the third version an additional assignment between a currently available card and an XML-based CardInfo file is necessary, a unique card type MUST be defined in this case (also refer to `CardType` in Annex A.3), which is determined for a currently available card within the framework of the recognition process (also refer to `CardIdentification` in Annex A.4). On the other hand it is not essential with the second version that unique card types exist and that these have to be recognised, as all necessary information is contained on the card itself. To enable protection against attacks by manipulated CardInfo structures, it MUST be possible to protect a CardInfo file either fully or partially by a digital signature (also refer to the `Signature` element in Annex A.7).

The following definition of the `CardInfo`-structure is based on Annex E of [CEN15480-3].

4.1 CardInfoType

The CardInfo structure may be used for the specification of European Citizen Card profiles [CEN15480-4] *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 (refer to Figure 3).

Each European Citizen Card profile SHOULD be described by a `<CardInfo>` element

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

of type `CardInfoType` which is 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" />
    <attribute name="schemaVersion" type="token" use="optional" />
  </complexType>
```

`<CardType> [required]`

Contains a unique identifier for the card type and optionally further links to specification documents. Further details are explained in section 4.2.

`<CardIdentification> [required]`

Allows to determine the type of a given card by traversing the decision tree (refer to Figure 4) and checking whether the characteristic features are as expected. Further details are explained in section 4.3.

`<CardCapabilities> [optional]`

Allows specifying the capabilities of the card. If the card is fully conform to ISO/IEC 7816 this element MAY be omitted. Further details are explained in section 4.4.

`<ApplicationCapabilities> [optional]`

Allows specifying the card-applications on the card and SHOULD be used to realize the mapping from SAL-calls to card-specific APDUs (refer to Figure 3). If the necessary information for this mapping is available on the card in adequate CIA-information structures according to ISO/IEC 7816-15 (see Section 7.5) this element MAY be omitted. Further details are explained in section 4.5.

`<Signature> [optional]`

Is used to protect the integrity and authenticity of (parts of) the CardInfo-element. The `ds:SignatureType` is defined in [RFC3275]. Further details are explained in section 4.6.

`<schemaVersion> [optional]`

Contains the version of the schema used for this cardinfo file. The identifier for the schema defined in this version of this document is "1.1". If this element is not present, version 1.1 of the schema SHOULD be assumed.

4.2 CardTypeType

The `<CardType>` element within the `CardInfo`-element (cf. Section 4.1) 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"/>
    <element name="Other" type="dss:AnyType" minOccurs="0"/>
  </sequence>
  <attribute name="Id" type="ID" use="optional" />
</complexType>
```

This type defines the following elements and attributes:

`<ProfilingInfo> [optional]`

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

`<ObjectIdentifier> [required]`

This element MUST contain the unique identifier of the card type, which MAY be the object identifier of a profile defined in [CEN15480-4].

`<SpecificationBodyOrIssuer> [optional]`

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

`<CardTypeName> [optional]`

This element contains the name of the card type.

`<Version> [optional]`

This element contains the version number of the card type.

`<Status> [optional]`

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

`<Date> [optional]`

This element contains the date of creation of the CardInfo file.

`<CardInfoRepository> [optional]`

If present this element contains the address of a `CardInfo`-repository, which may provide related CardInfo- files.

`<Other> [optional]`

This element MAY contain some additional element, which structure is defined by some other specification.

4.2.1 ProfilingType

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 two 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.

4.3 CardIdentificationType

The `<CardIdentification>` element, which is part of the `CardInfo`-element (cf. Section 4.1), allows to determine the type of a given card by traversing the decision tree (for an example see Figure 4) and checking whether the characteristic features are as expected. An implementation of the eCard-API MUST build its own decision tree based on the known CardInfo files.

The `CardIdentification` element MUST contain enough information to uniquely identify the card type, i.e.at least relevant operation system features including version and personalization variant.

To facilitate fast recognition of cards, an implementation SHOULD check easily available features first, e.g. ATR/ATS or EF.DIR/INFO. Therefore it is RECOMMENDED that authors of CardInfo files include these features in the `CardIdentification` element.

```
<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>
            <element name="Other" type="dss:AnyType" minOccurs="0"/>
      </sequence>
      <attribute name="Id" type="ID" use="optional" />
</complexType>
```

`<ATR> [optional, unbounded]`

> For contact-based smart cards this element contains, if present, information to the Answer To Reset[18] (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 contains, if present, 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 contains a list of card calls, which can be used to determine the card type. The elements of the list are of type CardCallType. Further details are explained below.

`<Other> [optional]`

> This element MAY contain some additional element, which structure is defined by some other specification.

18 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 in principle be used for a preselection of the card type (using a disjunction). In order to avoid interoperability problems it is RECOMMENDED in this case to specify no `ATR`-element in the CardInfo-file, but only use explicit characteristic features to identify the card type. If the card has no ATR, because it is a contact-less card for example, there MUST NOT be specified an `ATR`-element.

4.3.1 ATRType

The `<ATR>` element of type `ATRType` is part of the element `<CardIdentification>`. For further information about the structure of the ATR see section 8 of [ISO7816-3].

```
<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 indicates the amount of historical bytes and the presence of the first interface bytes (TA1, TB1, TC1 and TD1).

`<InterfaceBytes> [required]`

This element contains the interface bytes which could be included in the ATR. The elements `<Tx`*i*`>`, $i \in \{1,2,3,4\}$ 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.

4.3.2 ByteMaskType

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="iso:ByteType" />
    <element name="Mask" type="iso:ByteType" />
  </sequence>
</complexType>
```

4.3.3 ByteType

The `iso:ByteType` in turn is defined to be `hexBinary` with a length of one byte. Unlike the builtin `byte`-type this type allows to specify a byte of data in the common hexadecimal form and not as signed integer in the range between -127 and 128.

```
<simpleType name="ByteType">
      <restriction base="hexBinary">
            <length value="1"/>
      </restriction>
</simpleType>
```

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.

4.3.4 ATRInterfaceBytesType

The type `ATRInterfaceBytesType` is used by the elements `<Tx`*`i`*`>` of the element `<InterfaceBytes>`. This type consists of four elements `<Txi>`, $x \in \{A,B,C,D\}$. 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>
```

4.3.5 ATSType

The `<ATS>`[19] 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>
```

19 If the card does not provide an ATS, because it is a contact-based card or an ISO/IEC 14443 Type B card, one MUST NOT specify an `ATS`-element. In case of doubt it is RECOMMENDED to omit the `ATS`-element and exclusively use explicit characteristic features for card identification.

```
    <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 `ByteMaskType` which 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.

4.3.6 ATSInterfaceBytesType

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>
```

4.3.7 CardCallType

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 (see [TR-03112-7]) it is explained here to ease reading.

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

`<CommandAPDU> [choice, required]`

This element contains the command APDU to be sent to the card. For security reasons APDUs with CLA values ‘0*x*’ or ‘1*x*’, *x*∈ {0,…,9, A,…,F} and INS values ‘20’, ‘21’, ‘24’, ‘2C’, and ‘22’ SHOULD NOT be used, because these values would correspond to the commands CHANGE REFERENCE DATA, RESET RETRY COUNTER und MANAGE SECURITY ENVIRONMENT (see [ISO7816-4], sections 7.5.6-7.5.11). With these commands an attacker could use the card identification to increase the retry counter of the card which could result in a denial of service attack. Such commands MUST be blocked if the `<CharacteristicFeature>` element is not signed by a trustworthy authority.

`<ResponseAPDU> [choice, required, unbounded]`

This element appears one or more times after a `<CommandAPDU>`-element and contains the possible responses of the smart card to the command APDU. If the response corresponds to any of the given value in the CardInfo file the current path in the decision tree will be followed until an accepted state is reached. The `<ResponseAPDU>` is of type `ResponseAPDUType`, which is defined below.

`<APICall> [choice, required]`

This element MAY NOT appear within a `<CharacteristicFeature>`-element and contains an arbitrary `<APICall>` defined in the present series of specifications.

`<APIResponse> [choice, required, unbounded]`

This element appears one or more times after an `<APICall>`-element and contains the possible API-responses. As the `<APICall>`-element above the `<APIResponse>`-element MAY NOT appear within a `<CharacteristicFeature>`-element.

4.3.8 ResponseAPDUType

The `ResponseAPDU` is of type `ResponseAPDUType`, which is defined (in ISO24727-Protocols.xsd) as follows:

```
<complexType name="ResponseAPDUType">
      <sequence>
            <element name="Body" type="iso:DataMaskType" maxOccurs="1"
                  minOccurs="0" />
            <element name="Trailer" type="hexBinary" />
            <element ref="iso:Conclusion" maxOccurs="1" minOccurs="0"/>
      </sequence>
</complexType>
```

`<Body> [optional]`

This element contains information related to the analysis of the response APDU. It is of type `DataMaskType`, which is explained below.

`<Trailer> [required]`

This element relates to the expected status of the command and is equal to ‘9000’ in case of expected success.

`<Conclusion> [optional]`

This element is used for the recognition of the state of a key object (cf. `StateInfo` in [TR-03112-7]) for example and MAY NOT appear in a `CardInfo`-file.

4.3.9 DataMaskType

The `DataMaskType` is used to describe the body of a response APDU. Because of the optional `<Tag>`-element and choice between the terminal `MatchingData`-element or the recursive `DataObject`-element, which is again of `DataMaskType` it is possible to handle arbitrarily nested TLV structures. It is defined as follows:

```
<complexType name="DataMaskType">
	<sequence>
		<element name="Tag" type="hexBinary" maxOccurs="1" minOccurs="0" />
		<choice>
			<element name="MatchingData" type="iso:MatchingDataType"/>
			<element name="DataObject" type="iso:DataMaskType" />
		</choice>
	</sequence>
</complexType>
```

`<Tag> [optional]`

This element contains the tag where the expected value or structured data object is stored.

`<MatchingData> [choice]`

This element contains a description of the data against which the response from the card shall be matched. It is of type `MatchingDataType`, which is explained below.

`<DataObject> [choice]`

This element contains a further structured data object of type DataMaskType, which is returned by the smart card. This element is – similarly to the element <Body> contained in the <ResponseAPDU> element – of type DataMaskType, so that arbitrary deep nested TLV coded structures could be defined.

4.3.10 MatchingDataType

The `MatchingDataType` defines the structure of the terminal data against which the data from the card shall be matched. It is defined as follows:

```
<complexType name="MatchingDataType">
	<sequence>
		<element name="Offset" type="hexBinary"
			maxOccurs="1" minOccurs="0" />
		<element name="Length" type="hexBinary"
			maxOccurs="1" minOccurs="0" />
		<element name="MatchingValue" type="hexBinary"/>
		<element name="Mask" type="hexBinary"
			maxOccurs="1" minOccurs="0" />
	</sequence>
	<attribute name="MatchingRule" type="iso:MatchingRuleType" use="optional" de-
fault="Equals" />
</complexType>
```

`<Offset> [optional]`

If present, this element contains an offset, which specifies a starting point at which the data from the card shall be considered for matching. If the element is missing, the first byte of the data is used as starting point.

`<Length> [optional]`

If present, this element contains the length of the data considered for matching. If this element is missing, the entire data value is considered for comparison.

`<MatchingValue> [optional]`

This element contains the value, which is expected to be equal to or contained in the value returned by the smart card.

`<Mask> [optional]`

This element MAY contain a mask to perform a logical AND on the data returned by the eCard before it is compared to the `MatchingValue`. By this way it is possible to filter out a specific part (e.g. single bits) of the data. Refer also to the definition of the `ByteMaskType`.

`MatchingRule [optional attribute]`

This optional attribute indicates, whether the `MatchingValue` is expected to be equal (`Equals`) or only contained (`Contains`) in the data returned from the card. It is of type `MatchingRuleType`.

4.3.11 MatchingRuleType

```
<simpleType name="MatchingRuleType">
      <restriction base="string">
            <enumeration value="Equals" />
            <enumeration value="Contains" />
      </restriction>
</simpleType>
```

If the `MatchingRule` attribute is missing the default value “`Equals`” is assumed.

4.4 CardCapabilitiesType

The `<CardCapabilities>` element of type `CardCapabilitiesType` is an optional part of the `<CardInfo>` element and specifies the general capabilities of the card.

This information may be used to support cards which are not fully conforming to [ISO7816-4]. Furthermore it is possible to specify requirements for cards and card profiles (refer to [CEN15480-4]).

If a card is fully conform to [ISO7816-4] this element is not needed for mapping SAL-requests to APDUs.

```
<complexType name="CardCapabilitiesType">
      <sequence>
            <element name="Interface" maxOccurs="unbounded"
                  minOccurs="0">
                  <complexType>
                        <complexContent>
                              <extension base="iso:RequirementsType">
                                    <sequence>
                                          <element name="Protocol" type="anyURI" />
                                    </sequence>
                              </extension>
                        </complexContent>
                  </complexType>
            </element>
            <element name="EF.DIR" maxOccurs="1" minOccurs="0"
                  type="iso:FileRefReqType" />
            <element name="EF.ATRorINFO" maxOccurs="1" minOccurs="0"
                  type="iso:EFATRorINFOType" />
            <element name="Other" type="dss:AnyType" minOccurs="0"/>
      </sequence>
      <attribute name="Id" type="ID" use="optional" />
</complexType>
```

`<Interface> [optional, unbounded]`

This element contains an identifier for a supported transport protocol. The element is an extension of the `RequirementsType` and therefore contains an element `<RequirementLevel>` (see below). Additionally it contains an element `<Protocol>` which holds a URI specifying the transport protocol. The following protocols MAY be used:

- urn:iso:std:iso-iec:7816:-3:tech:protocols:T-equals-0
- urn:iso:std:iso-iec:7816:-3:tech:protocols:T-equals-1
- urn:iso:std:iso-iec:10536:tech:protocols:T-equals-2
- urn:iso:std:iso-iec:14443:-2:tech:protocols:Type-A
- urn:iso:std:iso-iec:14443:-2:tech:protocols:Type-B

`<EF.DIR> [optional]`

This element contains information about the EF.DIR according [ISO7816-4]. For details refer to the definition of FileRefReqType.

`<EF.ATRorINFO> [optional]`

This element contains information about the EF.ATRorINFO according [ISO7816-4]. For details refer to the definition of EFATRorINFOType.

`<Other> [optional]`

This element MAY contain some additional element, which structure is defined by some other specification.

4.4.1 RequirementsType

The element `<RequirementLevel>` in the type `RequirementsType` specifies, whether the given feature MUST be supported by the platform (‘`PlatformMandatory`’), MAY be supported by the platform (‘`PlatformOptional`’), MUST be personalized (‘`PersonalizationMandatory`’) or MAY be personalized (‘`PersonalizationOptional`’).

```
<complexType name="RequirementsType">
  <sequence maxOccurs="1" minOccurs="1">
    <element name="RequirementLevel"
             type="iso:BasicRequirementsType" maxOccurs="1" minOccurs="0"/>
  </sequence>
</complexType>
```

4.4.2 BasicRequirementsType

The type `BasicRequirementsType` is defined as follows:

```
<simpleType name="BasicRequirementsType">
  <restriction base="string">
    <enumeration value="PlatformMandatory" />
    <enumeration value="PlatformOptional" />
    <enumeration value="PersonalizationMandatory" />
    <enumeration value="PersonalizationOptional" />
  </restriction>
</simpleType>
```

4.4.3 FileRefReqType

The type `FileRefReqType` extends the RequirementsType by an element `<Path>` which is of type PathType (see below):

```
<complexType name="FileRefReqType">
  <complexContent>
    <extension base="iso:RequirementsType">
      <sequence>
        <element name="Path" type="iso:PathType" maxOccurs="1" minOccurs="0" />
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

4.4.4 PathType

The type `PathType` is based on Amendment 2 to [ISO7816-15] and used to specify the path to a file or a part of it:

```
<complexType name="PathType">
  <sequence>
    <choice>
      <element name="efIdOrPath" type="hexBinary" />
      <element name="TagRef">
        <complexType>
          <sequence>
            <element name="tag" type="hexBinary" />
            <element name="efIdOrPath"
                     type="hexBinary" maxOccurs="1" minOccurs="0" />
          </sequence>
        </complexType>
      </element>
      <element name="AppFileRef">
        <complexType>
          <sequence>
            <element name="aid" type="hexBinary" />
            <element name="efIDOrPath" type="hexBinary" />
          </sequence>
        </complexType>
      </element>
      <element name="AppTagRef">
        <complexType>
          <sequence>
            <element name="aid" type="hexBinary" />
            <element name="tag" type="string" />
            <element name="efIdOrPath"
                     type="hexBinary" maxOccurs="1" minOccurs="0" />
          </sequence>
        </complexType>
      </element>
    </choice>
    <element name="Index" type="hexBinary" maxOccurs="1" minOccurs="0" />
    <element name="Length" type="hexBinary" maxOccurs="1" minOccurs="0" />
  </sequence>
</complexType>
```

`<efIdOrPath> [choice]`

This element contains a file identifier or a path (as a sequence of file identifiers without separator) to a file on a smart card. According to section 8.2.5 of [ISO7816-15] there are five cases to be differentiated:

- `<efIdOrPath>` is empty and no file is identified.

- `<efIdOrPath>` consists of one byte where the five most significant bits contain a short file identifier. The other bits b1,…,b3 are zero.

- `<efIdOrPath>` consists of exactly two bytes and contains an ordinary file identifier.
- `<efIdOrPath>` consists of an even number (>2) of bytes and contains an absolute or relative path (a sequence of file identifiers without separator) to a file.
- `<efIdOrPath>` consists of an odd number (>1) of bytes and contains a “qualified path” to a file as described in [ISO7816-4].

`<TagRef> [choice]`

This element consists of an element `<tag>` containing a tag encapsulating the addressed data and an optional element `<efIdOrPath>` as described above.

`<AppFileRef> [choice]`

With this element it is possible to reference a file of a certain application on the card. It consists of an element `<aid>` containing the identifier of the application and an element `<efIdOrPath>` as described above.

`<AppTagRef> [choice]`

With this element it is possible to reference a data object encapsulated with a tag and stored in a card application. It consists of an element `<aid>` containing the identifier of the application, an element `<tag>` containing a tag where the addressed data is stored and an optional element `<efIdOrPath>` as described above.

`<Index>` and `<Length> [optional]`

For these elements there are two cases to differentiate

- *transparent file*
  In this case the optional element `<Index>` contains the offset in the READ BINARY command (parameters P1/P2) and `<Length>` the parameter L_e (see section 7.2.3 of [ISO7816-4]).
- *record oriented file*
  In this case the element `<Index>` contains the record number in the READ RECORD command (see section 7.3.3 of [ISO7816-4]). The element `<Length>` will be ignored, if present.

4.4.5 EFATRorINFOType

The element <EF.ATRorINFO> is of type `EFATRorINFOType` and is part of the CardCapabilitiesType. It contains information about the (EF.) ATR / INFO and is not necessary for the mapping of SAL-requests to APDUs, if the card is conforming to [ISO7816-4]. This element may also be used to specify requirements for a card within a given profile.

```
<complexType name="EFATRorINFOType">
  <complexContent>
    <extension base="iso:FileRefReqType">
      <sequence>
        <element name="ISO7816-4-CardServiceData" maxOccurs="1"
                 type="iso:ISO7816-4-CardServiceDataType" minOccurs="0" />
        <element name="Pre-Issuing-DO"
                 type="iso:FileRefReqType" maxOccurs="1" minOccurs="0" />
        <element name="ISO7816-4-CardCapabilities" maxOccurs="1"
                 type="iso:ISO7816-4-CardCapabilitiesType" minOccurs="0" />
        <element name="ImplicitlySelectedApplication"
```

```
                  type="iso:FileRefReqType" maxOccurs="1" minOccurs="0" />
         <element name="ExtendedLengthInfo"
                  type="iso:ExtendedLengthInfoType" maxOccurs="1" minOccurs="0" />
       </sequence>
     </extension>
   </complexContent>
</complexType>
```

`<ISO7816-4-CardServiceData> [optional]`

This element contains information about the card service data as described in section 8.1.1.2.3 of [ISO7816-4]. Details of the type ISO7816-4-CardServiceDataType are described below.

`<Pre-Issuing-DO> [optional]`

This element contains information about the path to manufacturer specific pre-issuing data (see section 8.1.1.2.6 of [ISO7816-4]). This element is not necessary if the card is conforming to [ISO7816-4]. For details refer to the definition of FileRefReqType.

`<ISO7816-4-CardCapabilities> [optional]`

This element contains information about the card capabilities as described in section 8.1.1.2.7 of [ISO7816-4]. For details refer to the definition of the ISO7816-4-CardCapabilitiesType.

`<ImplicitlySelectedApplication> [optional]`

This element contains information about an implicit selected application as described in section 8.1.1.2.2 of [ISO7816-4]. For details refer to the definition of FileRefReqType.

`<ExtendedLengthInfo> [optional, unbounded]`

This element contains information about the support of extended length. For details refer to the definition of ExtendedLengthInfoType.

4.4.6 ISO7816-4-CardServiceDataType

The type `ISO7816-4-CardServiceDataType` is an extension of the FileRefReqType. It is used in the definition of the EFATRorINFOType above.

```
<complexType name="ISO7816-4-CardServiceDataType">
  <complexContent>
    <extension base="iso:FileRefReqType">
      <sequence>
        <element name="Application-selection" maxOccurs="1" minOccurs="0">
          <complexType>
            <sequence>
              <element name="by-full-DF-name" type="iso:BitReqType" />
              <element name="by-partial-DF-name" type="iso:BitReqType" />
            </sequence>
          </complexType>
        </element>
        <element name="BER-TLV-data-objects-available"
                 maxOccurs="1" minOccurs="0">
          <complexType>
            <sequence>
              <element name="in-EF.DIR" type="iso:BitReqType" />
              <element name="in-EF.ATR" type="iso:BitReqType" />
            </sequence>
          </complexType>
        </element>
        <element name="EF.x-access-services" maxOccurs="1" minOccurs="0">
          <complexType>
            <choice>
```

```
              <element name="ReadBinary" type="iso:BasicRequirementsType" />
              <element name="ReadRecord" type="iso:BasicRequirementsType" />
              <element name="GetData" type="iso:BasicRequirementsType" />
            </choice>
          </complexType>
        </element>
        <element name="Root" maxOccurs="1" minOccurs="0">
          <complexType>
            <choice>
              <element name="Card-with-MF" type="iso:BasicRequirementsType" />
              <element name="Card-without-MF" type="iso:BasicRequirementsType" />
            </choice>
          </complexType>
        </element>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

`<Application-selection> [optional]`

This element MAY contain information about the method to select a card application. It consists of two elements, each of type `BitReqType`:

- `<by-full-DF-name>` indicates that the card applications can be addressed by the full DF name (see Table 85 in [ISO7816-4]).

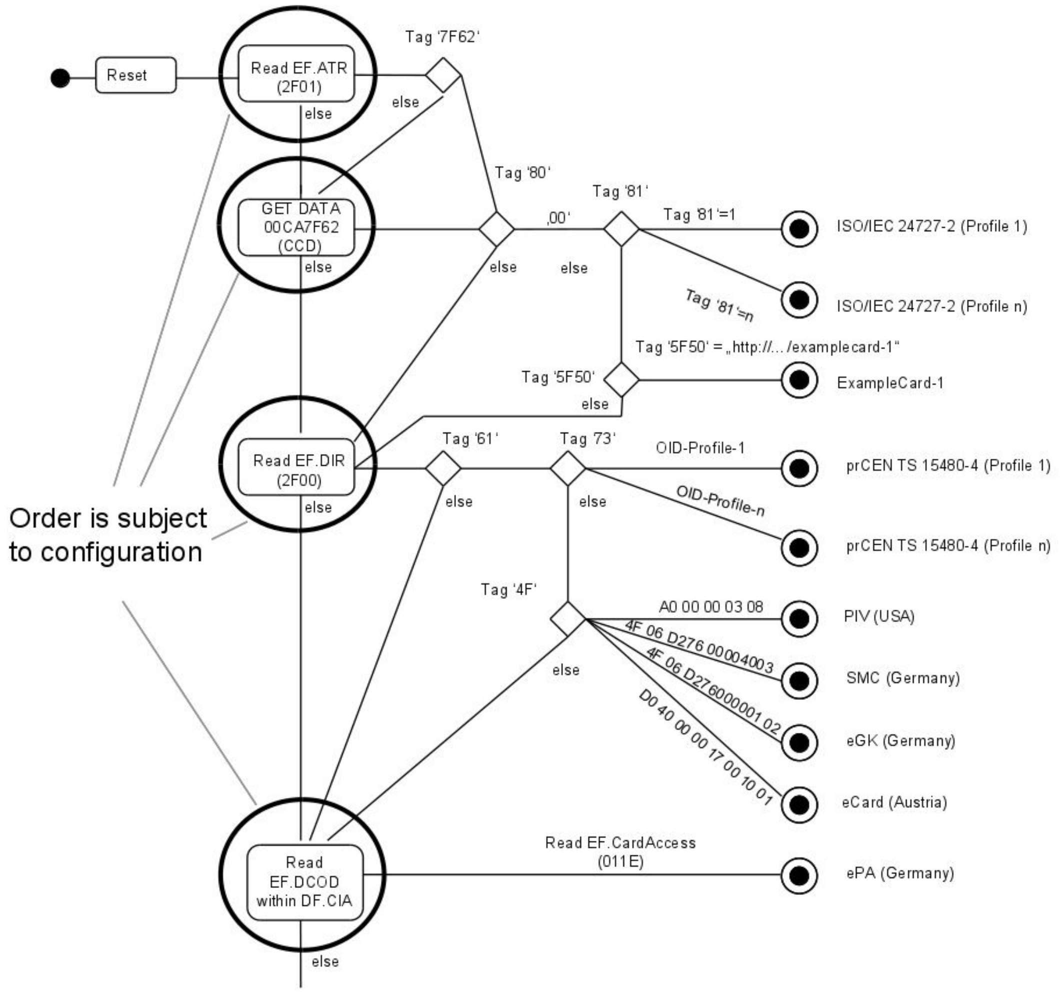


Figure 4: Example of a decision tree to recognize the card type

- `<by-partial-DF-name>` indicates that the card applications can be addressed by the partial DF name (see Table 85 in [ISO7816-4]).

Details of the type `BitReqType` are described below.

`<BER-TLV-data-objects-available> [optional]`

This element contains information about the presence of BER-TLV coded data objects in EF.DIR and EF.ATR. It consists of two elements, each of type :

- `<in-EF.DIR>` indicates the presence of BER-TLV coded data objects in EF.DIR.
- `<in-EF.ATR>` indicates the presence of BER-TLV coded data objects in EF.ATR.

Details of the type `BitReqType` are described below.

`<EF.x-access-services> [optional]`

This element contains information about the method to access EF.DIR and EF.ATR. It consists of a choice between three elements, each of type `BasicRequirementsType`:

- `<ReadBinary>` indicates that both files should be accessed via READ BINARY.
- `<ReadRecord>` indicates that both files should be accessed via READ RECORD.
- `<GetData>` indicates that both files should be accessed via GET DATA.

`<Root> [optional]`

This element contains information about the presence of a root directory. It consists of a choice between two elements, each of type `BasicRequirementsType` :

- `<Card-with-MF>` indicates that there is an MF on the Card.
- `<Card-without-MF>` indicates that there isn't an MF on the Card.

4.4.7 BitReqType

The type `BitReqType` expands the type RequirementsType by the element `<Bit>` which contains a bit represented as a Boolean value.

```
<complexType name="BitReqType">
  <complexContent>
    <extension base="iso:RequirementsType">
      <sequence>
        <element name="Bit" type="boolean" />
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

4.4.8 ISO7816-4-CardCapabilitiesType

The type `ISO7816-4-CardCapabilitiesType` is an extension of the FileRefReqType. It is used by the element `<ISO7816-4-CardCapabilities>`, which is part of the EFATRorINFOType. The inherited element `<Path>` contains a path to the three card capability bytes, as long as these are not part of the (EF.) ATR (compact header tags '71', '72' and '73'). The `<Path>` element is not necessary, if the card is conforming to [ISO7816-4].

```
<complexType name="ISO7816-4-CardCapabilitiesType">
```

```
<complexContent>
  <extension base="iso:FileRefReqType">
    <sequence>
      <element name="FirstSoftwareFunctionTable" maxOccurs="1" minOccurs="1">
        <complexType>
          <sequence>
            <element name="DF-selection" maxOccurs="1" minOccurs="0">
              <complexType>
                <sequence>
                  <element name="by-full-DF-name" maxOccurs="1"
                           type="iso:BitReqType" minOccurs="0" />
                  <element name="by-partial-DF-name" maxOccurs="1"
                           type="iso:BitReqType" minOccurs="0" />
                  <element name="by-path" maxOccurs="1"
                           type="iso:BitReqType" minOccurs="0" />
                  <element name="by-file-identifier" maxOccurs="1"
                           type="iso:BitReqType" minOccurs="0" />
                  <element name="implicit" maxOccurs="1"
                           type="iso:BitReqType" minOccurs="0" />
                </sequence>
              </complexType>
            </element>
            <element name="Short-EF-identifier" maxOccurs="1"
                     type="iso:BitReqType" minOccurs="0" />
            <element name="Record-number" maxOccurs="1"
                     type="iso:BitReqType" minOccurs="0" />
            <element name="Record-identifier" maxOccurs="1"
                     type="iso:BitReqType" minOccurs="0" />
          </sequence>
        </complexType>
      </element>
      <element name="SecondSoftwareFunctionTable">
        <complexType>
          <sequence>
            <element name="EFs-of-TLV-structure" maxOccurs="1"
                     type="iso:BitReqType" minOccurs="0" />
            <element name="Behaviour-of-write-functions"
                     maxOccurs="1" minOccurs="0">
              <complexType>
                <complexContent>
                  <extension base="iso:RequirementsType">
                    <sequence>
                      <element name="Behaviour" type="iso:WriteBehaviourType" />
                    </sequence>
                  </extension>
                </complexContent>
              </complexType>
            </element>
            <element name="Data-unit-size-in-quartets"
                     maxOccurs="1" minOccurs="0">
              <complexType>
                <complexContent>
                  <extension base="iso:RequirementsType">
                    <sequence>
                      <element name="Exponent">
                        <simpleType>
                          <restriction base="integer">
                            <minInclusive value="1" />
                            <maxInclusive value="31" />
                          </restriction>
                        </simpleType>
                      </element>
                    </sequence>
                  </extension>
                  </complexContent>
                </complexType>
              </element>
              <element name="Value-FF-for-first-byte-of-BER-TLV-valid"
                       type="iso:BitReqType" maxOccurs="1" minOccurs="0" />
            </sequence>
          </complexType>
        </element>
        <element name="ThirdSoftwareFunctionTable">
          <complexType>
            <sequence>
              <element name="Command-chaining"
                       type="iso:BitReqType" maxOccurs="1" minOccurs="0" />
              <element name="Extended-Lc-and-Le-fields"
                       type="iso:BitReqType" maxOccurs="1" minOccurs="0" />
              <element name="Logical-Channel-support" maxOccurs="1" minOccurs="0">
                <complexType>
                  <sequence>
                    <element name="LC-Number-by-Card" type="iso:BitReqType" />
                    <element name="LC-Number-by-IFD" type="iso:BitReqType" />
                    <element name="Number-of-Logical-Channels"
                             maxOccurs="1" minOccurs="1">
                      <complexType>
                        <complexContent>
                          <extension base="iso:RequirementsType">
                            <sequence>
                              <element name="Maxium-Number">
                                <simpleType>
                                  <restriction base="integer">
                                    <minInclusive value="1" />
                                    <maxInclusive value="8" />
                                  </restriction>
                                </simpleType>
                              </element>
                            </sequence>
                          </extension>
                        </complexContent>
                      </complexType>
                    </element>
                  </sequence>
                </complexType>
              </element>
            </sequence>
          </complexType>
        </element>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

4.4.9 WriteBehaviourType

The `WriteBehaviourType` is used to specify detailed requirements of the behaviour of a smart card. See [ISO7816-4] for details.

```
<simpleType name="WriteBehaviourType">
  <restriction base="string">
    <enumeration value="One-time-write" />
    <enumeration value="Proprietary" />
    <enumeration value="Write-OR" />
    <enumeration value="Write-AND" />
  </restriction>
```

```
</simpleType>
```

4.4.10 ExtendedLengthInfoType

The `ExtendedLengthInfoType` is used to specify information about the support of extended length. This type is derived from the RequirementsType and defined as follows:

```
<complexType name="ExtendedLengthInfoType">
  <complexContent>
       <extension base="iso:RequirementsType">
              <sequence>
                <element name="GlobalLengthInfo" type="iso:LengthInfoType" />
                <element name="CommandSpecificLengthInfo"
                     type="iso:CommandSpecificLengthInfoType"
                     maxOccurs="unbounded" minOccurs="0" />
              </sequence>
       </extension>
  </complexContent>
</complexType>
```

`<GlobalLengthInfo> [required]`

> This element provides general extended length information, which is valid unless it is overruled by a `CommandSpecificLengthInfo`-element. It is of type `LengthInfoType`, which is specified below.

`<CommandSpecificLengthInfo> [optional, unbounded]`

> This element may exist multiple times and is used to provide command specific extended length information. It is of type `CommandSpecificLengthInfoType`, which is specified below.

4.4.11 LengthInfoType

The `LengthInfoType` is used in the definition of the `ExtendedLengthInfoType` above and the definition of `CommandSpecificLengthInfoType` below. It is defined as follows:

```
<complexType name="LengthInfoType">
       <sequence>
              <element name="MaxNc" type="positiveInteger" />
              <element name="MaxNe" type="positiveInteger" />
       </sequence>
</complexType>
```

It contains the following elements:

`<MaxNc> [required]`

> Indicates the maximum value of the command length (Nc), which is valid unless it is overruled by the `MaxNc`-element in some `CommandSpecificLengthInfo`-element.

`<MaxNe> [required]`

> Indicates the maximum value of the expected response length (Ne), which is valid unless it is overruled by the `MaxNe`-element in some `CommandSpecificLengthInfo`-element.

4.4.12 CommandSpecificLengthInfoType

The `CommandSpecificLengthInfoType` is used in the definition of the `ExtendedLengthInfoType` above and it is defined as follows:

```
<complexType name="CommandSpecificLengthInfoType">
      <sequence>
            <element name="Tag" type="byte"/>
            <element name="Command" type="hexBinary"/>
            <element name="LengthInfo" type="iso:LengthInfoType"/>
      </sequence>
</complexType>
```

It contains the following elements:

`<Tag> [required]`

Indicates the tag ('81' – '8F') of the standardized data structure, which specifies what the command description in the `Command`-element includes (see [ISO7816-4], Section 5.4.3.2, Table 22).

`<Command> [required]`

Specifies the (part of the) command header, for which the extended length information in the `LengthInfo`-element is provided.

`<LengthInfo> [required]`

Provides the command specific extended length information for the command identified by `Command` and `Tag`. This element is of type `LengthInfoType` specified above.

4.5 ApplicationCapabilitiesType

The `<ApplicationCapabilities>` element is part of the `CardInfo`-element (cf. Section 4.1). It is of type `ApplicationCapabilitiesType` and provides detailed information about the card applications available on the card. When used for a card which contains an application capability description as defined in [ISO24727-2] and/or is fully described by an appropriate [ISO7816-15] structure this element MAY be omitted.

```
<complexType name="ApplicationCapabilitiesType">
    <sequence>
      <element name="ImplicitlySelectedApplication"
               type="iso:ApplicationIdentifierType" maxOccurs="1" minOccurs="0" />
      <element name="CardApplication" maxOccurs="unbounded"
               type="iso:CardApplicationType" minOccurs="0" />
      <element name="Other" type="dss:AnyType" minOccurs="0"/>
    </sequence>
    <attribute name="Id" type="ID" use="optional" />
  </complexType>
```

`<ImplicitlySelectedApplication> [optional]`

This element specifies which card application is implicitly selected after initialization.

`<CardApplication> [optional, unbounded]`

This element is present for every card application available on the card.

`<Other> [optional]`

This element MAY contain some additional element, which structure is defined by some other specification.

4.5.1 CardApplicationType

The `<CardApplication>` element of type CardApplicationType is part of the ApplicationCapabilitiesType. The `CardApplicationType` is an extension of the type RequirementsType containing the `<RequirementLevel>` element.

```
<complexType name="CardApplicationType">
  <complexContent>
    <extension base="iso:RequirementsType">
      <sequence>
        <element name="InterfaceProtocol"
                 type="anyURI" maxOccurs="unbounded" minOccurs="0" />
        <element name="ApplicationIdentifier" maxOccurs="1"
                 type="iso:ApplicationIdentifierType" minOccurs="1" />
        <element name="ApplicationName"
                 type="string" maxOccurs="1" minOccurs="0" />
        <element name="LocalApplicationName"
                 type="dss:InternationalStringType"
                 maxOccurs="unbounded" minOccurs="0" />
        <element name="CardApplicationServiceInfo" maxOccurs="unbounded"
                 type="iso:CardApplicationServiceType" minOccurs="0" />
        <element name="CardApplicationACL"
                 type="iso:AccessControlListType" />
        <element name="DIDInfo"
                 type="iso:DIDInfoType" maxOccurs="unbounded"
                 minOccurs="0" />
        <element name="DataSetInfo"
                 type="iso:DataSetInfoType" maxOccurs="unbounded"
                 minOccurs="0" />
        <element name="Other" type="dss:AnyType" minOccurs="0"/>
      </sequence>
      <attribute name="Id" type="ID" use="optional" />
    </extension>
  </complexContent>
</complexType>
```

`<InterfaceProtocol> [optional, unbounded]`

This element MAY appear multiple times and indicates which protocols can be used to access the card application. The protocols specified here MUST also be defined in the `Interface`-element in the CardCapabilitiesType.

`<ApplicationIdentifier>`

This element contains the application identifier of the card application.

`<ApplicationName> [optional]`

This element contains an informative name of the card application.

`<LocalApplicationName> [optional, unbounded]`

This element is used to specify localized names of the card-application.

`<CardApplicationServiceInfo> [optional, unbounded]`

This element contains information about the services supported by the card application. For details refer to the definition of `CardApplicationServiceType`.

`<DIDInfo> [optional, unbounded]`

This element is present for each differential identity (DID) of the card application and specifies the related details of this DID. For details refer to the definition of `DIDInfoType`.

`<DataSetInfo> [optional, unbounded]`

This element is present for each data set (and embodied data structures for interoperability) of the card application. For details refer to the definition of `DataSetInfoType`.

`<Other> [optional]`

This element MAY contain some additional element, which structure is defined by some other specification.

4.5.2 CardApplicationServiceInfoType

The `<CardApplicationServiceInfo>` element of type CardApplicationServiceType is part of the definition of CardApplicationType. The `CardApplicationServiceType` is an extension of the type RequirementsType containing the `<RequirementLevel>` element.

```
<complexType name="CardApplicationServiceType">
  <complexContent>
    <extension base="iso:RequirementsType">
      <sequence>
        <element name="CardApplicationServiceName" type="string" />
        <element name="CardApplicationServiceDescription" maxOccurs="1"
                 type="iso:CardApplicationServiceDescriptionType"
                 minOccurs="0" />
        <element name="Other" type="dss:AnyType" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

`<CardApplicationServiceName>`

This element contains the name of the card application service.

`<ServiceACL>`

This element contains access control information for the card application service (the structure of the `AccessControlListType` is explained below).

`<CardApplicationServiceDescription> [optional]`

If present, this element contains an interface description of the card application service. For details refer to the definition of `CardApplicationServiceDescriptionType` below. If the card application service is standardized as described in [ISO24727-3] this element is not necessary.

`<Other> [optional]`

This element MAY contain some additional element, which structure is defined by some other specification.

4.5.3 AccessControlListType

The `AccessControlListType` is originally defined in [ISO24727-3] and contains a sequence of `AccessRule`-elements (also refer to page 32).

```
<complexType name="AccessControlListType">
      <sequence>
            <element name="AccessRule" type="iso:AccessRuleType"
                  maxOccurs="unbounded" minOccurs="0"/>
      </sequence>
</complexType>
```

`<AccessRule> [optional, unbounded]`

This element defines an access rule, which is of type `AccessRuleType`.

4.5.4 AccessRuleType

The `AccessRuleType` is defined as follows:

```
<complexType name="AccessRuleType">
	<sequence>
		<element name="CardApplicationServiceName" type="string" />
		<element name="Action" type="iso:ActionNameType" />
		<element name="SecurityCondition" type="iso:SecurityConditionType"/>
	</sequence>
</complexType>
```

It contains the following elements:

`<CardApplicationServiceName> [optional]`

This element specifies the `CardApplicationServiceName`, if this information is not provided outside the `AccessControlList` as it is the case in the definition of the `CardApplicationServiceType`.

`<Action>`

This element specifies the action as defined in [ISO24727-3] or loaded onto the card.

`<SecurityCondition>`

This element specifies the security conditions, which are necessary to perform the action specified above. As defined in [ISO24727-3] the security condition may be specified as a Boolean combination of `DIDAuthenticationState`-elements.

4.5.5 CardApplicationServiceDescriptionType

The `CardApplicationServiceDescriptionType` is defined as follows:

```
<complexType name="CardApplicationServiceDescriptionType">
	<choice>
		<element name="ServiceDescriptionURL" type="anyURI" />
		<element name="ServiceDescriptionText" type="string" />
	</choice>
</complexType>
```

It supports the following alternatives

`<ServiceDescriptionURL> [choice]`

This element contains a URL at which the `ServiceDescriptionText` may be found.

`<ServiceDescriptionText> [choice]`

This element contains the description of the service.

4.5.6 DIDInfoType

The `<DIDInfo>` element of type DIDInfoType is part of the CardApplicationType. The `DIDInfoType` is an extension of the type RequirementsType containing the `<RequirementLevel>` element.

```
<complexType name="DIDInfoType">
  <complexContent>
    <extension base="iso:RequirementsType">
      <sequence>
        <element name="DifferentialIdentity"
                 type="iso:DifferentialIdentityType" />
        <element name="DIDACL" type="iso:AccessControlListType" />
        <element name="Other" type="dss:AnyType" minOccurs="0"/>
      </sequence>
      <attribute name="Id" type="ID" use="optional" />
    </extension>
  </complexContent>
</complexType>
```

`<DifferentialIdentity>`

According to [ISO24727-3] all key material used for authentication or other cryptographic operations is represented by a differential identity (DID). The DifferentialIdentityType is described in detail below.

`<DIDACL>`

This element contains the access control list defining the access rights to the differential identities. For more details refer to the definition of the `AccessControlListType`.

`<Other> [optional]`

This element MAY contain some additional element, which structure is defined by some other specification.

4.5.7 DifferentialIdentityType

The `<DifferentialIdentity>` element of type `DifferentialIdentityType` is part of the DIDInfoType .

```
<complexType name="DifferentialIdentityType">
  <sequence>
    <element name="DIDName" type="iso:DIDNameType" />
    <element name="LocalDIDName" type="dss:InternationalStringType"
             maxOccurs="unbounded" minOccurs="0" />
    <element name="DIDProtocol" type="anyURI" />
    <element name="DIDMarker" type="iso:DIDMarkerType" />
    <element name="DIDScope" type="iso:DIDScopeType" minOccurs="0" />
    <element name="DIDQualifier"
             type="iso:DIDQualifierType" minOccurs="0" maxOccurs="1" />
  </sequence>
</complexType>
```

`<DIDName> [required]`

This element contains the name (unique in the scope) which is used in function calls to refer to the differential identity.

`<LocalDIDName> [optional, unbounded]`

This element is used to specify localized names of the differential identity.

`<DIDProtocol> [required]`

This element specifies the protocol of the differential identity. Standardized protocols are defined [TR-03112-7] and [CEN15480-3] for example. Note that the protocol identifies the used cryptographic protocol including the used commands as well as the secure messaging to be used after successful completion of the cryptographic protocol.

`<DIDMarker> [required]`

The structure of this element depends on the `<DIDProtocol>` element.

`<DIDScope> [optional]`

This element specifies whether the differential identity can be accessed from all card applications of the card (global) or only within a certain card application (local).

`<DIDQualifier> [optional]`

If present, this element contains further information on the differential identity.

4.5.8 DIDQualifierType

The structure of this type is defined as follows:

```
<complexType name="DIDQualifierType">
      <choice>
            <element name="ApplicationIdentifier"
                     type="iso:ApplicationIdentifierType" />
            <element name="ObjectIdentifier" type="anyURI" />
            <element name="ApplicationFunction" type="iso:BitString" />
      </choice>
</complexType>
```

4.5.9 DataSetInfoType

The `<DataSetInfo>` element of type DataSetInfoType is part of the CardApplicationType. The `DataSetInfoType` is an extension of the type RequirementsType containing the `<RequirementLevel>` element.

```
<complexType name="DataSetInfoType">
  <complexContent>
    <extension base="iso:RequirementsType">
      <sequence>
        <element name="DataSetName" type="iso:DataSetNameType" />
        <element name="LocalDataSetName" type="dss:InternationalStringType"
                 maxOccurs="unbounded" minOccurs="0" />
        <element name="DataSetACL" type="iso:AccessControlListType" />
        <element name="DataSetPath" type="iso:PathType" />
        <element name="DSI"
                 type="iso:DSIType" maxOccurs="unbounded" minOccurs="0" />
        <element name="Other" type="dss:AnyType" minOccurs="0"/>
      </sequence>
      <attribute name="Id" type="ID" use="optional" />
    </extension>
  </complexContent>
</complexType>
```

`<DataSetName> [required]`

This element contains the name of a data set which can be used to address the data set in [ISO24727-3] calls.

`<LocalDataSetName> [optional, unbounded]`

This element MAY be used to specify localized names of the data set.

`<DataSetACL> [required]`

This element contains the access rules on the data set. For more details refer to the definition of `AccessControlListType`.

`<DataSetPath> [required]`

This element contains the path to a data set. For more details refer to the definition of PathType.

`<DSI> [optional, unbounded]`

If the data set contains data structures for interoperability (DSIs) each of these elements MAY contain further information about one DSI. Details of the `DSIType` are specified below.

`<Other> [optional]`

This element MAY contain some additional element, which structure is defined by some other specification. Such an additional element MAY be used for post-issuance personalization purposes for example.

4.5.10 DSIType

The `DSIType` is an extension of the type RequirementsType and is specified as follows:

```
<complexType name="DSIType">
  <complexContent>
    <extension base="iso:RequirementsType">
      <sequence>
        <element name="DSIName" type="iso:DSINameType" />
        <element name="DSIPath" type="iso:PathType" />
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

`<DSIName> [required}`

This element contains the name of the DSI which is used for addressing the DSI in procedure calls.

`<DSIPath> [required]`

This element contains the path to the DSI on the card. For further details refer to the definition of PathType.

4.6 Signature

To defeat attacks which make use of manipulated CardInfo-structures the issuers of `CardInfo`-files SHOULD apply a digital signature according to [RFC3275] to protect the `<CardInfo>`-element or chosen parts of it.

When signed CardInfo files are imported, the signature SHALL be verified according to an appropriate policy.

Furthermore it SHOULD be ensured that

- especially protected key material for which the `<Protected>` element of the `KeyRefType` is TRUE and
- potential dangerous APDUs in the `CommandAPDU`–element with CLA values ‘0x’ or ‘1x’, x∈ {0, …,9, A,…,F} and INS values ‘20’, ‘21’, ‘24’, ‘2C’, and ‘22’

are only accessible or executed, if they are protected by an appropriate signature. CardInfo-files with protected key material or dangerous APDU and without an appropriate signature SHOULD be rejected.

In a signature on a CardInfo file the signer SHOULD only use the `ds:X509Data` choice in the `KeyInfo` element (see Section 4.4 in [RFC3275]).

All parts to be signed MUST be specified with `ds:Reference` elements. Every element to be included in the signature MUST have an `Id` attribute which is used in the `URI` attribute of the `ds:Reference` element. As the simplest case the whole `<CardInfo>` element is referenced, so that the signature is part of the signed data and therefore is excluded when calculating the hash value ("enveloped signature"). On the other hand it is possible to sign only child elements of the `<CardInfo>` element (e.g. `<CardType>`, `<CardIdentification>` and `<CardCapabilities>`) as well as existing `<CardApplication>` elements (contained in the element `<ApplicationCapabilities>`) so that it is possible to add a complete card application (on the card and in the CardInfo file) without invalidating the existing signature. The tests described above assure that an attacker is not able to use an unsigned part of the CardInfo file to access sensitive key objects which are protected by a signature.

References

[TR-03112-1]	BSI: TR-03112-1: eCard-API-Framework – Part 1: Overview and Generic Mechanisms
[TR-03112-2]	BSI: TR-03112-2: eCard-API-Framework – Part 2: eCard-Interface
[TR-03112-3]	BSI: TR-03112-3: eCard-API-Framework – Part 3: Management-Interface
[TR-03112-5]	BSI: TR-03112-5: eCard-API Framework – Part 5: Suppor- Interface
[TR-03112-6]	BSI: TR-03112-6: eCard-API-Framework – Part 6: IFD-Interface
[TR-03112-7]	BSI: TR-03112-7: eCard-API-Framework – Part 7: Protocols
[CEN15480-3]	CEN: TS 15480-3: Identification card systems —European Citizen Card — Part 3: European Citizen Card Interoperability using an application interface
[CEN15480-4]	CEN: TS 15480-4: Identification card systems — European Citizen Card — Part 4: Recommendations for European Citizen Card issuance, operation and use
[eGK-2]	gematik: Specification of the electronic health insurance card - Part 2: Applications and application-specific structures, Version 2.2.1
[RFC1738]	IETF: RFC 1738: T. Berners-Lee, L. Masinter, M. McCahill: Uniform Resource Locators (URL)
[RFC2119]	IETF: RFC 2119: S. Bradner: Key words for use in RFCs to Indicate Requirement Levels
[RFC3275]	IETF: RFC 3275: D. Eastlage, J. Reagle, D. Solo: (Extensible Markup Language) XMLSignature Syntax and Processing
[RFC3280]	IETF: RFC 3280: R. Housley, W. Polk, W. Ford, D. Solo: Internet X.509 Public Key Infrastructure, Certificate and Certificate Revocation List (CRL) Profile
[RFC3281]	IETF: RFC 3281: S. Farrell, R. Housley: An Internet Attribute Certificate Profile for Authorization
[RFC3966]	IETF: RFC 3966: H. Schulzrinne: The tel URI for Telephone Numbers
[ISO24727-2]	ISO: ISO/IEC 24727-2: Identification Cards — Integrated Circuit Cards Programming Interfaces — Part 2: Generic card interface
[ISO24727-3]	ISO: ISO/IEC 24727-3: Identification Cards — Integrated Circuit Cards Programming Interfaces — Part 3: Application Interface
[ISO24727-4]	ISO: ISO/IEC 24727-4: Identification Cards — Integrated Circuit Cards Programming Interfaces — Part 4: Application programming interface (API) administration
[ISO7816-15]	ISO: ISO/IEC 7816-15: Identification cards - Integrated circuit(s) cards with contacts — Part 15: Cryptographic information application
[ISO7816-3]	ISO: ISO/IEC 7816-3: Identification cards — Integrated circuit cards — Part 3: Cards with contacts — Electrical interface and transmission protocols
[ISO7816-4]	ISO: ISO/IEC 7816-4: Identification cards — Integrated circuit cards — Part 4:Organization, security and commands for interchange
[ISO7816-8]	ISO: ISO/IEC 7816-8: Identification cards — Integrated circuit cards — Part 8: Security related interindustry commands
[PAOSv1.1]	Liberty Alliance Project: Liberty Reverse HTTP Binding for SOAP Specification, Version v1.1
[PAOSv2.0]	Liberty Alliance Project: Liberty Reverse HTTP Binding for SOAP Specification, Version v2.0
[SOAPv1.1]	W3C: W3C Note: Simple Object Access Protocol (SOAP) 1.1