ID-ONE™ EPASS J V2.2
POLYMNIE

EXTENDED ACCESS CONTROL CONFIGURATION (EAC)

PUBLIC SECURITY TARGET

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1 Security Target introduction

1.1 Security Target identification

General identification:

Title:	Polymnie Security Target EAC
Editor:	Oberthur Technologies
CC version:	3.1 revision 3
EAL:	EAL4 + ALC_DVS.2 + AVA_VAN.5
PP(s):	BSI-CC-PP-056

TOE technical identification:

Name:	LDS EAC Java Applet in EAC configuration with AA
version:	v2.2

Platform technical identification:

Name:	**ID One Cosmo v7.0.1-n,** configuration Standard and Standard dual
Certificate:	ANSSI-CC-2010/40
Chips:	NXP P5CD081

Or

Name:	**ID One Cosmo v7.0.1-n,** Large and Large dual
Certificate:	ANSSI-CC-2011/64
Chips:	NXP P5CD145

1.2 Overview of the TOE

The current document aims at defining the functions and assurance security requirements which apply to the Polymnie smartcard.

It is composed of both an Integrated Circuit (IC), JavaCard platform and a loaded applet providing secure data management following ePassport specifications(BAC, EAC) and driving licence specifications (BAP, EAP); this document is therefore a composite Security Target (ST).

In the following, the smartcard will be called “Target Of Evaluation” or TOE.

The TOE is a versatile device that can be easily configured in order to operate in different modes including BAC ePassport, EAC ePassport, BAP driving licence and EAP driving licence. It possesses a dual interface to perform contact and contactless communications to go beyond current ePassport usages.

This device can be proposed as inlay to integrate in secure document booklet but can also be provided in a regular credit card format especially in driving licence configurations.

See 2.2.2 for details of the configuration targeted in this ST.

2 TOE Description

This part of the Security Target describes the TOE as an aid to the understanding of its security requirements. It addresses the product type, the intended usage and the main features of the TOE.

2.1 TOE usages

State or organisation issues TOEs to be used by the holder to prove his/her identity and claiming associated rights. For instance, it can be used to check identity at customs in an ePassport configuration, verifying authenticity of electronic visa stored on the card and correspondence with the holder or checking driving licence validity during a police control.

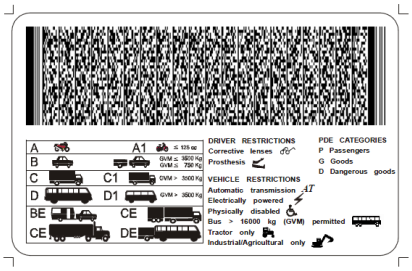
In order to pass successfully the control, the holder presents its personal TOE to the inspection system to first prove his/her identity. The inspection system is under control of an authorised agent and can be either a desktop device such as those present in airports or a portable device to be used on the field.

The TOE in context of this security target contains:

- Visual (eye readable) biographical data and portrait of the holder printed in the booklet
- A separate data summary (MRZ or keydoc data) for visual and machine reading using OCR methods in the Machine Readable Zone (MRZ or keydoc area)
- And data elements stored on the TOE's chip for contact-less machine reading.

The authentication of the holder is based on:

- The possession of a valid TOE personalized for a holder with the claimed identity as given on the biographical data page and
- The Biometric matching performed on the Inspection system using the reference data stored in the TOE.



When holder has been authenticated the issuing State or Organization can performed extra authentications in order to gain rights required to grant access to some sensitive information such as "driving licence penalty points", "visa information"…

The issuing State or Organization ensures the authenticity of the data of genuine TOEs. The receiving State trusts a genuine TOE of an issuing State or Organization.

The TOE can be viewed as the combination:

- A physical TOE in form of paper or plastic with an embedded chip and possibly an antenna. It presents visual readable data including (but not limited to) personal data of the TOE holder
  - (1) The biographical data on the biographical data page of the passport book,
  - (2) The printed data in the Machine-Readable Zone (MRZ) or keydoc area that identifies the device and
  - (3) The printed portrait.
- A logical TOE as data of the TOE holder stored according to the Logical Data Structure as specified by ICAO and extended in [R6], [R7], [R8] on the contactless integrated circuit. It presents contact or contact-less readable data including (but not limited to) personal data of the TOE holder
  - (4) The digital Machine Readable Zone Data (digital MRZ data or keydoc data, DG1),
  - (5) The digitized portraits,
  - (6) The optional biometric reference data of finger(s) or iris image(s) or both

(7) The other data according to LDS (up to DG24) and
(8) The Document security object.

The issuing State or Organization implements security features of the TOE to maintain the authenticity and integrity of the TOE and its data. The TOE as the physical device and the MRTD's chip is uniquely identified by the document number.

The physical TOE is protected by physical security measures (e.g. watermark on paper, security printing), logical (e.g. authentication keys of the TOE's chip) and organisational security measures (e.g. control of materials, personalisation procedures). These security measures include the binding of the TOE's chip to the physical support.

The logical TOE is protected in authenticity and integrity by a digital signature created by the document signer acting for the issuing State or Organization and the security features of the TOE's chip.

2.2 TOE architecture

The Target of Evaluation (TOE) is a smartcard composed of the following components:

- An ID One Cosmo v7.0.1-n JavaCard platform including Global Platform support and a cryptographic libary,
- An LDS applet providing both the BAC/EAC and BAP/EAP features loaded on the platform.

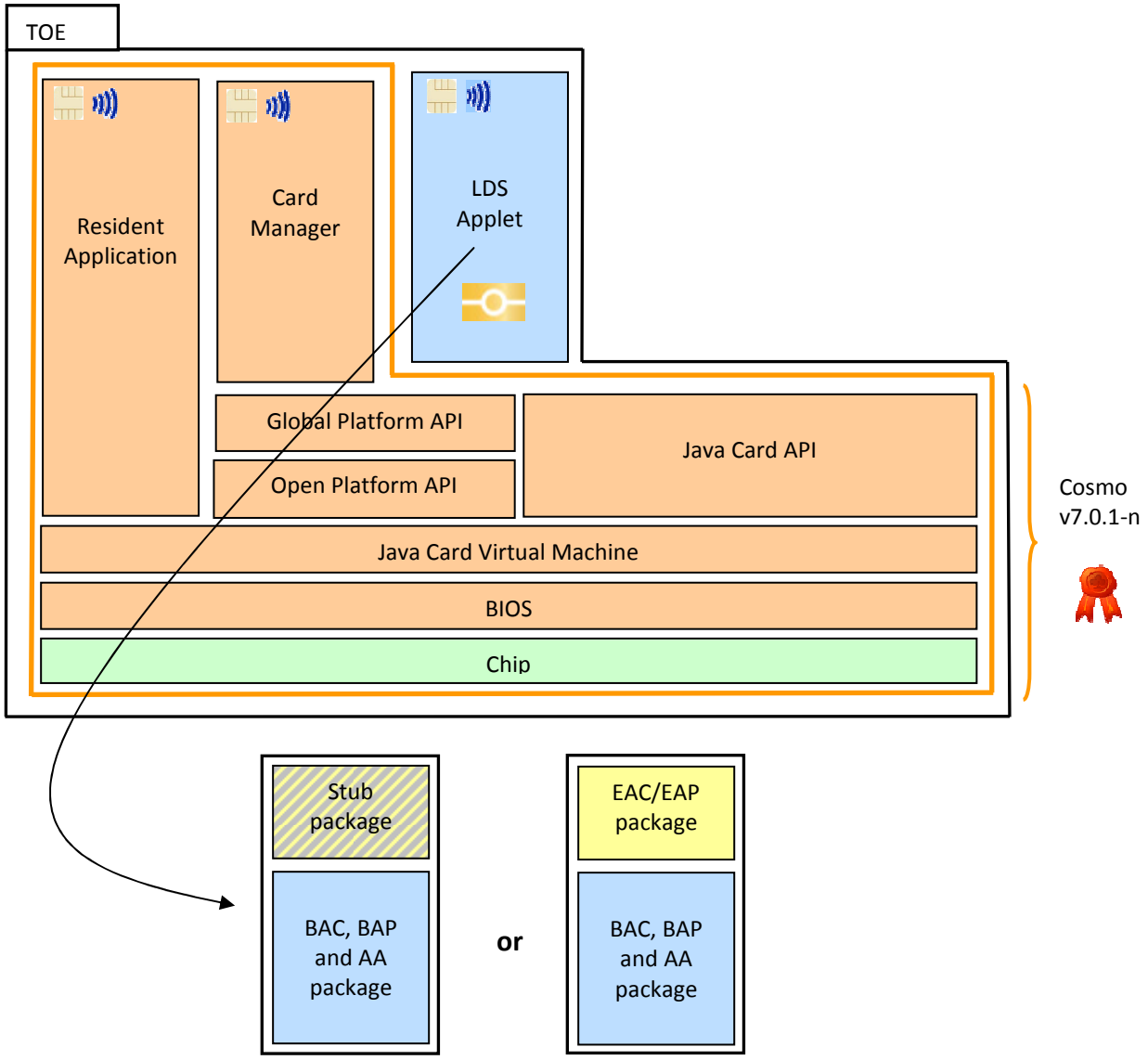


Figure 1 TOE architecture

2.2.1 JavaCard Platform

The Operating System is based on Java Card technology [JCRE], [JCVM], [JCAPI] and Global Platform technology [GP]. His main responsibilities are:

- providing interface between the Integrated Circuit and the applet
- providing to the applet, basic services to access to memories and all needed cryptographic operations
- ensuring global management of the card (loading, installation and deletion of applets) and monitor the security of the card (data integrity and physical attacks counter-measures).

For details see [COSMO-ST] §3.1 and §3.2.

2.2.1.1 Integrated Circuit (IC)

The platform relies on the functional and security features of an NXP P5CD081 or P5CD145 (and derived products) depending on the platform version (basic, standard or Large).This chip is designed to embed the secure code of Oberthur Technologies for the production of smart cards.

This chip provides the following major features:

- Die integrity,
- Monitoring of environmental parameters,
- Protection mechanisms against faults,
- Hardware Security Enhanced DES accelerator,
- AIS-31 class P2 compliant True Random Number Generator,
- CRC calculation block,
- Memory Protection Unit,
- Cryptographic coprocessor.

2.2.1.2 Cryptographic library

A dedicated cryptographic library is idesigned and embedded on the platform to provide the highest security level and best tuned performances. It provides the especially the following algorithms which are used by the LDS applet:

Feature	Embedded
SHA-1, SHA-224, SHA 256 and SHA-384 bits	✔
RSA CRT from 1024,to 2048 bits (by steps of 512 bits)	✔
ECC with key sizes from 192 to 512 bits	✔
3DES with 112 bits key size	✔
AES with 128, 192, 256 key sizes	✔

2.2.2 LDS application (as Javacard applet)

The Logical Data Structure (LDS) application is a generic filesystem that can be configured to match especially ICAO specifications for ePassports BAC and EAC and ISO specifications for IDL BAP and EAP.
It also includes commands and protocol management specified in [R15] used to grant access to sensitive data stored in the filesystem.

Here are the main features provided by the LDS application and present in the evaluation scope:

Feature	Embedded	In the ST scope[1]	References
BAC	✔	✔[2]	[R1],[R2], [R3], [R5]
EAC	✔	✔	R1],[R2], [R3], [R4], [R5]
Active Authentication (DES, AES, RSA CRT and ECC)	✔	✔	[R1],[R2], [R3], [R5], [R32]
Cryptosystem migration (Algorithm change during certificate verification transaction)	✔	✔	[R1],[R2], [R3], [R4], [R5]
BAP	✔	✘	[R6], [R7], [R8]
EAP	✔	✘	[R6], [R7], [R8]

[1] Features not included in the present Security Target are covered in the context of other CC certificates of the same product.
[2] BAC is included in the scope through an objective on the environment.

2.2.2.1 Basic Access Control (BAC)

The Basic Access Control (BAC) is a security feature that is supported by the TOE. The inspection system

- reads the printed data in the MRZ (for ePassport),
- authenticates itself as inspection system by means of keys derived from MRZ data. After successful 3DES based authentication, the TOE provides read access to data requiring BAC rights by means of a private communication (secure messaging) with the inspection system.

2.2.2.2 Basic Access Protection (BAP)

The Basic Access Protection (BAP) is especially used in the context of IDL as an alternative to BAC. Indeed it is actually a generalisation of BAC allowing usage of extra algorithms and key length. It exists in 4 modes:

- BAP1 - 3DES with key length of 128 bits (equivalent to BAC),
- BAP2 - AES with key length of 128 bits,
- BAP3 - AES with key length of 192 bits,
- BAP4 - AES with key length of 256 bits.

Following Secure messaging is performed using the algorithm used in the selected BAP mode.

Note that the term MRZ is specific to ICAO standard; [R8] uses the term “Keydoc” which refers to an equivalent unique identifier printed on the physical TOE as a random number or barcode.

2.2.2.3 Active Authentication (AA)

The Active Authentication of the TOE is an optional feature that may be implemented. It ensures that the TOE has not been substituted, by means of a challenge-response protocol between the inspection system and the TOE. For this purpose the chip contains its own Active Authentication DES/AES key or RSA/ECC Key pair. A hash representation of Data Group 15 (DG15, see 2.4.1) Secret/Public key is stored in the Document Security Object (SOD, see 2.4.1) and therefore authenticated by the issuer’s digital signature. If any, the corresponding Private Key is stored in the TOE’s secure memory. Note that the access to DG15 is disabled if a secret key is stored[3].
The TOE supports the loading and generation of the Active Authentication DES/AES key or RSA/ECC Key pair.

2.2.2.4 Extended Access Control (EAC)

The Extended Access Control (EAC) enhances the later security features and ensures a strong and mutual authentication of the TOE and the Inspection system. This step is required to access biometric data such as fingerprints and iris stored in DG3 and DG4. In particular, the authentication steps ensures a strong secure channel able to provide confidentiality of the biometric data that are read and authentication of the Inspection system retrieving the date to perform a Match on Terminal comparison. The Extended Access Control authentication steps the TOE implements may be performed either with elliptic curve cryptography, or with RSA cryptography.

2.2.2.5 Extended Access Protection (EAP)

The Extended Access Protection (EAP) extends EAC to allow a more flexible protocol. It can protect up to 24 DGs (from 1 to 24) and is no more restricted to DG3 and 4. Note that a BAP must be performed prior to starting EAP.

Following secure messaging can be either in 3DES or AES taking into that the algorithm used must be the same as the one used for BAP.

[3] Note also that in any cases, a key is stored in a specific secure container.

2.2.2.6 Personalisation features

This application also manages the TOE in pre-personalisation, personalisation and use phase in order to configure the card in the expected way.
It implements and control access to the following services:

- File management including data reading and writing,
- Key generation,
- Key injection,
- PIN management.

The resident application can be addressed:

- In clear mode for secure environment or non-sensitive commands,
- Using a 3DES secure channel otherwise.

2.3 TOE Configurations

There are 1 configuration based on packaged loaded on the platform:
- (1) BAC/BAP and AA package (a) loaded with EAC/EAP package (b): full features are provided (BAP, BAP, EAC, EAP and AA).

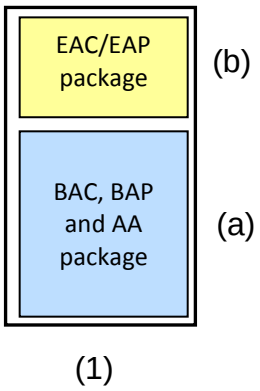


Figure 2 TOE configuration

2.4 TOE logical structure

Roughly, the embedded application, when powered, is seen as a master file, containing a Dedicated file (DF) for the LDS.
This dedicated file is selected by means of the Application Identifier (AID) of the LDS application for example in case of ePassport. Once the application dedicated files are selected, the file structure it contains may be accessed, provided the access conditions are fulfilled.

2.4.1 File structure of the TOE

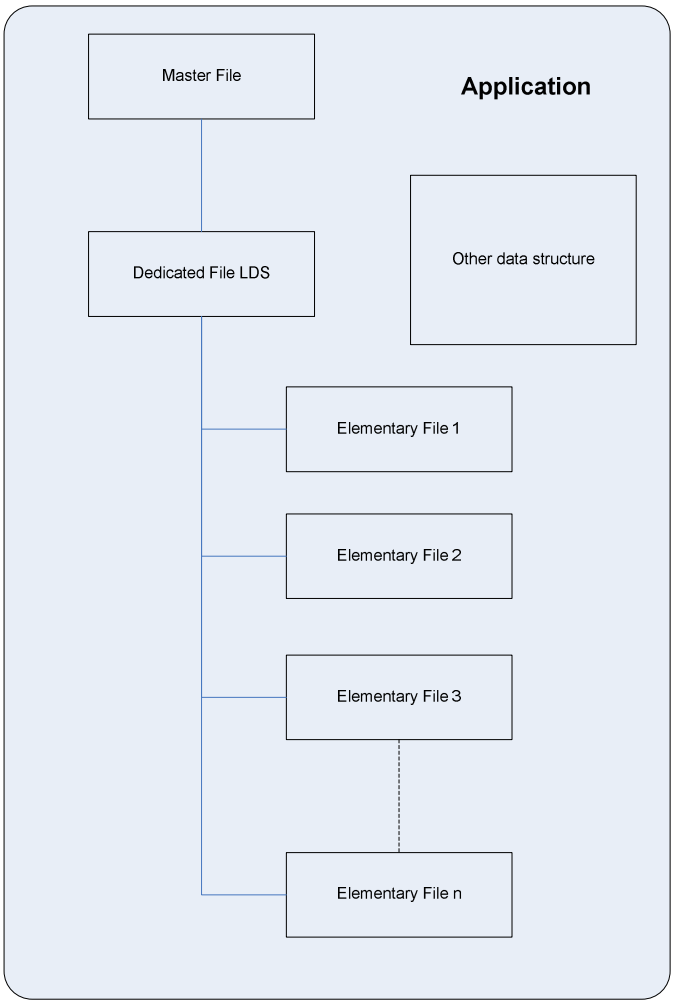


Figure 3 : Structure of the file system

The TOE distinguish between two types of data

- System containers,
- Data files that store data that are potentially visible from the outside.

Basically, system containers and data files are handled by the application. It handles their creation and management. Both types have the following characteristics:

- Size, size reserved within the EEPROM for the content of this file,
- EF ID, Elementary File Identifier within the file structure,
- SFI, Short File Identifier used for an easy selection; It is only used for data files,
- Access conditions, it specify under which conditions the file may be accessed (read never, read always...).

2.4.2 System containers

System containers are dedicated to store sensitive data that are used by the application; these data are protected in integrity. Theses containers may be created and updated in pre-personalisation or personalisation phase. Containers containing keys are never readable.
Once created, these containers are used by the application to work properly. They have to be created before any use of the application.

In particular, theses containers are used to store:

- The active authentication public key needed to perform the active authentication,
- The active authentication secret/private key needed to perform the active authentication,
- The keys needed to perform AA, BAC, BAP, EAC and EAP.

2.4.3 Data files

Data files also called Elementary files (EF) or Data Groups (DG) are dedicated to store data that may be retrieved. They are protected in integrity and can be created or updated either in pre-personalisation or in personalisation phase. They are also created in such a way they can only be read or write in use phase, provided authentications specified in access rights are performed.

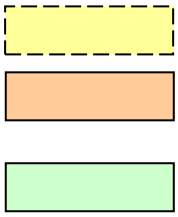
All personalisation configurations are possible including BAC and EAC. Nevertheless, Data Files usually considered are the following:

- EF.COM which describes which DGs are present in the file structure,
- EF.SOD which contains a certificate computed over the whole DGs. It ensures their integrity & authenticity,
- DG1 up to DG24 which contains information about the holder (picture, name…) and key required to perform authentications.

2.5 TOE product life cycle

2.5.1 Card life cycle

The Smart card product life cycle is split up into 7 phases[4] where evaluation scope (i.e. evaluation phases under the developer's responsibility) goes from phase 1 to phase 5[5]. For convenience, functional operations like card testing or card printing are specified in the figures.



[4] For details regarding phases see [COSMO-ST] §3.5.
[5] Note that applet loading is deactivated at the end of phase 5.

2.5.1.1 Applets loading without DAP in Vitré factory

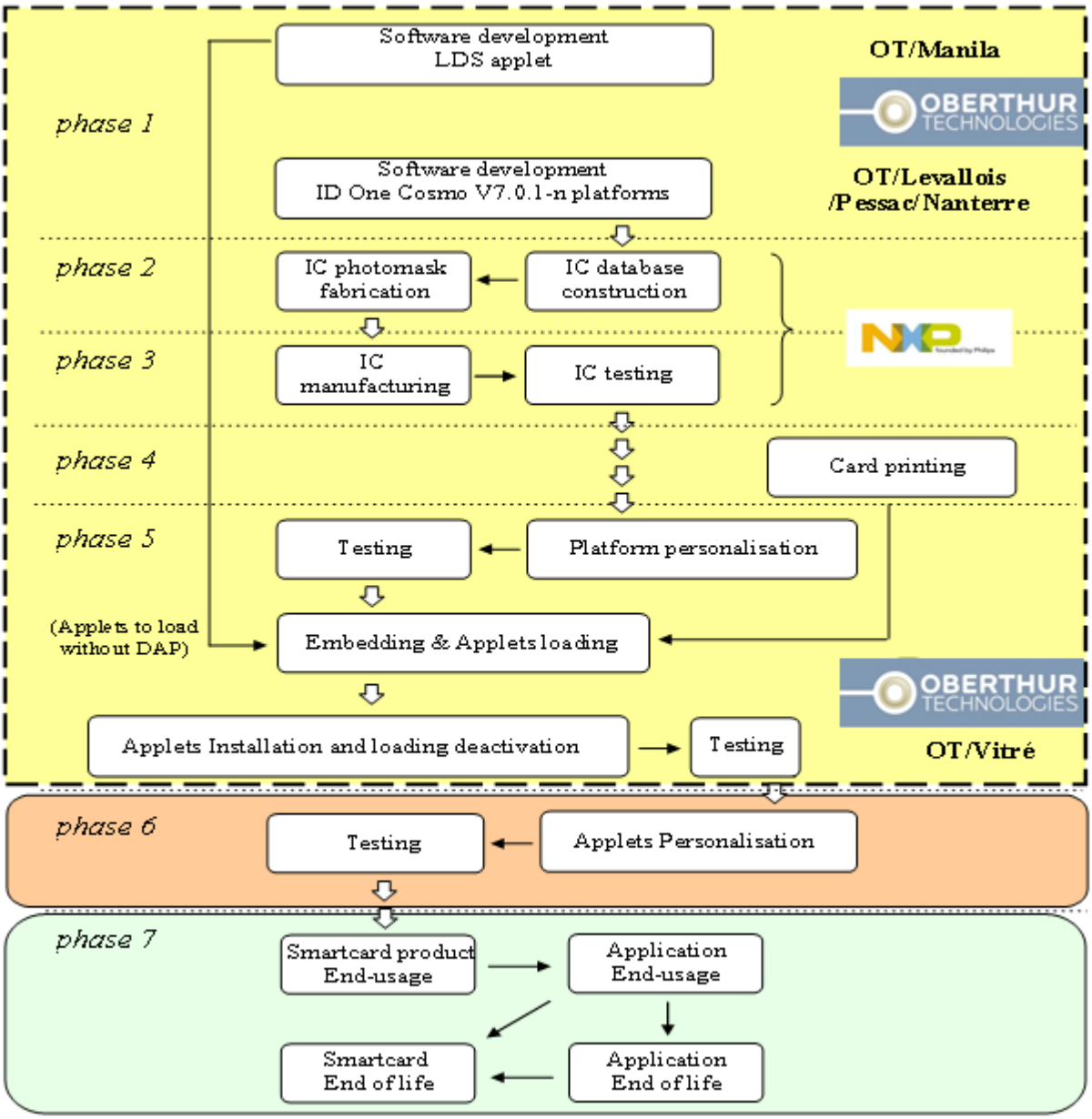


Figure 4 Smartcard product life-cycle for the TOE without DAP loading

3 Conformance claims

3.1 Common Criteria conformance

This Security Target (ST) is CC Part 2 extended [R34] and CC Part 3 conformant [R35] and written according to the Common Criteria version 3.1 Part 1 [R33].

3.2 Package conformance

This ST is conformant to the EAL4 package as defined in [R35].

The EAL4 have been augmented with the following requirements to fulfill the Oberthur Technologies assurance level:

Requirement	Name	Type
ALC_DVS.2	Sufficiency of security measures	Higher hierarchical component
AVA_VAN.5	Advanced methodical vulnerability analysis	Higher hierarchical component

3.3 Protection Profile conformance

The Security Target claims strict conformance to the following PP written in CC3.1 revision 2:

- Machine Readable Travel Documents with “ICAO Application”, Extended Access Control [R11].

4 Security problem definition

4.1 Assets

Logical MRTD data

The logical MRTD data consists of the EF.COM, EF.DG1 to EF.DG16 (with different security needs) and the Document Security Object EF.SOD according to LDS [R2]. These data are user data of the TOE. The EF.COM lists the existing elementary files (EF) with the user data. The EF.DG1 to EF.DG13 and EF.DG16 contain personal data of the MRTD holder. The Chip Authentication Public Key (EF.DG 14) is used by the inspection system for the Chip Authentication. The EF.SOD is used by the inspection system for Passive Authentication of the logical MRTD.

The current EAC Security Target is dedicated to the protection of both Active Authentication EF.DG15 (see below) and sensitive biometric EF.DG3&4. The other one (and associated keys) are described and managed in the related BAC Security Target.

The Active Authentication Secret/Public Key Info in EF.DG15 is used by the inspection system for Active Authentication of the chip. The Document security object is used by the inspection system for Passive Authentication of the logical MRTD.

All these data may be sorted out in two different categories.

- If they are specific to the user, they are User data,
- If they ensure the correct behaviour of the application, they are TSF Data.

User data

CPLC Data	Data uniquely identifying the chip. They are considered as user data as they enable to track the holder
Sensitive biometric reference data (EF.DG3, EF.DG4)	Contain the fingerprint and the iris picture
Chip Authentication Public Key in EF.DG14	Contain public data enabling to authenticate the chip thanks to a chip authentication
Active Authentication Secret/Public Key in EF.DG15	Contain public data or secret key enabling to authenticate the chip thanks to an active authentication

TSF data

TOE_ID	Data enabling to identify the TOE
Personalisation Agent reference authentication Data	Private key enabling to authenticate the Personalisation agent (same as BAC ST)
Basic Access Control (BAC) Key	Master keys used to established a trusted channel between the Basic Inspection Terminal and the travel document (same as BAC ST)
Chip Authentication private Key	Private key the chip uses to perform a chip authentication
Active Authentication private key	Private key the chip uses to perform an active authentication
Session keys for the secure channel	Session keys used to protect the communication in confidentiality and in integrity
Life Cycle State	Life Cycle state of the TOE
Public Key CVCA	Trust point of the travel document stored in persistent memory
CVCA Certificate	All the data related to the CVCA key (expiration date, name,..) stored in persistent memory
Current Date	Current date of the travel document

Authenticity of the MRTD's chip

The authenticity of the MRTD's chip personalized by the issuing State or Organization for the MRTD holder is used by the traveler to prove his possession of a genuine MRTD.

4.2 Threats

This section describes the threats to be averted by the TOE independently or in collaboration with its IT environment. These threats result from the TOE method of use in the operational environment and the assets stored in or protected by the TOE.

T.Read_Sensitive_Data

Adverse action: An attacker tries to gain the sensitive biometric reference data through the communication interface of the MRTD's chip. The attack T.Read_Sensitive_Data is similar to the threat T.Skimming (cf. [R10]) in respect of the attack path (communication interface) and the motivation (to get data stored on the MRTD's chip) but differs from those in the asset under the attack (sensitive biometric reference data vs. digital MRZ, digitized portrait and other data), the opportunity (i.e. knowing Document Basic Access Keys) and therefore the possible attack methods. Note, that the sensitive biometric reference data are stored only on the MRTD's chip as private sensitive personal data whereas the MRZ data and the portrait are visually readable on the physical MRTD as well.

Threat agent: having high attack potential, knowing the Document Basic Access Keys, being in possession of a legitimate MRTD

Asset: confidentiality of sensitive logical MRTD (i.e. biometric reference) data

T.Forgery

Adverse action: An attacker alters fraudulently the complete stored logical MRTD or any part of it including its security related data in order to deceive on an inspection system by means of the changed MRTD holder's identity or biometric reference data.

This threat comprises several attack scenarios of MRTD forgery. The attacker may alter the biographical data on the biographical data page of the passport book, in the printed MRZ and in the digital MRZ to claim another identity of the traveler. The attacker may alter the printed portrait and the digitized portrait to overcome the visual inspection of the inspection officer and the automated biometric authentication mechanism by face recognition. The attacker may alter the biometric reference data to defeat automated biometric authentication mechanism of the inspection system. The attacker may combine data groups of different logical MRTDs to create a new forged MRTD, e.g. the attacker writes the digitized portrait and optional biometric reference finger data read from the logical MRTD of a traveler into another MRTD's chip leaving their digital MRZ unchanged to claim the identity of the holder this MRTD. The attacker may also copy the complete unchanged logical MRTD to another contactless chip.

Threat agent: having high attack potential, being in possession of one or more legitimate MRTDs.

Asset: authenticity of logical MRTD data.

T.Counterfeit

Adverse action: An attacker with high attack potential produces an unauthorized copy or reproduction of a genuine MRTD's chip to be used as part of a counterfeit MRTD. This violates the authenticity of the MRTD's chip used for authentication of a traveller by possession of a MRTD.

The attacker may generate a new data set or extract completely or partially the data from a genuine MRTD's chip and copy them on another appropriate chip to imitate this genuine MRTD's chip.

Threat agent: having high attack potential, being in possession of one or more legitimate MRTDs

Asset: authenticity of logical MRTD data,

T.Abuse-Func

Adverse action: An attacker may use functions of the TOE which shall not be used in "Operational Use" phase in order (i) to manipulate User Data, (ii) to manipulate (explore, bypass, deactivate or change) security features or functions of the TOE or (iii) to disclose or to manipulate TSF Data.

This threat addresses the misuse of the functions for the initialization and the personalization in the operational state after delivery to MRTD holder.

Threat agent: having high attack potential, being in possession of a legitimate MRTD.

Asset: confidentiality and authenticity of logical MRTD and TSF data, correctness of TSF.

T.Information_Leakage

Adverse action: An attacker may exploit information which is leaked from the TOE during its usage in order to disclose confidential TSF data. The information leakage may be inherent in the normal operation or caused by the attacker.

Leakage may occur through emanations, variations in power consumption, I/O characteristics, clock frequency, or by changes in processing time requirements.

This leakage may be interpreted as a covert channel transmission but is more closely related to measurement of operating parameters, which may be derived either from measurements of the contactless interface (emanation) or direct measurements (by contact to the chip still available even for a contactless chip) and can then be related to the specific operation being performed.

Examples are the Differential Electromagnetic Analysis (DEMA) and the Differential Power Analysis (DPA). Moreover the attacker may try actively to enforce information leakage by fault injection (e.g. Differential Fault Analysis).

Threat agent: having high attack potential, being in possession of a legitimate MRTD.

Asset: confidentiality of logical MRTD and TSF data.

T.Phys-Tamper

Adverse action: An attacker may perform physical probing of the MRTD's chip in order (i) to disclose TSF Data or (ii) to disclose/reconstruct the MRTD's chip Embedded Software. An attacker may physically modify the MRTD's chip in order to (i) modify security features or functions of the MRTD's chip, (ii) modify security functions of the MRTD's chip Embedded Software, (iii) modify User Data or (iv) to modify TSF data.

The physical tampering may be focused directly on the disclosure or manipulation of TOE User Data (e.g. the biometric reference data for the inspection system) or TSF Data (e.g. authentication key of the MRTD"' chip) or indirectly by preparation of the TOE to following attack methods by modification of security features (e.g. to enable information leakage through power analysis). Physical tampering requires direct interaction with the MRTD's chip internals. Techniques commonly employed in IC failure analysis and IC reverse engineering efforts may be used. Before that, the hardware security mechanisms and layout characteristics need to be identified. Determination of software design including treatment of User Data and TSF Data may also be a pre-requisite. The modification may result in the deactivation of a security function. Changes of circuitry or data can be permanent or temporary.

Threat agent: having high attack potential, being in possession of a legitimate MRTD.

Asset: confidentiality and authenticity of logical MRTD and TSF data, correctness of TSF.

T.Malfunction

Adverse action: An attacker may cause a malfunction of TSF or of the MRTD's chip Embedded Software by applying environmental stress in order to (i) deactivate or modify security features or functions of the TOE or (ii) circumvent, deactivate or modify security functions of the MRTD's chip Embedded Software.

This may be achieved e.g. by operating the MRTD's chip outside the normal operating conditions, exploiting errors in the MRTD"s chip Embedded Software or misusing administration function. To exploit these vulnerabilities an attacker needs information about the functional operation.

Threat agent: having high attack potential, being in possession of a legitimate MRTD.

Asset: confidentiality and authenticity of logical MRTD and TSF data, correctness of TSF.

4.3 Organisational Security Policies

P.BAC-PP

The issuing States or Organizations ensures that successfully authenticated Basic Inspection Systems have read access to logical MRTD data DG1, DG2, DG5 to DG16 the "ICAO Doc 9303" [R2] as well as to the data groups Common and Security Data. The MRTD is successfully evaluated and certified in accordance with the "Common Criteria Protection Profile Machine Readable Travel Document with "ICAO Application", Basic Access Control" [R10] in order to ensure the confidentiality of standard user data and preventing the traceability of the MRTD data.

P.Sensitive_Data

The biometric reference data of finger(s) (EF.DG3) and iris image(s) (EF.DG4) are sensitive private personal data of the MRTD holder. The sensitive biometric reference data can be used only by inspection systems which are authorized for this access at the time the MRTD is presented to the inspection system (Extended Inspection Systems). The issuing State or Organization authorizes the Document Verifiers of the receiving States to manage the authorization of inspection systems within the limits defined by the Document Verifier Certificate. The MRTD's chip shall protect the confidentiality and integrity of the sensitive private personal data even during transmission to the Extended Inspection System after Chip Authentication.

P.Manufact

The Initialization Data are written by the IC Manufacturer to identify the IC uniquely. The MRTD Manufacturer writes the Pre-personalization Data which contains at least the Personalization Agent Key.

P.Personalization

The issuing State or Organization guarantees the correctness of the biographical data, the printed portrait and the digitized portrait, the biometric reference data and other data of the logical MRTD with respect to the MRTD holder. The personalization of the MRTD for the holder is performed by an agent authorized by the issuing State or Organization only.

P.Sensitive_Data_Protection

All the sensitive data are at least protected in integrity. The keys are protected in both integrity and confidentiality.

Application note:

DG3 and DG4 protection is managed by P.Sensitive_data.

P.Key_Function

All the cryptographic routines are designed in such a way that they are protected against probing and do not cause any information leakage that may be used by an attacker.

4.4 Assumptions

The assumptions describe the security aspects of the environment in which the TOE will be used or is intended to be used.

A.MRTD_Manufact

It is assumed that appropriate functionality testing of the MRTD is used. It is assumed that security procedures are used during all manufacturing and test operations to maintain confidentiality and integrity of the MRTD and of its manufacturing and test data (to prevent any possible copy, modification, retention, theft or unauthorized use).

A.MRTD_Delivery

Procedures shall guarantee the control of the TOE delivery and storage process and conformance to its objectives:

- Procedures shall ensure protection of TOE material/information under delivery and storage,

- Procedures shall ensure that corrective actions are taken in case of improper operation in the delivery process and storage,
- Procedures shall ensure that people dealing with the procedure for delivery have got the required skill.

A.Pers_Agent

The Personalization Agent ensures the correctness of(i) the logical MRTD with respect to the MRTD holder, (ii) the Document Basic Access Keys, (iii) the Chip Authentication Public Key (EF.DG14) if stored on the MRTD's chip, and (iv) the Document Signer Public Key Certificate (if stored on the MRTD"s chip). The Personalization Agent signs the Document Security Object. The Personalization Agent bears the Personalization Agent Authentication to authenticate himself to the TOE by symmetric cryptographic mechanisms.

A.Insp_Sys

The Inspection System is used by the border control officer of the receiving State (i) examining an MRTD presented by the traveler and verifying its authenticity and (ii) verifying the traveler as MRTD holder. The Basic Inspection System for global interoperability (i) includes the Country Signing CA Public Key and the Document Signer Public Key of each issuing State or Organization, and (ii) implements the terminal part of the Basic Access Control [R2]. The Basic Inspection System reads the logical MRTD under Basic Access Control and performs the Passive Authentication to verify the logical MRTD.

The General Inspection System in addition to the Basic Inspection System implements the Chip Authentication Mechanism. The General Inspection System verifies the authenticity of the MRTD's chip during inspection and establishes secure messaging with keys established by the Chip Authentication Mechanism. The Extended Inspection System in addition to the General Inspection System (i) supports the Terminal Authentication Protocol and (ii) is authorized by the issuing State or Organization through the Document Verifier of the receiving State to read the sensitive biometric reference data.

A.Signature_PKI

The issuing and receiving States or Organizations establish a public key infrastructure for passive authentication i.e. digital signature creation and verification for the logical MRTD. The issuing State or Organization runs a Certification Authority (CA) which securely generates, stores and uses the Country Signing CA Key pair. The CA keeps the Country Signing CA Private Key secret and is recommended to distribute the Country Signing CA Public Key to ICAO, all receiving States maintaining its integrity. The Document Signer (i) generates the Document Signer Key Pair, (ii) hands over the Document Signer Public Key to the CA for certification, (iii) keeps the Document Signer Private Key secret and (iv) uses securely the Document Signer Private Key for signing the Document Security Objects of the MRTDs. The CA creates the Document Signer Certificates for the Document Signer Public Keys that are distributed to the receiving States and Organizations.

A.Auth_PKI

The issuing and receiving States or Organizations establish a public key infrastructure for card verifiable certificates of the Extended Access Control. The Country Verifying Certification Authorities, the Document Verifier and Extended Inspection Systems hold authentication key pairs and certificates for their public keys encoding the access control rights. The Country Verifying Certification Authorities of the issuing States or Organizations are signing the certificates of the Document Verifier and the Document Verifiers are signing the certificates of the Extended

Inspection Systems of the receiving States or Organizations. The issuing States or Organizations distribute the public keys of their Country Verifying Certification Authority to their MRTD's chip.

5 Security Objectives

5.1 Security Objectives for the TOE

This section describes the security objectives for the TOE addressing the aspects of identified threats to be countered by the TOE and organizational security policies to be met by the TOE.

OT.AC_Pers

The TOE must ensure that the logical MRTD data in EF.DG1 to EF.DG16, the Document security object according to LDS [R2] and the TSF data can be written by authorized Personalization Agents only. The logical MRTD data in EF.DG1 to EF.DG16 and the TSF data may be written only during and cannot be changed after its personalization. The Document security object can be updated by authorized Personalization Agents if data in the data groups EF.DG3 to EF.DG16 are added.

OT.Data_Int

The TOE must ensure the integrity of the logical MRTD stored on the MRTD's chip against physical manipulation and unauthorized writing. The TOE must ensure the integrity of the logical MRTD data during their transmission to the General Inspection System after Chip Authentication.

OT.Sens_Data_Conf

The TOE must ensure the confidentiality of the sensitive biometric reference data (EF.DG3 and EF.DG4) by granting read access only to authorized Extended Inspection Systems. The authorization of the inspection system is drawn from the Inspection System Certificate used for the successful authentication and shall be a non-strict subset of the authorization defined in the Document Verifier Certificate in the certificate chain to the Country Verifier Certification Authority of the issuing State or Organization. The TOE must ensure the confidentiality of the logical MRTD data during their transmission to the Extended Inspection System. The confidentiality of the sensitive biometric reference data shall be protected against attacks with high attack potential.

OT.Identification

The TOE must provide means to store IC Identification and Pre-Personalization Data in its nonvolatile memory. The IC Identification Data must provide a unique identification of the IC during Phase 2 "Manufacturing" and Phase 3 "Personalization of the MRTD". The storage of the Pre- Personalization data includes writing of the Personalization Agent Key(s).

OT.Chip_Auth_Proof

The TOE must support the General Inspection Systems to verify the identity and authenticity of the MRTD’s chip as issued by the identified issuing State or Organization by means of the Chip Authentication as defined in [R2]. The authenticity proof provided by MRTD’s chip shall be protected against attacks with high attack potential.

OT.Prot_Abuse-Func

After delivery of the TOE to the MRTD Holder, the TOE must prevent the abuse of test and support functions that may be maliciously used to (i) disclose critical User Data, (ii) manipulate critical User Data of the IC Embedded Software, (iii) manipulate Soft-coded IC Embedded Software or (iv) bypass, deactivate, change or explore security features or functions of the TOE.

Details of the relevant attack scenarios depend, for instance, on the capabilities of the Test Features provided by the IC Dedicated Test Software which are not specified here.

OT.Prot_Inf_Leak

The TOE must provide protection against disclosure of confidential TSF data stored and/or processed in the MRTD's chip

- by measurement and analysis of the shape and amplitude of signals or the time between events found by measuring signals on the electromagnetic field, power consumption, clock, or I/O lines and
- by forcing a malfunction of the TOE and/or
- by a physical manipulation of the TOE.

OT.Prot_Phys-Tamper

The TOE must provide protection of the confidentiality and integrity of the User Data, the TSF Data, and the MRTD's chip Embedded Software. This includes protection against attacks with high attack potential by means of

- measuring through galvanic contacts which is direct physical probing on the chips surface except on pads being bonded (using standard tools for measuring voltage and current) or
- measuring not using galvanic contacts but other types of physical interaction between charges (using tools used in solid-state physics research and IC failure analysis)
- manipulation of the hardware and its security features, as well as
- controlled manipulation of memory contents (User Data, TSF Data)

with a prior

- reverse-engineering to understand the design and its properties and functions.

OT.Prot_Malfunction

The TOE must ensure its correct operation. The TOE must prevent its operation outside the normal operating conditions where reliability and secure operation has not been proven or tested. This is to prevent errors. The environmental conditions may include external energy (esp. electromagnetic) fields, voltage (on any contacts), clock frequency, or temperature.

OT.Chip_Authenticity

The TOE must support the Inspection Systems to verify the authenticity of the MRTD's chip. The TOE stores a DES/AES secret key or an RSA/ECC private key to prove its identity, and that is used in chip authentication. This mechanism is described in [R1] and [R32] as "Active Authentication".

5.2 Security objectives for the Operational Environment

5.2.1 Issuing State or Organization

The issuing State or Organization will implement the following security objectives of the TOE environment.

OE.MRTD_Manufact

Appropriate functionality testing of the TOE shall be used in step 4 to 6.

During all manufacturing and test operations, security procedures shall be used through phases 4, 5 and 6 to maintain confidentiality and integrity of the TOE and its manufacturing and test data.

OE.MRTD_ Delivery

Procedures shall ensure protection of TOE material/information under delivery including the following objectives:

- non-disclosure of any security relevant information,
- identification of the element under delivery,
- meet confidentiality rules (confidentiality level, transmittal form, reception acknowledgment),
- physical protection to prevent external damage,
- secure storage and handling procedures (including rejected TOE's),
- traceability of TOE during delivery including the following parameters:
  - origin and shipment details,
  - reception, reception acknowledgement,
  - location material/information.

Procedures shall ensure that corrective actions are taken in case of improper operation in the delivery process (including if applicable any non-conformance to the confidentiality convention) and highlight all non-conformance to this process.

Procedures shall ensure that people (shipping department, carrier, reception department) dealing with the procedure for delivery have got the required skill, training and knowledge to meet the procedure requirements and be able to act fully in accordance with the above expectations.

OE.Personalization

The issuing State or Organization must ensure that the Personalization Agents acting on behalf of the issuing State or Organization (i) establish the correct identity of the holder and create biographical data for the MRTD, (ii) enroll the biometric reference data of the MRTD holder i.e. the portrait, the encoded finger image(s) and/or the encoded iris image(s) and (iii) personalize the MRTD for the holder together with the defined physical and logical security measures to protect the confidentiality and integrity of these data.

OE.Pass_Auth_Sign

The issuing State or Organization must (i) generate a cryptographic secure Country Signing CA Key Pair, (ii) ensure the secrecy of the Country Signing CA Private Key and sign Document Signer Certificates in a secure operational environment, and (iii) distribute the Certificate of the Country Signing CA Public Key to receiving States and Organizations maintaining its authenticity and integrity. The issuing State or Organization must (i) generate a cryptographic secure Document Signer Key Pair and ensure the secrecy of the Document Signer Private Keys, (ii) sign Document Security Objects of genuine MRTD in a secure operational environment only and (iii) distribute the Certificate of the Document Signer Public Key to receiving States and Organizations. The digital signature in the Document Security Object relates all data in the data in EF.DG1 to EF.DG16 if stored in the LDS according to [R2].

OE.Auth_Key_MRTD

The issuing State or Organization has to establish the necessary public key infrastructure in order to (i) generate the MRTD's Chip Authentication Key Pair, (ii) sign and store the Chip Authentication Public Key in the Chip Authentication Public Key data in EF.DG14 and (iii) support inspection

systems of receiving States or organizations to verify the authenticity of the MRTD's chip used for genuine MRTD by certification of the Chip Authentication Public Key by means of the Document Security Object.

OE.Authoriz_Sens_Data

The issuing State or Organization has to establish the necessary public key infrastructure in order to limit the access to sensitive biometric reference data of MRTD's holders to authorized receiving States or Organizations. The Country Verifying Certification Authority of the issuing State or Organization generates card verifiable Document Verifier Certificates for the authorized Document Verifier only.

OE.BAC-PP

It has to be ensured by the issuing State or Organization, that the TOE is additionally successfully evaluated and certified in accordance with the "Common Criteria Protection Profile Machine Readable Travel Document with "ICAO Application", Basic Access Control" [R10]. This is necessary to cover the BAC mechanism ensuring the confidentiality of standard user data and preventing the traceability of the MRTD data. Note that due to the differences within the assumed attack potential the addressed evaluation and certification is a technically separated process.

5.2.2 Receiving State or Organization

The receiving State or Organization will implement the following security objectives of the TOE environment.

OE.Exam_MRTD

The inspection system of the receiving State or Organization must examine the MRTD presented by the traveler to verify its authenticity by means of the physical security measures and to detect any manipulation of the physical MRTD. The Basic Inspection System for global interoperability (i) includes the Country Signing CA Public Key and the Document Signer Public Key of each issuing State or Organization, and (ii) implements the terminal part of the Basic Access Control [R2]. Additionally General Inspection Systems and Extended Inspection Systems perform the Chip Authentication Protocol to verify the Authenticity of the presented MRTD's chip.

OE.Passive_Auth_Verif

The border control officer of the receiving State uses the inspection system to verify the traveler as MRTD holder. The inspection systems must have successfully verified the signature of Document Security Objects and the integrity data elements of the logical MRTD before they are used. The receiving States and Organizations must manage the Country Signing CA Public Key and the Document Signer Public Key maintaining their authenticity and availability in all inspection systems.

OE.Prot_Logical_MRTD

The inspection system of the receiving State or Organization ensures the confidentiality and integrity of the data read from the logical MRTD. The inspection system will prevent eavesdropping to their communication with the TOE before secure messaging is successfully established based on the Chip Authentication Protocol.

OE.Ext_Insp_Systems

The Document Verifier of receiving States or Organizations authorizes Extended Inspection Systems by creation of Inspection System Certificates for access to sensitive biometric reference data of the logical MRTD. The Extended Inspection System authenticates themselves to the MRTD's chip for access to the sensitive biometric reference data with its private Terminal Authentication Key and its Inspection System Certificate.

6 Extended requirements

6.1 Extended families

6.1.1 Extended family FAU_SAS - Audit data storage

6.1.1.1 Description

see [R11].

6.1.1.2 Extended components

Extended component FAU_SAS.1

Description

see [R11].

Definition

FAU_SAS.1 Audit storage

FAU_SAS.1.1 The TSF shall provide [assignment: authorized users] with the capability to store [assignment: list of audit information] in the audit records.

Dependencies: No dependencies.

Rationale

see [R11].

6.1.1.3 Rationale

see [R11].

6.1.2 Extended family FCS_RND - Generation of random numbers

6.1.2.1 Description

see [R11].

6.1.2.2 Extended components

Extended component FCS_RND.1

Description

See [R11].

Definition

FCS_RND.1 Quality metric for random numbers

FCS_RND.1.1 The TSF shall provide a mechanism to generate random numbers that meet [assignment: a defined quality metric].

Dependencies: No dependencies.

Rationale

See [R11].

6.1.2.3 Rationale

see [R11].

6.1.3 Extended family FMT_LIM - Limited capabilities and availability

6.1.3.1 Description

See [R11].

6.1.3.2 Extended components

Extended component FMT_LIM.1

Description

See [R11].

Definition

FMT_LIM.1 Limited capabilities

FMT_LIM.1.1 The TSF shall be designed in a manner that limits their capabilities so that in conjunction with "Limited availability (FMT_LIM.2)" the following policy is enforced [assignment: Limited capability and availability policy].

Dependencies: (FMT_LIM.2)

Rationale

See [R11].

Extended component FMT_LIM.2

Description

See [R11].

Definition

FMT_LIM.2 Limited availability

FMT_LIM.2.1 The TSF shall be designed in a manner that limits their availability so that in conjunction with "Limited capabilities (FMT_LIM.1)" the following policy is enforced [assignment: Limited capability and availability policy].

Dependencies: (FMT_LIM.1)

Rationale

See [R11].

6.1.3.3 Rationale

See [R11].

6.1.4 Extended family FPT_EMSEC - TOE Emanation

6.1.4.1 Description

See [R11].

6.1.4.2 Extended components

Extended component FPT_EMSEC.1

Description

See [R11].

Definition

FPT_EMSEC.1 TOE Emanation

FPT_EMSEC.1.1 The TOE shall not emit [assignment: types of emissions] in excess of [assignment: specified limits] enabling access to [assignment: list of types of TSF data] and [assignment: list of types of user data].

FPT_EMSEC.1.2 The TSF shall ensure [assignment: type of users] are unable to use the following interface [assignment: type of connection] to gain access to [assignment: list of types of TSF data] and [assignment: list of types of user data].

Dependencies: No dependencies.

Rationale

See [R11].

6.1.4.3 Rationale

See [R11].

6.1.5 Extended family FIA_API - Authentication Proof of Identity

6.1.5.1 Description

See [R11]§5.3 for more details.

6.1.5.2 Extended components

Extended component FIA_API.1

Description

See [R11]§5.3 for more details.

Definition

FIA_API.1 Authentication Proof of Identity

FIA_API.1.1 The TSF shall provide a [assignment: authentication mechanism] to prove the identity of the [assignment: authorized user or role].

Dependencies: No dependencies.

Rationale

See [R11]§5.3 for more details.

6.1.5.3 Rationale

See [R11]§5.3 for more details.

7 Security Functional Requirements

7.1 Security Functional Requirements

Definitions of security attributes, keys and certificated referred in this section can be foun din [R11]§6.

7.1.1 PP EAC

FAU_SAS.1 Audit storage

FAU_SAS.1.1 The TSF shall provide **the Manufacturer** with the capability to store **the IC Identification Data** in the audit records.

FCS_CKM.1 Cryptographic key generation

FCS_CKM.1.1 The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm **Diffie Hellman or Elliptic Curve Diffie Hellmann** and specified cryptographic key sizes **112 bits** that meet the following: **[R4], Annex A.1**.

FCS_CKM.4 Cryptographic key destruction

FCS_CKM.4.1 The TSF shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method **zeroisation** that meets the following: **none**.

FCS_COP.1/SHA Cryptographic operation

FCS_COP.1.1/SHA The TSF shall perform **hashing** in accordance with a specified cryptographic algorithm **SHA-1, SHA-224, SHA-256 and SHA-384** and cryptographic key sizes **none** that meet the following: **FIPS 180-2**.

FCS_COP.1/SYM Cryptographic operation

FCS_COP.1.1/SYM The TSF shall perform **secure messaging - encryption and decryption** in accordance with a specified cryptographic algorithm **Triple-DES** and cryptographic key sizes **112 bits** that meet the following: **TR-03110 [R4]**.

FCS_COP.1/MAC Cryptographic operation

FCS_COP.1.1/MAC The TSF shall perform **secure messaging - message authentication code**

in accordance with a specified cryptographic algorithm **MAC Algo 3** and cryptographic key sizes **112 bits** that meet the following: **TR-03110 [R4]**.

FCS_COP.1/SIG_VER Cryptographic operation

FCS_COP.1.1/SIG_VER The TSF shall perform **digital signature verification** in accordance with a specified cryptographic algorithm **RSASSA-PKCS1-v1_5 or RSASSA-PSS or ECDSA with SHA algorithms as specified in FCS_COP.1/SHA** and cryptographic key sizes

- **1024 to 2048 bits (by steps of 256 bits) for RSA,**
- **192 to 521 bits over characteristic p curves for ECDSA**

that meet the following:

- **[R24] and [R24] for RSASSA,**
- **[R17], [R18], [R19] for ECDSA**.

FCS_RND.1 Quality metric for random numbers

FCS_RND.1.1 The TSF shall provide a mechanism to generate random numbers that meet **the requirement to provide an entropy of at least 7.976 bits in each byte, following AIS 31 [R31]**.

FIA_UID.1 Timing of identification

FIA_UID.1.1 The TSF shall allow

- **1. to establish the communication channel,**
- **2. to read the Initialization Data if it is not disabled by TSF according to FMT_MTD.1/INI_DIS,**
- **3. to carry out the Chip Authentication Protocol,**

on behalf of the user to be performed before the user is identified.

FIA_UID.1.2 The TSF shall require each user to be successfully identified before allowing any other TSF-mediated actions on behalf of that user.

FIA_UAU.1 Timing of authentication

FIA_UAU.1.1 The TSF shall allow

- **1. to establish the communication channel,**
- **2. to read the Initialization Data if it is not disabled by TSF according to FMT_MTD.1/INI_DIS,**

- **3. to identify themselves by selection of the authentication key,**
- **4. to carry out the Chip Authentication Protocol,**

on behalf of the user to be performed before the user is authenticated.

FIA_UAU.1.2 The TSF shall require each user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user.

FIA_UAU.4 Single-use authentication mechanisms

FIA_UAU.4.1 The TSF shall prevent reuse of authentication data related to

- **1. Terminal Authentication Protocol,**
- **2. Authentication Mechanisms based on Triple-DES and AES**.

FIA_UAU.5 Multiple authentication mechanisms

FIA_UAU.5.1 The TSF shall provide

- **1. Terminal Authentication Protocol,**
- **2. Secure messaging in MAC-ENC mode,**
- **3. Symmetric Authentication Mechanism based on Triple-DES and AES**

to support user authentication.

FIA_UAU.5.2 The TSF shall authenticate any user's claimed identity according to the

- **1. The TOE accepts the authentication attempt as Personalization Agent by**
  - **the Symmetric Authentication Mechanism with Personalization Agent Key,**
- **2. After run of the Chip Authentication Protocol the TOE accepts only received commands with correct message authentication code sent by means of secure messaging with key agreed with the terminal by means of the Chip Authentication Mechanism,**
- **3. The TOE accepts the authentication attempt by means of the Terminal Authentication Protocol only if the terminal uses the public key presented during the Chip Authentication Protocol and the secure messaging established by the Chip Authentication Mechanism**.

FIA_UAU.6 Re-authenticating

FIA_UAU.6.1 The TSF shall re-authenticate the user under the conditions **each command sent to the TOE after successful run of the Chip Authentication Protocol shall be verified as being sent by the GIS**.

FIA_API.1 Authentication Proof of Identity

FIA_API.1.1 The TSF shall provide a **Chip Authentication Protocol according to [R4]** to prove the identity of the **TOE**.

FDP_ACC.1 Subset access control

FDP_ACC.1.1 The TSF shall enforce the **Access Control SFP** on **terminals gaining write, read and modification access to data in the EF.COM, EF.SOD, EF.DG1 to EF.DG16 and Active Authentication private key of the logical MRTD**.

FDP_ACF.1 Security attribute based access control

FDP_ACF.1.1 The TSF shall enforce the **Basic Access Control SFP** to objects based on the following:

- **1. Subjects:**
  - **a. Personalization Agent,**
  - **b. Extended Inspection System,**
  - **c. Terminal,**
- **2. Objects:**
  - **a. data EF.DG1, EF.DG2 and EF.DG5 to EF.DG16 of the logical MRTD,**
  - **b. data EF.DG3 and EF.DG4 of the logical MRTD,**
  - **c. data in EF.COM,**
  - **d. data in EF.SOD,**
  - **e. Active Authentication public key,**
- **3. Security attributes:**
  - **a. authentication status of terminals,**
  - **b. Terminal Authorization**.

FDP_ACF.1.2 The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed:

- **1. the successfully authenticated Personalization Agent is allowed to write and to read the data of the EF.COM, EF.SOD, EF.DG1 to EF.DG16 of the logical MRTD, including the Active Authenticate public Key,**
- **2. the successfully authenticated Extended Inspection System with the Read access to DG3 (Fingerprint) granted by the relative certificate holder authorization encoding is allowed to read the data in EF.DG3 of the logical MRTD.**
- **3. the successfully authenticated Extended Inspection System with the Read access to DG4 (Iris) granted by the relative certificate holder authorization encoding is allowed to read the data in EF.DG4 of the logical MRTD**.

FDP_ACF.1.3 The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: **none**.

FDP_ACF.1.4 The TSF shall explicitly deny access of subjects to objects based on the following additional rules:

- **1. A terminal authenticated as CVCA is not allowed to read data in the EF.DG3,**
- **2. A terminal authenticated as CVCA is not allowed to read data in the EF.DG4,**
- **3. A terminal authenticated as DV is not allowed to read data in the EF.DG3,**
- **4. A terminal authenticated as DV is not allowed to read data in the EF.DG4,**
- **5. Any terminal is not allowed to modify any of the EF.DG1 to EF.DG16 of the logical MRTD,**
- **6. Any terminal not being successfully authenticated as Extended Inspection System is not allowed to read any of the EF.DG3 to EF.DG4 of the logical MRTD**.

FDP_UCT.1 Basic data exchange confidentiality

FDP_UCT.1.1 [Editorially Refined] The TSF shall enforce the **Access Control SFP** to **transmit and receive** user data in a manner protected from unauthorised disclosure **after Chip Authentication**.

FDP_UIT.1 Data exchange integrity

FDP_UIT.1.1 [Editorially Refined] The TSF shall enforce the **Access Control SFP** to **transmit and receive** user data in a manner protected from **modification, deletion, insertion and replay** errors **after Chip Authentication**.

FDP_UIT.1.2 [Editorially Refined] The TSF shall be able to determine on receipt of user data, whether **modification, deletion, insertion and replay** has occurred **after Chip Authentication**.

FMT_SMF.1 Specification of Management Functions

FMT_SMF.1.1 The TSF shall be capable of performing the following management functions:

- **1. Initialization,**
- **2. Pre-personalization,**
- **3. Personalization**.

FMT_SMR.1 Security roles

FMT_SMR.1.1 The TSF shall maintain the roles

- **1. Manufacturer,**
- **2. Personalization Agent,**

- **3. Country Verifying Certification Authority,**
- **4. Document Verifier,**
- **5. Domestic Extended Inspection System,**
- **6. Foreign Extended Inspection System**.

FMT_SMR.1.2 The TSF shall be able to associate users with roles.

FMT_LIM.1 Limited capabilities

FMT_LIM.1.1 The TSF shall be designed in a manner that limits their capabilities so that in conjunction with "Limited availability (FMT_LIM.2)" the following policy is enforced**:**

Deploying Test Features after TOE Delivery does not allow

- **1. User Data to be manipulated,**
- **2. sensitive User Data (EF.DG3 and EF.DG4) to be disclosed,**
- **3. TSF data to be disclosed or manipulated,**
- **4. software to be reconstructed and,**
- **5. substantial information about construction of TSF to be gathered which may enable other attacks**.

FMT_LIM.2 Limited availability

FMT_LIM.2.1 The TSF shall be designed in a manner that limits their availability so that in conjunction with "Limited capabilities (FMT_LIM.1)" the following policy is enforced**:**

Deploying Test Features after TOE Delivery does not allow

- **1. User Data to be manipulated,**
- **2. sensitive User Data (EF.DG3 and EF.DG4) to be disclosed,**
- **3. TSF data to be disclosed or manipulated,**
- **4. software to be reconstructed and,**
- **5. substantial information about construction of TSF to be gathered which may enable other attacks**.

FMT_MTD.1/INI_ENA Management of TSF data

FMT_MTD.1.1/INI_ENA The TSF shall restrict the ability to **write** the **the Initialization Data and Prepersonalization Data** to **the Manufacturer**.

FMT_MTD.1/INI_DIS Management of TSF data

FMT_MTD.1.1/INI_DIS The TSF shall restrict the ability to **disable read access for users to** the **Initialization Data** to **the Personalization Agent**.

FMT_MTD.1/CVCA_INI Management of TSF data

FMT_MTD.1.1/CVCA_INI The TSF shall restrict the ability to **write** the

- **1. initial Country Verifying Certification Authority Public Key,**
- **2. initial Country Verifying Certification Authority Certificate,**
- **3. initial Current Date**

to **the Personalization Agent**.

FMT_MTD.1/CVCA_UPD Management of TSF data

FMT_MTD.1.1/CVCA_UPD The TSF shall restrict the ability to **update** the

- **1. Country Verifying Certification Authority Public Key,**
- **2. Country Verifying Certification Authority Certificate**

to **Country Verifying Certification Authority**.

FMT_MTD.1/DATE Management of TSF data

FMT_MTD.1.1/DATE The TSF shall restrict the ability to **modify** the **Current date** to

- **1. Country Verifying Certification Authority,**
- **2. Document Verifier,**
- **3. domestic Extended Inspection System**.

FMT_MTD.1/KEY_WRITE Management of TSF data

FMT_MTD.1.1/KEY_WRITE The TSF shall restrict the ability to **write** the **Document Basic Access Keys and Active Authentication private key** to **Personalization Agent**.

FMT_MTD.1/CAPK Management of TSF data

FMT_MTD.1.1/CAPK The TSF shall restrict the ability to **create and load** the **Chip Authentication Private Key** to **respectively the Manufacturer Agent and the Personalization Agent**.

FMT_MTD.1/KEY_READ Management of TSF data

FMT_MTD.1.1/KEY_READ The TSF shall restrict the ability to **read** the

- **1. Document Basic Access keys,**
- **2. Chip Authentication Private key,**
- **3. Personalization Agent Keys,**
- **4. Active Authentication private key**

to **none**.

FMT_MTD.3 Secure TSF data

FMT_MTD.3.1 [Editorially Refined] The TSF shall ensure that only secure values **of the certificate chain** are accepted for **TSF data of the Terminal Authentication Protocol and the Access Control**.

Refinement:

The certificate chain is valid if and only if

- (1) the digital signature of the Inspection System Certificate can be verified as correct with the public key of the Document Verifier Certificate and the expiration date of the Inspection System Certificate is not before the Current Date of the TOE,
- (2) the digital signature of the Document Verifier Certificate can be verified as correct with the public key in the Certificate of the Country Verifying Certification Authority and the expiration date of the Document Verifier Certificate is not before the Current Date of the TOE,
- (3) the digital signature of the Certificate of the Country Verifying Certification Authority can be verified as correct with the public key of the Country Verifying Certification Authority known to the TOE and the expiration date of the Certificate of the Country Verifying Certification Authority is not before the Current Date of the TOE.

The Inspection System Public Key contained in the Inspection System Certificate in a valid certificate chain is a secure value for the authentication reference data of the Extended Inspection System.

The intersection of the Certificate Holder Authorizations contained in the certificates of a valid certificate chain is a secure value for Terminal Authorization of a successful authenticated Extended Inspection System.

FPT_EMSEC.1 TOE Emanation

FPT_EMSEC.1.1 The TOE shall not emit **power variations, timing variations during command execution** in excess of **non useful information** enabling access to **Personalization Agent Keys** and **Active Authentication private key**.

FPT_EMSEC.1.2 The TSF shall ensure **any users** are unable to use the following interface **smart card circuit contacts** to gain access to **Personalization Agent Keys** and **Active Authentication private key**.

FPT_FLS.1 Failure with preservation of secure state

FPT_FLS.1.1 The TSF shall preserve a secure state when the following types of failures occur:

- **1. Exposure to out-of-range operating conditions where therefore a malfunction could occur,**
- **2. failure detected by TSF according to FPT_TST.1**.

FPT_TST.1 TSF testing

FPT_TST.1.1 The TSF shall run a suite of self tests **during initial start-up (at each power on) or at first use** to demonstrate the correct operation of **the TSF**.

FPT_TST.1.2 The TSF shall provide authorised users with the capability to verify the integrity of **TSF data**.

FPT_TST.1.3 The TSF shall provide authorised users with the capability to verify the integrity of **TSF executable code**.

FPT_PHP.3 Resistance to physical attack

FPT_PHP.3.1 The TSF shall resist **physical manipulation and physical probing** to the **TSF** by responding automatically such that the SFRs are always enforced.

7.1.2 Active Authentication (AA)

FDP_DAU.1/AA Basic Data Authentication

FDP_DAU.1.1/AA The TSF shall provide a capability to generate evidence that can be used as a guarantee of the validity of **the TOE itself**.

FDP_DAU.1.2/AA The TSF shall provide **any users** with the ability to verify evidence of the validity of the indicated information.

Refinement:

Evidence generation and ability of verfying it, constitute the Active Authentication protocol.

FCS_COP.1/SIG_MRTD Cryptographic operation

FCS_COP.1.1/SIG_MRTD The TSF shall perform **digital signature creation** in accordance with a specified cryptographic algorithm **Triple-DES, AES, RSA CRT or ECDSA with SHA1, SHA-224, SHA-256 or SHA-384** and cryptographic key sizes

- **112 bits for Triple-DES,**

- **256 bits for AES,**
- **1024 to 2048 bits for RSA CRT (by steps of 512 bits),**
- **192 to 512 bits for ECDSA,**

that meet the following:

- **[R32] for Triple DES and AES,**
- **scheme 1 of [R20] for RSA CRT,**
- **[R17], [R18], [R19] for ECC**.

FDP_ITC.1/AA Import of user data without security attributes

FDP_ITC.1.1/AA The TSF shall enforce the **Basic Access Control SFP** when importing user data, controlled under the SFP, from outside of the TOE.

FDP_ITC.1.2/AA The TSF shall ignore any security attributes associated with the user data when imported from outside the TOE.

FDP_ITC.1.3/AA The TSF shall enforce the following rules when importing user data controlled under the SFP from outside the TOE: **none**.

FMT_MOF.1/AA Management of security functions behaviour

FMT_MOF.1.1/AA The TSF shall restrict the ability to **disable and enable** the functions **TSF Active Authentication** to **Personalization Agent**.

FCS_CKM.1/ASYM Cryptographic key generation

FCS_CKM.1.1/ASYM The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm **Triple-DES, AES, RSA and ECC** and specified cryptographic key sizes

- **112 bits for Triple-DES,**
- **256 bits for AES,**
- **1024 to 2048 for RSA (by steps of 512 bits),**
- **192b to 512 bits over characteristic p curves for ECC**

that meet the following: **[R20], [R21], [R22], [R23]**.

7.2 Security Assurance Requirements

The security assurance requirement level is EAL4 augmented with AVA_VAN.5 and ALC_DVS.2.

8 TOE Summary Specification

8.1 TOE Summary Specification

Access Control in reading

This function controls access to read functions (in EEPROM) and enforces the security policy for data retrieval. Prior to any data retrieval, it authenticates the actor trying to access the data, and checks the access conditions are fulfilled as well as the life cycle state.

It ensures that at any time, the keys are never readable:

- BAC keys,
- Chip authentication keys,
- CVCA keys,
- Active Authentication secret/private key,
- Personalisation agent keys.

It controls access to the CPLC data as well:

- It ensures the CPLC data can be read during the personalization phase,
- It ensures it can not be readable in free mode at the end of the personalization step.

Regarding the file structure:

In the operational use:

- The terminal can read user data (except DG3 & 4), the Document Security Object, the EF.CVCA, EF.COM only after BAC authentication and throught a valid secure channel,
- When the EAC was successfully performed, The terminal can only read the DG3 & 4 provided the access rights are sufficient throught a valid secure channel.

In the personalisation phase:

- The personalisation agent can read all the data stored in the TOE after it is authenticated by the TOE (using its authentication keys).
- The TOE is uniquely identified by a random number, generated at each reset. This unique identifier is called (PUPI)

It ensures as well that no other part of the EEPROM can be accessed at anytime.

Access Control in writing

This function controls access to write functions (in EEPROM) and enforces the security policy for data writing. Prior to any data update, it authenticates the actor, and checks the access conditions are fulfilled as well as the life cycle state.

This security functionality ensures the application locks can only be written once in personalization phase to be set to "1".

It ensures as well the CPLC data can not be written anymore once the TOE is personalized and that it is not possible to load an optional code or change the personnaliser authentication keys in personalization phase.

Regarding the file structure

In the operational use: It is not possible to create any files (system or data files). Furthermore, it is not possible to update any system files. However

- the application data is still accessed internally by the application for its own needs,

- the Root CVCA key files and temporary key files are updated internally by the application according to the authentication mechanism described in [R4].

In the personalisation phase

- The personalisation agent can create and write through a valid secure channel all the data files it needs after it is authenticated by the TOE (using its authentication keys).

EAC mechanism

This security functionality ensures the EAC is correctly performed. In particular,

- it handles the certificate verification,
- the management of access rights to DG3 & DG4,
- the management of the current date (update and control towards the expiration date of the incoming certificate),
- the signature verification (in the certificate or in the challenge/response mechanism).

It can only be performed once the TOE is personalized with the chip authentication keys & Root CVCA key(s) the Personnalization Agent loaded during the personalization phase. Furthermore, this security functionalities ensures the authentication is performed as described in [R4].

This security functionality ensures the session keys for secure messaging are destroyed at each successful Chip Authentication step.

The TOE handles an error counter; after several failure in attempting to strongly authenticate the GIS (the error limit is reached). The TOE also implements countermeasures to protect the TOE; it takes more and more time for the TOE to reply to subsequent wrong GIS authentication attempts.

Secure Messaging

This security functionality ensures the confidentiality & integrity of the channel the TOE and the IFD are using to communicate.

After a successful BAC authentication and successful Chip authentication, a secure channel is (re)established based on Triple DES algorithms.

This security functionality ensures

- No commands were inserted nor deleted within the data flow,
- No commands were modified,
- The data exchanged remain confidential,
- The issuer of the incoming commands and the destinatory of the outgoing data is the one that was authenticated (through BAC or EAC).

If an error occurs in the secure messaging layer, the session keys are destroyed.

Personalisation Agent Authentication

This security functionality ensures the TOE, when delivered to the Personnalization Agent, demands an authentication prior to any data exchange. This authentication is based on a symmetric Authentication mechanism based on a Triple DES or AES algorithm.

Active Authentication

This security functionality ensures the Active Authentication is performed as described in [R1], [R2] and [R32]. (if it is activated by the personnalizer). Moreover, this security functionality is protected against the DFA.

Note that if symmetric keys are used (3DES or AES-256), the key is stored in DG15 and this read access to this DG become forbidden.

Self tests

The TOE performs self tests on the TSF data it stores to protect the TOE.

When needed, at each start up or before first use, a self test of each hardware functional module is done. SHA, RSA, AES, DES, ECC and RNG implement a know calculus and checks if the result is correct.

The integrity of the highly sensitive containers is monitored each time they are accessed and the integrity of the optional code is checked each time the TOE is powered on.

Safe state management

This security functionalities ensures that the TOE gets back to a secure state when

- An integrity error is detected by F.SELFTESTS,
- A tearing occurs (during a copy of data in EEPROM).

This security functionality ensures that such a case occurs, the TOE is either switched in the state "kill card" or becomes mute.

Physical protection

This security functionality protects the TOE against physical attacks.

9 PP Claims

9.1 PP reference

The PP EAC in CC3.1 [R11] is claimed.

9.2 PP additions

The additional functionalities are the Active Authentication (AA) based on the ICAO PKI V1.1 and the related on-card generation of RSA and ECC keys. It implies some addition to the standard PP.

The following SFRs are added to the standard PP for the AA feature:

- FCS_COP.1 / SIG_MRTD
- FDP_DAU.1 / AA
- FDP_ITC.1 / AA
- FMT_MOF.1 / AA
- FCS_CKM.1 / ASYM

The following Objective for the TOE is added to the standard PP for the AA feature:

- OT.Chip_authenticity “Protection against forgery”

Moreover, some complementary OSPs are introduced:

- P.Sensitive_Data_Protection “Protection of sensitive data”
- P.Key_Function “Design of the cryptographic routines in order to protect the keys”

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[R23] AMERICAN NATIONAL STANDARD X9.62-1998: Public Key Cryptography For The Financial Services Industry (rDSA), 9 septembre 1998

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11 ACRONYMS

AA	Active Authentication
BAC	Basic Access Control
CC	Common Criteria Version 3.1 revision 3
CPLC	Card personalisation life cycle
DF	Dedicated File
DFA	Differential Fault Analysis
DG	Data Group
EAL	Evaluation Assurance Level
EF	Elementary File
EFID	File Identifier
DES	Digital encryption standard
DH	Diffie Hellmann
I/0	Input/Output
IC	Integrated Circuit
ICAO	International Civil Aviation organization
ICC	Integrated Circuit Card
IFD	Interface device
LDS	Logical Data structure
MF	Master File
MRTD	Machine readable Travel Document
MRZ	Machine readable Zone
MSK	Manufacturer Secret Key
OS	Operating System
PKI	Public Key Infrastructure
PP	Protection Profile
SFI	Short File identifier
SHA	Secure hashing Algorithm
SOD	Security object Data
TOE	Target of Evaluation
TSF	TOE Security function

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