



ID-One ePass Full EAC v2 MRTD  
in EAC configuration with AA on NXP P60x080 PVC/PVG  
Public Security Target

FQR No: 110 7960

FQR Issue: 2

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## Document Management

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### A. Identification

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## 1 SECURITY TARGET INTRODUCTION

### 1.1 Purpose

The objective of this document is to present the Public Security Target of the ID-One ePass Full EAC v2 MRTD in EAC configuration with AA on NXP P60x080 PVC/PVG.

### 1.2 Objective of the security target

This security target describes the security needs for ID-One ePass Full EAC v2 MRTD product. The product is conforming to PP EAC and adds requirements for prepersonalization and personalization.

This security target aims to satisfy the requirements of Common Criteria level EAL5 augmented as defined in §1.3 in defining the security enforcing functions of the Target Of Evaluation and describing the environment in which it operates.

The objectives of this Security Target are:

- To describe the Target of Evaluation (TOE), its life cycle and to position it in the smart card life cycle.
- To describe the security environment of the TOE including the assets to be protected and the threats to be countered by the TOE and by the operational environment during the platform active phases.
- To describe the security objectives of the TOE and its supporting environment in terms of integrity and confidentiality of sensitive information. It includes protection of the TOE (and its documentation) during the product active phases.
- To specify the security requirements which include the TOE functional requirements, the TOE assurance requirements and the security requirements for the environment.
- To describe the summary of the TOE specification including a description of the security functions and assurance measures that meet the TOE security requirements.
- To present evidence that this ST is a complete and cohesive set of requirements that the TOE provides on an effective set of IT security countermeasures within the security environment, and that the TOE summary specification addresses the requirements.

### 1.3 Security target identification

<b>Title:</b>	<b>MINOS -- ID-One ePass Full EAC v2 MRTD in EAC configuration with AA on NXP P60x080 PVC/PVG – Security Target</b>
Editor:	Oberthur Technologies
CC version:	3.1 revision 4
EAL:	EAL5 augmented with: <ul style="list-style-type: none"> <li>- ALC_DVS.2</li> <li>- AVA_VAN.5</li> </ul>
PP(s):	BSI-CC-PP-056 [R12]
ST Reference:	FQR 110 7882 Issue 2
ITSEF:	LETI
Certification Body:	ANSSI
Evaluation scheme:	FR

**Table 1 - General Identification**

## 1.4 TOE technical identification

<b>Product name:</b>	<b>ID-One ePass Full EAC v2</b>
<b>Commercial name of the TOE 1:</b>	<b>ID-One ePass Full EAC v2 MRTD in EAC configuration with AA on P60x080 PVC/PVG</b>
IC type	'6C14' (P60D080 VC) '6014' (P60D080 VG) '6019' (P60C080 VG)
Additional code 1 Mandatory generic Identification:	'082456FF412E4D1EC087005B56A9A2CAC0B6558F4CAA041D8B5A69345559B562A6F4C8E'
Additional code 2 Optional DBI Identification:	'082844FFE339C30BC6A81162413612FE2698284FA6CD28AA5CF5257A20B83611E58E9BEE'
Guidance documents	MINOS - ID-One ePass Full EAC v2 MRTD in EAC configuration with AA - Guidance Document - PREparative procedures FQR 110 7927 Issue 2  MINOS - MRTD full EAC v2 - Guidance Document - OPERational user guidance FQR 110 7565 Issue 3

**Table 2 - TOE Technical Identification**

### Nota Bene

- The additional code is encrypted with the LSK key
- An optional additional code (functional) can be loaded. This additional code, relative to the Digitally Blurred Image process (DBI) is part of the product, but not in the scope of the evaluation.

## 1.5 IC identification

IC Reference:	NXP P60 chips
TOE:	NXP P60x080/052/040 PVC/PVG <b>[R18]</b> EAL 6 + AVA_VAN.5 + ALC_DVS.2 + ASE_TSS.2
Communication protocol:	Contact, Contactless and Dual
Memory:	ROM
Chip Manufacturer:	NXP Semiconductors

**Table 3 - Chip Identification**

## 2 TOE OVERVIEW

### 2.1 Product overview

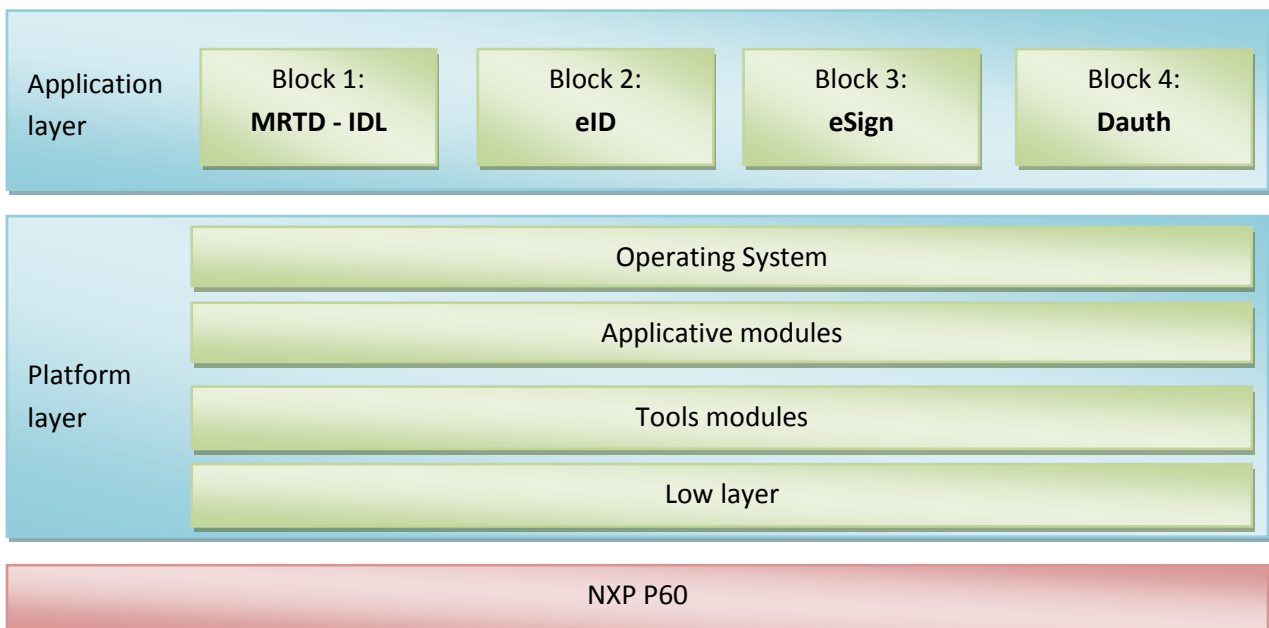
The product **ID-One Native eDoc** is a multi-applicative native software, embeddable in contact and/or contact-less smart card integrated circuits of different form factors. The product can be configured to serve different use cases, during the **Prepersonalization/personalization phases** of the product. For more information on the product, please refer to complete ST.

The product supports the storage and retrieval of structured information compliant to the Logical Data Structure as specified in **[R2]**. It also provides standard authentication protocols, namely Basic Access Control **[R11]**, Supplementary Access Control **[R17]**, Active Authentication **[R38]**, Extended Access Control **([R12] and [R13])**, the Basic Access Protection **[R9]** and Extended Access Protection (compliant to **[R9]**).

It can host four types of applications as mentioned above, namely the IDL, **MRTD**, eID and eSign. Moreover, further configuration may also be done to each type of application to serve use cases other than those behaviourally defined in the referenced normative documents.

This product is embedded on the ICs described in §1.5 IC identification.

The **ID-One Native eDoc** architecture can be viewed as shown in the following picture:



**Figure 1 - ID-One Native eDoc Overview**

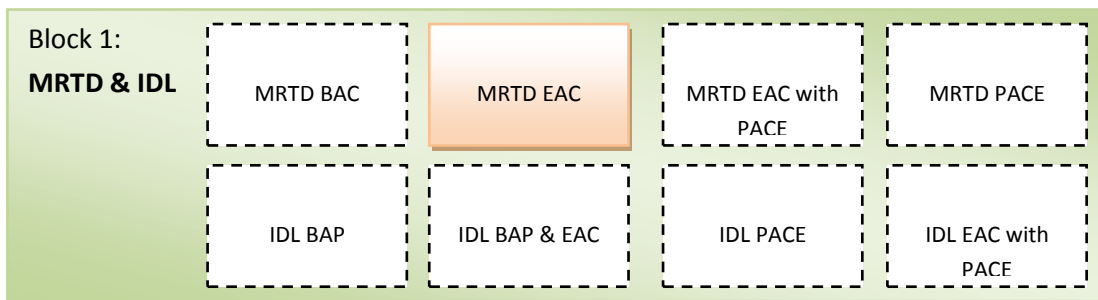
## 2.2 TOE overview

The TOE described in this security target is the EAC with AA TOE of the product, a subset of the Block 1 MRTD - IDL.

The block 1 of the ID-One Native eDoc is composed of the following applications:

Applications	PP	Targeted EAL
<b>MRTD</b>		
BAC with CA and AA	[R11]	EAL4 + ADV_FSP.5 + ADV_INT.2 + ADV_TDS.4 + ALC_DVS.2 + ALC_CMS.5 + ALC_TAT.2 + ATE_DPT.3
EAC with AA	[R12]	EAL5 + ALC_DVS.2 + AVA_VAN.5
EAC with PACE and AA	[R13]	EAL5 + ALC_DVS.2 + AVA_VAN.5
PACE, with CA, PACE_CAM and AA	[R14]	EAL5 + ALC_DVS.2 + AVA_VAN.5
<b>IDL</b>		
BAP	X	EAL4 + ADV_FSP.5 + ADV_INT.2 + ADV_TDS.4 + ALC_DVS.2 + ALC_CMS.5 + ALC_TAT.2 + ATE_DPT.3
EAC and BAP	X	EAL5 + ALC_DVS.2 + AVA_VAN.5
PACE	X	EAL5 + ALC_DVS.2 + AVA_VAN.5
PACE and EAC	X	EAL5 + ALC_DVS.2 + AVA_VAN.5

**Table 4 - Block 1 Applications overview**



**Figure 2 - Block 1 Overview**

The EAC with AA TOE is instantiated during the product prepersonalization, using the operating system that creates the MF / DF required for the EAC configuration.

The TOE life cycle is described in §4 TOE life cycle.

The TOE identification is described in §1.4 TOE technical identification.

#### **Nota bene**

The TOE scope encompasses the following features:

- Extended Access Control with Chip Authentication and Terminal Authentication
- Active Authentication
- Prepersonalization phase (in particular with Additional code loading)
- Personalization phase

Nevertheless, the TOE can embed other secure functionalities, but they are not in the scope of this TOE and subject to an evaluation in other TOEs.

## **2.3 TOE usages**

State or organisation issues MRTDs 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 MRTD configuration, verifying authenticity of electronic visa stored on the card and correspondence with the holder.

In order to pass successfully the control, the holder presents its personal MRTD 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 MRTD 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 MRTD 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 MRTD.

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 "visa information"...

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

The MRTD can be viewed as the combination:

- **A physical MRTD** 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 MRTD holder
  - The biographical data on the biographical data page of the passport book
  - The printed data in the Machine-Readable Zone (MRZ) or keydoc area that identifies the device
  - The printed portrait
- **A logical MRTD** as data of the MRTD holder stored according to the Logical Data Structure as specified by ICAO and extended in **[R7], [R8], [R9]** on the contactless integrated circuit. It presents contact or contact-less readable data including (but not limited to) personal data of the MRTD holder
  - The digital Machine Readable Zone Data (digital MRZ data or keydoc data, DG1)
  - The digitized portraits
  - The optional biometric reference data of finger(s) or iris image(s) or both
  - The other data according to LDS (up to DG24)
  - The Document security object

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

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

The logical MRTD 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 MRTD's chip.

## 2.4 TOE definition

The Target of Evaluation (TOE) is the contactless integrated circuit chip of machine readable travel documents (MRTD's chip) programmed according to the Logical Data Structure (LDS) and providing the following features:

- Basic Access Control



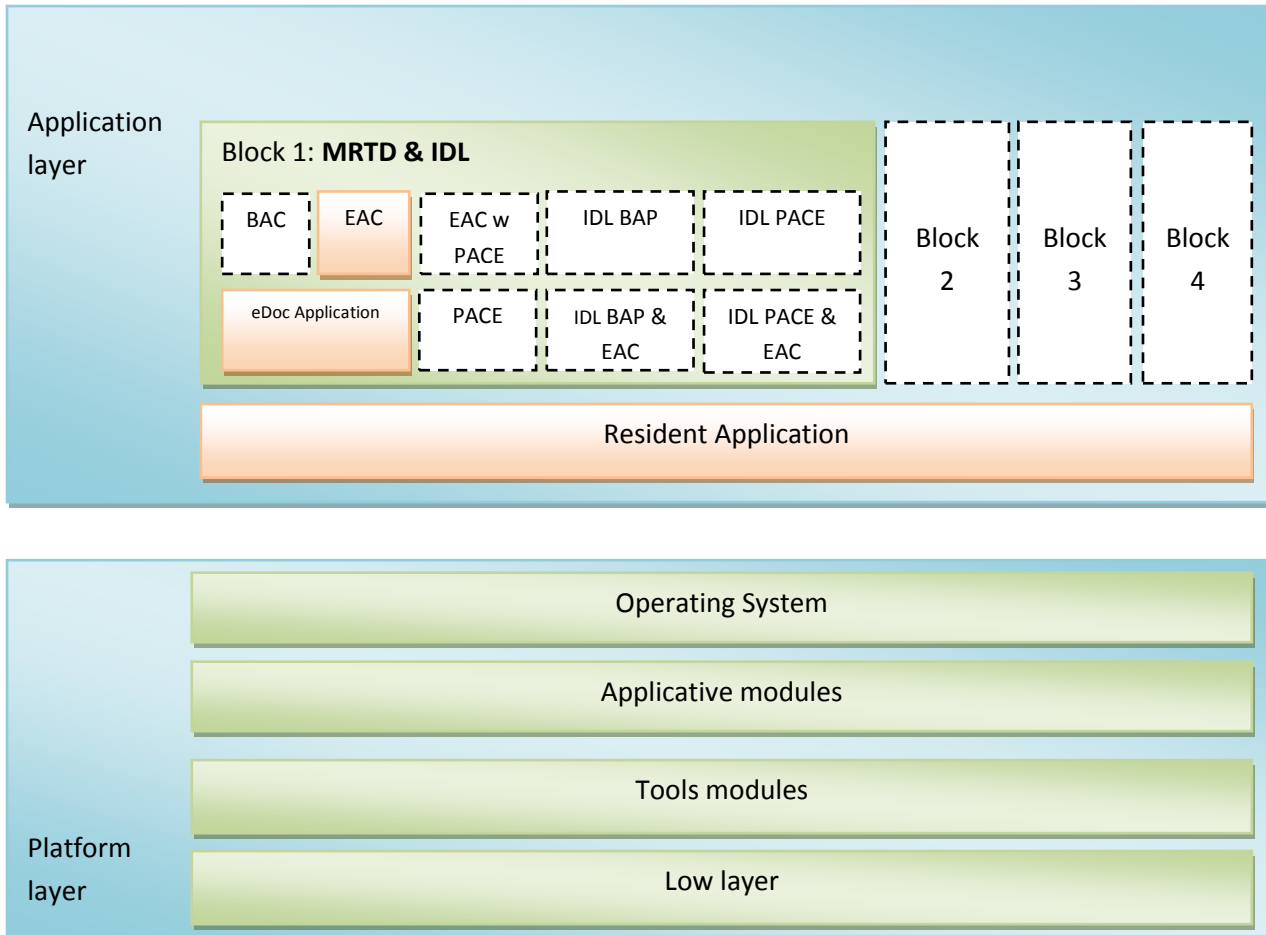
- Active Authentication
- Extended Access Control

The TOE comprises at least:

- Circuitry of the MRTD's chip (the integrated circuit, IC)
- IC Dedicated Software with the parts IC Dedicated Test Software and IC Dedicated Support Software
- IC Embedded Software (operating system)
- MRTD application
- Associated guidance documentation

### 3 TOE ARCHITECTURE

The TOE is a smartcard, composed of various modules and composed of the following components:



**Figure 3 - TOE architecture**

#### 3.1 Integrated Circuit - NXP P60

The TOE is embedded on NXP chips, as presented in **Table 3 - Chip Identification**. More information on the chips are given in the related security targets.

### 3.2 Low layer

The low layer developed by Oberthur Technologies provides an efficient and easy way to access chip features from the applications. Indeed, it is based on services organized according to a multi-layer design which allows applications to use a high level interface completely independent of the chip.

The main features of the OS are the following:

- EEPROM management including secure data processing,
- Other memories management,
- Transaction management,
- APDU protocol management,
- Low level T=0 ; T=1 and T=CL management,
- Error processing,
- Advanced securities activation.

A dedicated cryptographic library has been developed and designed by Oberthur Technologies to provide the highest security level and best tuned performances. It provides the following algorithms:

Cryptographic Feature	Embedded
SHA1, SHA-224, SHA-256, SHA-384 and SHA-512 bits	✓
RSA CRT from 1024, to 4096 bits (by steps of 256 bits): - signature/verification - key pair generation	✓
RSA SFM from 1024 to 4096 bits (by steps of 256 bits): - signature/verification - key pair generation	✓
ECC with key sizes from 192 to 521 bits : - signature/verification (ECDSA) - key agreement (ECDH) - key pair generation	✓
3DES with 112 bits key size	✓
AES with 128, 192, 256 key sizes	✓
Random Generator compliant AIS31	✓
Diffie Hellman from 1024 to 2048 : - key agreement - key generation	✓
Integrated mapping over prime field and Elliptic curves	✓

**Table 5 - OT Cryptographic library**

More information is available in complete ST.

### 3.3 Tools modules

The tools modules provide MRTD full EAC v2 product:

- File system compliant with ISO/IEC 7816-4 and ISO/IEC 7816-9. It is also compliant with ICAO recommendations **[R2]**.
- ISO Secure Messaging as specified in **[R19]** and as described in annex E of **[R40]**.
- PIN and BIO access rights management as presented in § 2.5 of **[R39]** and B.6 of **[R40]**
- Asymmetric Keys Management as storage, signature, verification, DH and generation.
- Symmetric Key management
- Access Control for 'Change MSK' and 'PUT KEY' APDU
- Authentication and secure messaging to be used during Prepersonalization and Personalization phases, based on Global Platform standard

More information is available in complete ST.

### 3.4 Applicative modules

The applicative modules provide MRTD full EAC v2 product:

- Chip Authentication version 1 as described in **[R38]** and version 2 as described in **[R39]**, an ephemeral-static Diffie-Hellman key agreement protocol that provides secure communication and unilateral authentication of the MRTD chip.
- Terminal Authentication version 1 as described in **[R38]** and version 2 as described in **[R39]**, a two move challenge-response protocol that provides explicit unilateral authentication of the terminal.
- PACE Protocol as specified in **[R17]**, a password authenticated Diffie-Hellman key agreement protocol that provides secure communication and explicit password-based authentication of the MRTD chip and the terminal.
- Access Conditions Engine that checks the AC rules attached to an object (file, key, data object) with a current context (CHA, Role ID...). For applications already defined by normative documents such as eMRTD, iDL, eID and eSign, the application embeds ROMed access condition rules.
- Another applicative module is the Digital Blurred Image (DBI) module. It allows the blurring of a JPG or JPEG2000 file stored in a transparent file. This feature is the implementation of patents owned by Oberthur Technologies. This module is part of the TOE and outside the scope of this present certification.

More information is available in complete ST.

### 3.5 Operating System

This application manages the TOE in pre-personalization and personalization phases in order to configure the TOE in the expected way. It implements and control access to Key management (MSK, LSK), File management including data reading and writing or additional code loading. It can be addressed in clear mode for secure environment or non-sensitive commands, using SCP02 or SCP03.

More information is available in complete ST.

### 3.6 Application layer

Two kinds of dispatcher are available on the top of the product: the resident application that is used for Personalization Phase and for administration during Use Phase and the eDoc application that is used during the Use Phase of MRTD Applications.

The application layer also manages protocols available during Use phase such as Basic Access Control Extended Access Control or Active Authentication.

The protocol for Basic Access Control is specified by ICAO **[R2]**. Basic Access Control checks that the terminal has physical access to the MRTD's data page. This is enforced by requiring the terminal to derive an authentication key from the optically read MRZ of the MRTD. The protocol for Basic Access Control is based on ISO/IEC 11770-2 **[R35]** key establishment mechanism 6. This protocol is also used to generate session keys that are used to protect the confidentiality (and integrity) of the transmitted data.

The inspection system:

- Reads the printed data in the MRZ (for MRTD),
- 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.

The protocol for Basic Access Control is specified by ICAO. Basic Access Control checks that the terminal has physical access to the MRTD's data page. This is enforced by requiring the terminal to derive an authentication key from the optically read MRZ of the MRTD. The protocol for Basic Access Control is based on ISO/IEC 11770-2 **[R35]** key establishment mechanism 6. This protocol is also used to generate session keys that are used to protect the confidentiality (and integrity) of the transmitted data.

The Extended Access Control (EAC) enhances the latest 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 data to perform a Match on Terminal comparison. The Extended Access Control authentication steps may be performed either with elliptic curve cryptography, or with RSA cryptography.

This application uses the Chip Authentication and then after the Terminal Authentication.

The Active Authentication of the TOE is an optional feature that may be implemented. It ensures that the TOE has not been “cloned”, by means of a challenge-response protocol between the Inspection System and the TOE. For this purpose the chip contains its own Active Authentication RSA or ECC Key pair. A hash representation of Data Group 15 and optionally 14 (DG14/DG15) containing the Verification Public Key and attributes (algorithm...) is stored in the Document Security Object (SOD) and therefore authenticated by the issuer’s digital signature. The corresponding Private Key is stored in the TOE’s secure memory.

The TOE supports the loading and generation of the Active Authentication RSA or ECC Key pair.

More information is available in complete ST.

## 4 TOE LIFE CYCLE

### 4.1 Life cycle overview

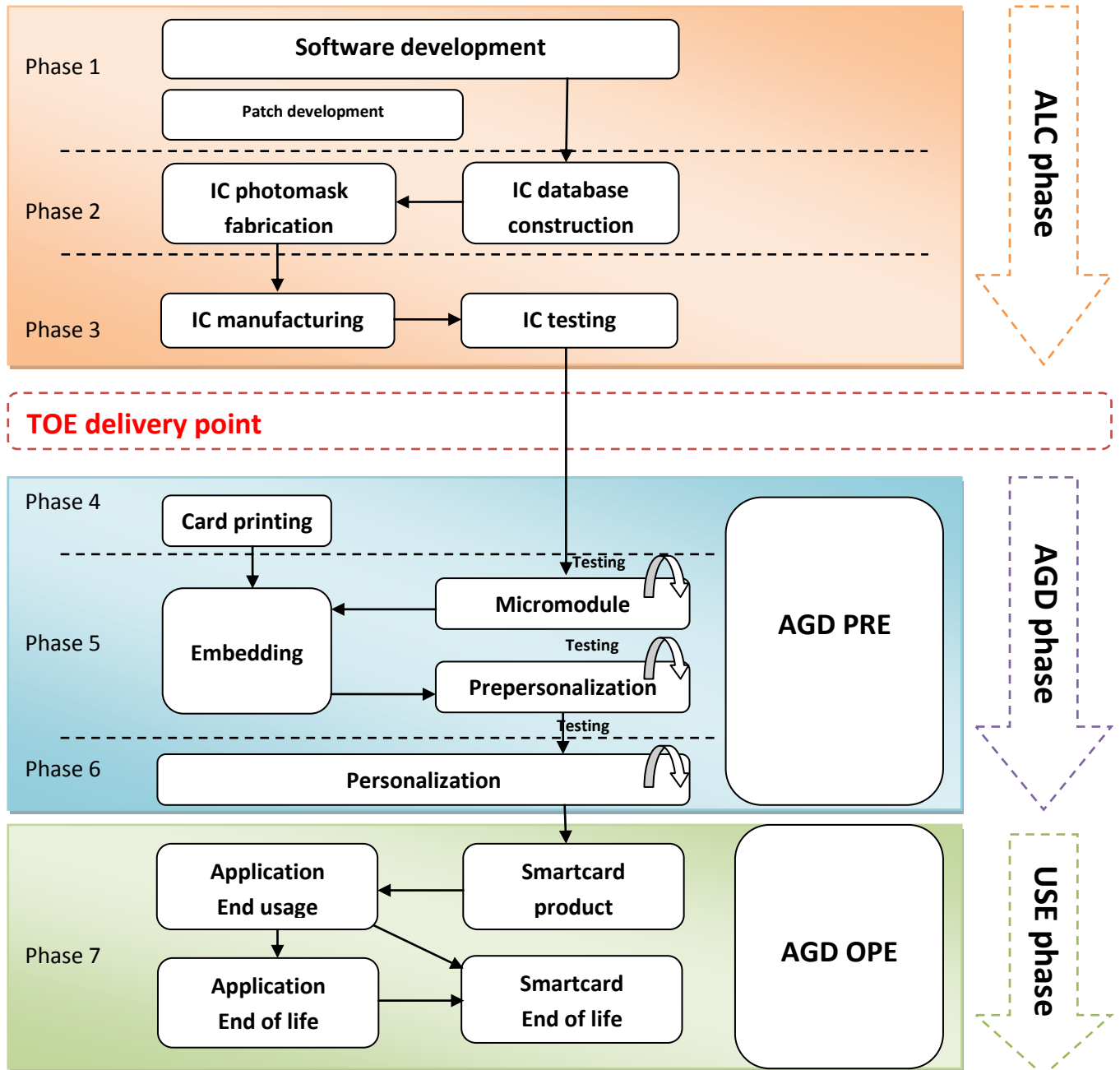


Figure 4: Smartcard product life-cycle for the TOE

The TOE life-cycle is described in terms of four life-cycle phases. (With respect to the [R10], the TOE life-cycle is additionally subdivided into 7 steps.)

Additional codes are identified in §1.5.

The table below presents the TOE role:

Roles	Subject
IC developer	NXP Semiconductors
IC manufacturer	NXP Semiconductors
TOE developer	Oberthur Technologies
Manufacturer	NXP Semiconductors Oberthur Technologies or another agent
Prepersonalizer	Oberthur Technologies or another agent
Personalization Agent	Oberthur Technologies or another agent

**Table 6 - Roles identification on the life cycle**

The table below presents the subjects following TOE life cycle steps in accordance with the standard smart card life cycle [R10], the Protection Profile lifecycle in phases, the TOE delivery point and the coverage:

Steps	Phase	Subject	Covered by	
Step 1	Development	Oberthur Technologies	ALC R&D sites	Pessac and Colombes
Step 2	Development	NXP Semiconductors	IC certification	IC certification
Step 3	Manufacturing	NXP Semiconductors	IC certification	IC certification
<b>TOE delivery point</b>				
Step 4	Manufacturing	MRD Manufacturer (Prepersonalizer)	AGD_PRE	
Step 5	Manufacturing	MRD Manufacturer (Prepersonalizer)	AGD_PRE	
Step 6	Personalization	Personalization Agent	AGD_PRE	
Step 7	Operational Use	End user	AGD_OPE	

**Table 7 - Subjects identification following life cycle steps**



## 4.2 Phase 1 “Development”

(Step1) The TOE is developed in phase 1. The IC developer develops the integrated circuit, the IC Dedicated Software and the guidance documentation associated with these TOE components.

(Step2) The TOE developer uses the guidance documentation for the integrated circuit and the guidance documentation for relevant parts of the IC Dedicated Software and develops the IC Embedded Software (operating system), the MRTD application and the guidance documentation associated with these TOE components.

The manufacturing documentation of the IC including the IC Dedicated Software and the Embedded Software in the non-volatile non-programmable memories is securely delivered to the IC manufacturer. The IC Embedded Software in the non-volatile programmable memories, the eMRTD application and the guidance documentation is securely delivered to the Manufacturer.

## 4.3 Phase 2 “Manufacturing”

(Step3) In a first step the TOE integrated circuit is produced containing the travel document’s chip Dedicated Software and the parts of the travel document’s chip Embedded Software in the non-volatile non-programmable memories (ROM). The IC manufacturer writes the IC Identification Data onto the chip to control the IC as travel document material during the IC manufacturing and the *delivery process to the Manufacturer. The IC is securely delivered from the IC manufacture to the Manufacturer.* If necessary the IC manufacturer adds the parts of the IC Embedded Software in the non-volatile programmable memories (for instance EEPROM). The IC manufacturer add initialization data in EEPROM and keys (MSK, LSK).

### TOE delivery point

(Step4) The Manufacturer combines the IC with hardware for the contact based / contactless interface in the travel document unless the travel document consists of the card only.

(Step5) The Manufacturer (i) adds the IC Embedded Software or part of it and the additional source code in the non-volatile programmable memories if necessary, (ii) creates the eMRTD application, and (iii) equips travel document’s chips with pre-personalization Data.

The pre-personalised travel document together with the IC Identifier is securely delivered from the Manufacturer to the Personalization Agent. The Manufacturer also provides the relevant parts of the guidance documentation to the Personalization Agent.

Additional code loading is performed in Prepersonalization phase. It is compliant to ANSSI Note 6 [R44].

The additional code loading process is performed by the Prepersonalizer in the following steps, via the Command LOAD SECURE:

- Additional code generation
- MSK authentication
- LSK derivation
- Memory area definition
- Loading of the additional code
- Secure activation of the additional code

The additional code loading is performed before the creation of the MF file during Prepersonalization.

Identification of the additional code loading is given in Table 2 - TOE Technical Identification.

#### **Additional code generation**

The additional code is generated by Oberthur Technologies: developed, compiled, ciphered and signed. After generation, it is sent to the MRTD manufacturer so that it can load it in the (initial) TOE.

#### **Loading of the additional code**

The additional code is loaded in the (initial) TOE by the Prepersonalizer that shall authenticate itself to the TOE beforehand. Upon reception, the (initial) TOE checks it has been generated by Oberthur Technologies (by verifying the signature) before activating it.

#### **Identification of the TOE**

After successful loading and activation of the additional code, the TOE updates its identification data to reflect the presence of the additional code.

## **4.4 Phase 3 “Personalization of the travel document”**

(Step6) The personalization of the travel document includes (i) the survey of the travel document holder’s biographical data, (ii) the enrolment of the travel document holder biometric reference data

(i.e. the digitized portraits and the optional biometric reference data), (iii) the personalization of the visual readable data onto the physical part of the travel document, (iv) the writing of the TOE User Data and TSF Data into the logical travel document and (v) configuration of the TSF if necessary. The step (iv) is performed by the Personalization Agent and includes but is not limited to the creation of (i) the digital MRZ data (EF.DG1), (ii) the digitized portrait (EF.DG2), and (iii) the Document security object. The signing of the Document security object by the Document signer finalizes the personalization of the genuine travel document for the travel document holder. The personalised travel document (together with appropriate guidance for TOE use if necessary) is handed over to the travel document holder for operational use.

#### 4.5 Phase 4 “Operational Use”

(Step7) The TOE is used as a travel document's chip by the traveller and the inspection systems in the “Operational Use” phase. The user data can be read according to the security policy of the issuing State or Organisation and can be used according to the security policy of the issuing State but they can never be modified.

Note that the personalization process and its environment may depend on specific security needs of an issuing State or Organisation. All production, generation and installation procedures after TOE delivery up to the “Operational Use” (phase 4) have to be considered in the product evaluation process under AGD assurance class. Therefore, the Security Target has to outline the split up of P.Manufact, P.Personalization and the related security objectives into aspects relevant before vs. after TOE delivery. Some production steps, e.g. Step 4 in Phase 2 may also take place in the Phase 3.

## 5 CONFORMANCE CLAIMS

### 5.1 Common Criteria conformance

This Security Target (ST) claims conformance to the Common Criteria version 3.1 revision 4 [R41], [R42] and [R43].

The conformance to the CC is claimed as follows:

CC	Conformance rationale
Part 1	Strict conformance
Part 2	Conformance to the extended <sup>1</sup> part: <ul style="list-style-type: none"> <li>- FAU_SAS.1 "Audit Storage"</li> <li>- FCS_RND.1 "Quality metric for random numbers"</li> <li>- FMT_LIM.1 "Limited capabilities"</li> <li>- FMT_LIM.2 "Limited availability"</li> <li>- FPT_EMS.1 "TOE Emanation"</li> <li>- FIA_API.1 "Authentication Proof of Identity"</li> </ul>
Part 3	Strict conformance to Part 3. The product claims conformance to EAL 5, augmented with: <ul style="list-style-type: none"> <li>- ALC_DVS.2 "Sufficiency of security measures"</li> <li>- AVA_VAN.5 "Advanced methodical vulnerability analysis"</li> </ul>

**Table 8 - Conformance Rationale**

#### 5.1.1 Overview of the SFR defined in this ST

SFR are presented in § 9.1 Security Functional Requirements:

- SFR (/global) that are global to the product (shared between the various TOE)
- SFR (/MP\_Add\_code) that are dedicated for the patch loading
- SFR (/MP) that are dedicated for the Manufacturing and Personalization phases
- SFR (/AA) that are dedicated for Active Authentication
- SFR (/BAC) that are dedicated for Basic Access Control
- SFR (/CA) that are dedicated for Chip Authentication
- SFR (/TA) that are dedicated for Terminal Authentication
- SFR (/EAC) that are dedicated for Extended Access Control

<sup>1</sup> The rationale for SFR addition is described in the relative PP and in this Security Target

The following table presents all the SFR defined in the ST with the generic notation.

SFR from the PP
FAU_SAS.1; FCS_CKM.1; FCS_CKM.4; FCS_COP.1/SHA ; FCS_COP.1/SYM ; FCS_COP.1/MAC ; FCS_COP.1/SIG_VER ; FCS_RND.1; FIA_UID.1; FIA_UAU.1; FIA_UAU.4 ; FIA_UAU.5; FIA_UAU.6 ; FIA_API.1 ; FDP_ACC.1 ; FDP_ACF.1 ; FDP_UCT.1 ; FDP_UIT.1 ; FMT_SMF.1; FMT_SMR.1; FMT_LIM.1; FMT_LIM.2 FMT_MTD.1/INI_ENA ; FMT_MTD.1/INI_DIS ; FMT_MTD.1/CVCA_INI ; FMT_MTD.1/CVCA_UPD ; FMT_MTD.1/DATE ; FMT_MTD.1/KEY_WRITE ; FMT_MTD.1/CAPK; FMT_MTD.1/KEY_READ; FMT_MTD.3; FPT_EMS.1 ; FPT_FLS.1; FPT_TST.1; FPT_PHP.3

Table 9 -SFR from the PP

Section	Additional SFR
MP	FCS_CKM.1/MP ; FCS_COP.1/MP ; FDP_ACC.2/MP ; FDP_ACF.1/MP ; FDP_ITC.1/MP ; FDP_UCT.1/MP ; FDP_UIT.1/MP ; FIA_AFL.1/MP ; FIA_UAU.1/MP ; FIA_UID.1/MP ; FIA_UAU.4/MP ; FIA_UAU.5/MP ; FMT_MTD.1/MP ; FTP_ITC.1/MP ; FMT_MTD.1/MP_KEY_READ ; FMT_MTD.1/MP_KEY_WRITE
MP Add code	FAU_STG.2/MP_Add_code ; FTP_ITC.1/MP_Add_code ; FCS_CKM.1/MP_Add_code ; FCS_COP.1/MP_Add_code ; FDP_UIT.1/MP_Add_code ; FMT_MTD.1/MP_Add_code ; FMT_MTD.1/MP_KEY_READ_Add_code ; FMT_SMR.1/MP_Add_code
Active Authentication	FCS_COP.1/AA ; FDP_DAU.1/AA ; FDP_ITC.1/AA ; FMT_MTD.1/AA_KEY_READ ; FMT_MOF.1/AA ; FMT_MTD.1/AA_KEY_WRITE

Table 10 - Additional SFR

## 5.1.2 Overview of the additional protocols

### 5.1.2.1 Active Authentication

The additional functionality of Active Authentication (AA) is based on the ICAO PKI V1.1 and the related on-card generation of RSA and ECC keys.

It implies the following addition to the standard PP:

- Additional Threats: § 6.3.2 Threats for AA
- Additional Objective: § 7.1.2 SO for AA
- Additional OE: § 7.2.2 OE for AA

### 5.1.2.2 Prepersonalization phase

The prepersonalization phase has been reinforced in this Security Target, with the following elements.

This functionality is usable in phase 5 and phase 6. Once the product is locked, stated as personalized, it is no more possible to perform this operation. The following addition has been performed:

- Additional Threats: **§ 6.3.3 Threats for Note 6**
- Additional Objective: **§ 7.1.3 SO for Note 6**

The TOE is compliant to the last version (draft) of ANSSI Note 6 [R44].

## 5.2 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 [R12].

## 5.3 Rationale for the additions

The rationales are available in the complete ST.

## 5.4 Non evaluated features

Some features may be part of the TOE but are not evaluated as they are not relevant for the TSFs:

- Standard and biometric PIN management
- File system management
- PACE
- DBI

The TOE may also contain other applications such as eID, eSign, .....The current evaluation covers any combination of application.

Last but not least, the TOE may also contain PACE together with BAC. PACE allows the terminal to gain access to the TOE and its assets in the same manner as BAC, but resists to attacker with high potential, unlike BAC (that only resists to attacker with moderate potential).

Strictly speaking, as PACE affects the TSF (access control policies,...) it should be included in the evaluation. However, the evaluation of PACE will be fully performed through the evaluation of another configuration of the TOE claiming conformance with [R30]. Therefore, PACE is considered as being part of the TOE as non evaluated feature.

## 6 SECURITY PROBLEM DEFINITION

### 6.1 Subjects

#### 6.1.1 PP EAC subjects

##### **Manufacturer**

The generic term for the IC Manufacturer producing the integrated circuit and the MRTD Manufacturer completing the IC to the MRTD's chip. The Manufacturer is the default user of the TOE during the Phase 2 Manufacturing. The TOE does not distinguish between the users IC Manufacturer and MRTD Manufacturer using this role Manufacturer.

##### **Personalization Agent**

The agent is acting on behalf of the issuing State or Organization to personalize the MRTD for the holder by some or all of the following activities (i) establishing the identity the holder for the biographic data in the MRTD, (ii) enrolling the biometric reference data of the MRTD holder i.e. the portrait, the encoded finger image(s) and/or the encoded iris image(s) (iii) writing these data on the physical and logical MRTD for the holder as defined for global, international and national interoperability, (iv) writing the initial TSF data and (iv) signing the Document Security Object defined in [R2].

##### **Application Note**

Personalization Agent is referred as the Personalizer in the Security Target

##### **Country Verifying Certification Authority**

The Country Verifying Certification Authority (CVCA) enforces the privacy policy of the issuing State or Organization with respect to the protection of sensitive biometric reference data stored in the MRTD. The CVCA represents the country specific root of the PKI of Inspection Systems and creates the Document Verifier Certificates within this PKI. The updates of the public key of the CVCA are distributed in the form of Country Verifying CA Link-Certificates.

##### **Document Verifier**

The Document Verifier (DV) enforces the privacy policy of the receiving State with respect to the protection of sensitive biometric reference data to be handled by the Extended Inspection Systems. The Document Verifier manages the authorization of the Extended Inspection Systems for the

sensitive data of the MRTD in the limits provided by the issuing States or Organizations in the form of the Document Verifier Certificates.

### **Terminal**

A terminal is any technical system communicating with the TOE through the contactless interface.

### **Inspection System (IS)**

A technical system 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** (BIS) (i) contains a terminal for the contactless communication with the MRTD's chip, (ii) implements the terminals part of the Basic Access Control Mechanism and (iii) gets the authorization to read the logical MRTD under the Basic Access Control by optical reading the MRTD or other parts of the passport book providing this information. The **General Inspection System** (GIS) is a Basic Inspection System which implements additionally the Chip Authentication Mechanism. The **Extended Inspection System** (EIS) in addition to the General Inspection System (i) implements 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. The security attributes of the EIS are defined of the Inspection System Certificates.

### **MRTD Holder**

The rightful holder of the MRTD for whom the issuing State or Organization personalized the MRTD.

### **Traveler**

Person presenting the MRTD to the inspection system and claiming the identity of the MRTD holder.

### **Attacker**

A threat agent trying (i) to manipulate the logical MRTD without authorization, (ii) to read sensitive biometric reference data (i.e. EF.DG3, EF.DG4) or (iii) to forge a genuine MRTD.

### **Application Note**

- Note that an attacker trying to identify and to trace the movement of the MRTD's chip remotely (i.e. without knowing or optically reading the physical MRTD) is not considered by this PP since this can only be averted by the BAC mechanism using the "weak" Document Basic Access Keys that is covered by [25]. The same holds for the confidentiality of the user data EF.DG1, EF.DG2, EF.DG5 to EF.DG16 as well as EF.SOD and EF.COM.



- An impostor is attacking the inspection system as TOE IT environment independent on using a genuine, counterfeit or forged MRTD. Therefore the impostor may use results of successful attacks against the TOE but the attack itself is not relevant for the TOE.

### 6.1.2 Additional Subjects

#### IC Developer

Developer of the IC.

#### TOE Developer

Developer of part of the TOE source code.

#### Prepersonalizer

Agent in charge of the Prepersonalization. This agent corresponds to the MRTD manufacturer as described in [R11].

## 6.2 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 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	Description
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User Data	Description
CPLC Data	Data uniquely identifying the chip. They are considered as user data as they enable to track the holder
Sensitive biometric reference data	Contain the fingerprint and the iris picture
Active Authentication Public Key in EF.DG15 (AAPK)	Contains public data enabling to authenticate the chip thanks to an Active Authentication
Chip Authentication Public Key in EF.DG14 (CAPK)	Contains public data enabling to authenticate the chip thanks to an the Chip Authentication Protocol

**Table 11 - User Data**

TSF Data	Description
TOE_ID	Data enabling to identify the TOE
Prepersonalizer reference authentication data	Private key enabling to authenticate the Prepersonalizer
Personalization Agent reference authentication Data	Private key enabling to authenticate the Personalization Agent
Basic Access Control (BAC) Key	Master keys used to established a trusted channel between the Basic Inspection Terminal and the travel document
Active Authentication private key (AAK)	Private key the chip uses to perform an Active Authentication
Chip Authentication private key (CAK)	Private key the chip uses to perform a Chip Authentication
Session keys for the secure channel	Session keys used to protect the communication in confidentiality, authenticity and integrity
Life Cycle State	Life Cycle state of the TOE
Additional Code	Additional code to be loaded on the initial TOE during prepersonalization by the Prepersonalizer. The loading of the additional code on the initial TOE constitutes the final 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

**Table 12 - TSF Data**

### 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.

## 6.3 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.

**Application note:** The threats T.Chip\_ID and T.Skimming (cf [R11]) are averted by the mechanisms described in the BAC PP which cannot withstand an attack with high attack potential thus these are not addressed here. T.Chip\_ID addresses the threat of tracing the movement of the MRTD by identifying remotely the MRTD's chip by establishing or listening to communications through the contactless communication interface. T.Skimming addresses the threat of imitating the inspection system to read the logical MRTD or parts of it via the contactless communication channel of the TOE. Both attacks are conducted by an attacker who cannot read the MRZ or who does not know the physical MRTD in advance.

### 6.3.1 Threats from the PP EAC

#### 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 enhanced basic 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 the phase "Operational Use" 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 enhanced basic 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 enhanced basic 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's 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 enhanced basic 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 enhanced basic attack potential, being in possession of a legitimate MRTD.

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

### 6.3.2 Threats for AA

#### T.Counterfeit

##### 6.3.3 Threats for Note 6

#### T.Unauthorized\_Load

**Adverse action:** An attacker tries to load an additional code that is not intended to be assembled with the initial TOE, ie the evidence of authenticity or integrity is not correct.

**Threat agent:** having high attack potential, knowing the MSK, LSK and derivation data, being in possession of a legitimate MRTD

**Asset:** Logical MRTD data

#### T.Bad\_Activation

**Adverse action:** An attacker tries to perturbate the additional code activation such as the final TOE is different than the expected one (initial TOE or perturbed TOE).

**Threat agent:** having high attack potential, knowing the MSK, LSK and derivation data, being in possession of a legitimate MRTD, being in possession of an additional code that is authorized to be load

**Asset:** Logical MRTD data

#### T.TOE\_Identification\_Forgery

**Adverse action:** An attacker tries to perturbate the TOE identification and in particular the additional code identification.

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

**Asset:** TOE\_ID

#### Application Note

This threat is not applicable in phase 7, as the TOE identification is not possible in phase 7.

## 6.4 Organisational Security Policies

### 6.4.1 OSP from PP EAC

#### **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" [R11] in order to ensure the confidentiality of standard user data and preventing the traceability of the MRTD data.

**Application note:**The organizational security policy P.Personal\_Data drawn from the 'ICAO Doc 9303' [R2] is addressed by the [R11] (cf. P.BAC-PP). The confidentiality of the personal data other than EF.DG3 and EF.DG4 is ensured by the BAC mechanism. Note the BAC mechanisms may not resist attacks with high attack potential (cf. [R11]). The TOE shall protect the sensitive biometric reference data in EF.DG3 and EF.DG4 against attacks with high attack potential. Due to the different resistance the protection of EF.DG3 and EF.DG4 on one side and the other EF.SOD, EF.COM, EF.DG1, EF.DG2 and EF.DG5 to EF.DG16 are addressed separated protection profiles, which is assumed to result in technically separated evaluations (at least for classes ASE and VAN) and certificates.

#### **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.

### **6.4.2 OSP for AA**

## **P.Activ\_Auth**

The terminal implements the Active Authentication protocol as described in [R38].

## **6.5 Assumptions**

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

### **6.5.1 Assumptions from PP EAC**

## **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. 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.

### 6.5.2 Assumptions for Active Authentication

#### A.Insp\_Sys\_AA

The Inspection System implements the Active Authentication Mechanism. The Inspection System verifies the authenticity of the MRTD's chip during inspection using the signature returned by the TOE during Active Authentication.

## 7 SECURITY OBJECTIVES

### 7.1 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.

#### 7.1.1 SO from PP EAC

##### **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.DG 3 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 data.

##### **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). The storage of the Prepersonalization data includes writing of the Personalization Agent Key(s).

#### **OT.CA\_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 [R38]. The authenticity proof provided by the 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
- (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 enhanced-basic 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.

### **7.1.2 SO for AA**

#### **OT.AA\_Proof**

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

#### **OT.Data\_Int\_AA**

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 Active Authentication.

### **7.1.3 SO for Note 6**

#### **OT.Secure\_Load\_ACode**

The Loader of the Initial TOE shall check an evidence of authenticity and integrity of the loaded Additional Code. The Loader enforces that only the allowed version of the Additional Code can be loaded on the Initial TOE. The Loader shall forbid the loading of an Additional Code not intended to be assembled with the Initial TOE.

During the Load Phase of an Additional Code, the TOE shall remain secure.

#### **OT.Secure\_AC\_Activation**

Activation of the Additional Code and update of the Identification Data shall be performed at the same time in an Atomic way. All the operations needed for the code to be able to operate as in the Final TOE shall be completed before activation.

If the Atomic Activation is successful, then the resulting product is the Final TOE, otherwise (in case of interruption or incident which prevents the forming of the Final TOE), the Initial TOE shall remain in its initial state or fail secure.

## **OT.TOE\_Identification**

The Identification Data identifies the Initial TOE and Additional Code. The TOE provides means to store Identification Data in its non-volatile memory and guarantees the integrity of these data. After Atomic Activation of the Additional Code, the Identification Data of the Final TOE allows identifications of Initial TOE and Additional Code. The user must be able to uniquely identify Initial TOE and Additional Code(s) which are embedded in the Final TOE. TOE must support the Inspection Systems to verify the authenticity.

## **7.2 Security objectives for the Operational Environment**

### **7.2.1 OE from PP EAC**

#### **7.2.1.1 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:
  - o Origin and shipment details
  - o Reception, reception acknowledgement
  - o 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)
- (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
- (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
- (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
- (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" [R11]. 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.

#### **7.2.1.2 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 Public Key and the Document Signer Public Key of each issuing State or Organization
- (ii) Implements the terminal part of the Basic Access Control [R2]

#### **OE.Pass\_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 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 receiving State examining the logical MRTD being under Basic Access Control will use inspection systems which implement the terminal part of the Basic



Access Control and use the secure messaging with fresh generated keys for the protection of the transmitted data (i.e. Basic Inspection Systems).

### **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.

## **7.2.2 OE for AA**

### **OE.Exam\_MRTD\_AA**

Additionally to the OE.Exam\_MRTD, the inspection systems perform the Active Authentication protocol to verify the Authenticity of the presented MRTD's chip.

### **OE.Prot\_Logical\_MRTD\_AA**

Additionally to the OE.Prot\_Logical\_MRTD, the inspection system prevents eavesdropping to their communication with the TOE before secure messaging is successfully established based on the Active Authentication Protocol.

### **OE.Activ\_Auth\_Verif**

In addition to the verification by passive authentication, the inspection systems may use the verification by Active Authentication, which offers a stronger guaranty of the authenticity of the MRTD.

### **OE.Activ\_Auth\_Sign**

The issuing State or Organization has to establish the necessary public key infrastructure in order to (i) generate the MRTD's Active Authentication Key Pair, (ii) ensure the secrecy of the MRTD's Active Authentication Private Key, sign and store the Active Authentication Public Key in the Active Authentication Public Key data in EF.DG15 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 Active Authentication Public Key by means of the Document Security Object.

## 8 EXTENDED REQUIREMENTS

### 8.1 Extended family FAU\_SAS - Audit data storage

#### 8.1.1 Extended components FAU\_SAS.1

**Description:** see [R11].

#### 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]

### 8.2 Extended family FCS\_RND - Generation of random numbers

#### 8.2.1 Extended component FCS\_RND.1

**Description:** see [R11]

#### 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]

### 8.3 Extended family FIA\_API – Authentication proof of identity

#### 8.3.1 Extended component FIA\_API.1

**Description:** see [R12]

## FIA\_API.1 Quality metric for random numbers

**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 [R12]

## 8.4 Extended family FMT\_LIM - Limited capabilities and availability

### 8.4.1 Extended component FMT\_LIM.1

**Description:** see [R11]

## 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]

### 8.4.2 Extended component FMT\_LIM.2

**Description:** See [R11]

## 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]

## 8.5 Extended family FPT\_EMS - TOE Emanation

### 8.5.1 Extended component FPT\_EMS.1

**Description:** see [R11]

#### FPT\_EMS.1 TOE Emanation

**FPT\_EMS.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\_EMS.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]

## 9 SECURITY REQUIREMENTS

### 9.1 Security Functional Requirements

This chapter presents the Security Functional Requirements to take into account within the TOE configuration presented in this security target. It is composed of the following elements:

- **Global SFR** that are applicable to all the passports configuration
- **MP SFR** for covering the phase Manufacturing and Personalization described in the Passport Protection Profile and also the coverage of Additional Code.
- **Active Authentication SFR** that cover the Active Authentication Protocol
- **BAC SFR** that cover the Basic Access Control
- **CA SFR** that cover the Chip Authentication Protocol
- **TA SFR** that cover the Terminal Authentication Protocol (note: Terminal Authentication Protocol is only available with the Extended Access Control)
- **EAC SFR** that cover the Extended Access Control (note: EAC protocol is a combination of TA and CA, this chapter only contains SFR that can not be strictly applied to one or another)

#### 9.1.1 Global SFR

This chapter covers the common SFR that are shared between the different applications that are embedded on the product.

#### FCS\_CKM.4/Global Cryptographic key destruction

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

#### FCS\_RND.1/Global Quality metric for random numbers

**FCS\_RND.1.1/Global** The TSF shall provide a mechanism to generate random numbers that meet

- 1. The requirement to provide an entropy of at least 7.976 bits in each byte, following AIS 31 [R36] and**
- 2. The requirement of RGS\_B1 for random number generation.**

### FMT\_LIM.1/Global Limited capabilities

**FMT\_LIM.1.1/Global** 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. TSF data to be disclosed or manipulated**
- 3. Software to be reconstructed**
- 4. Substantial information about construction of TSF to be gathered which may enable other attacks**

### FMT\_LIM.2/Global Limited availability

**FMT\_LIM.2.1/Global** 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. TSF data to be disclosed or manipulated**
- 3. Software to be reconstructed**
- 4. Substantial information about construction of TSF to be gathered which may enable other attacks**

### FPT\_EMS.1/Global TOE Emanation

**FPT\_EMS.1.1/Global** The TOE shall not emit **power variations, timing variations during command execution** in excess of **non useful information** enabling access to

- 1. EF.COM, EF.SOD and EF.DG1 to EF.DG16**

**FPT\_EMS.1.2/Global** The TSF shall ensure any **unauthorized users** are unable to use the following interface **smart card circuit contacts** to gain access to

- 1. EF.COM, EF.SOD and EF.DG1 to EF.DG16**

### FPT\_FLS.1/Global Failure with preservation of secure state

**FPT\_FLS.1.1/Global** 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/Global TSF testing

**FPT\_TST.1.1/Global** The TSF shall run a suite of self tests to demonstrate the correct operation of **the TSF, at the conditions:**

- **At reset**
- **Before any cryptographic operation**
- **When accessing a DG or any EF**
- **Prior to any use of TSF data**
- **Before execution of any command**

**FPT\_TST.1.2/Global** The TSF shall provide authorised users with the capability to verify the integrity of **TSF data**.

**FPT\_TST.1.3/Global** The TSF shall provide authorised users with the capability to verify the integrity of **stored TSF executable code**.

## FPT\_PHP.3/Global Resistance to physical attack

**FPT\_PHP.3.1/Global** The TSF shall resist **physical manipulation and physical probing** to the **TSF** by responding automatically such that the SFRs are always enforced.

### 9.1.2 Product configuration SFR

This chapter covers the Manufacturing and Personalization SFR. It also includes additional SFR for the compliance to Note 6.

#### 9.1.2.1 SFR for additional code

## FAU\_STG.2/MP\_Add\_code Guarantees of audit data availability

**FAU\_STG.2.1/MP\_Add\_code** The TSF shall protect the stored audit records in the audit trail from unauthorized deletion.

**FAU\_STG.2.2/MP\_Add\_code** The TSF shall be able to **prevent** unauthorized modifications to the stored audit records in the audit trail.

**FAU\_STG.2.3/MP\_Add\_code** The TSF shall ensure that **Additional code identification** stored audit records will be maintained when the following conditions occur: **failure and attack**.

Application Note:

Additional code code is loaded with its integrity information. This integrity information is verified by the TOE after the loading, and before the writing of the identification information by calculating the signature and comparing to the expected value. The signature is protected in integrity through the TOE life cycle, at each power on, the card verifies the integrity of this signature.

**FCS\_CKM.1/MP\_Add\_code Cryptographic key generation**

**FCS\_CKM.1.1/MP\_Add\_code** The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [**cryptographic key generation algorithm**] and specified cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic key generation algorithm	Key length (bits)	Standards
Calculation of LSK_LOAD, from initial LSK and derivation data entered - AES 128 ECB	128	None

**FCS\_COP.1/MP\_ENC\_Add\_code Cryptographic operation**

**FCS\_COP.1.1/MP\_ENC\_Add\_code** The TSF shall perform [**cryptographic operation**] in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**cryptographic key sizes**] that meet the following [**standard**]:

Cryptographic operation	Algo	Key length (bits)	Standard
Encryption of the additional code (ciphered with LSK_LOAD) and signature verification	AES	128	[R34]

**FCS\_COP.1/MP\_MAC\_Add\_code Cryptographic operation**

**FCS\_COP.1.1/MP\_MAC\_Add\_code** The TSF shall perform [**cryptographic operation**] in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**cryptographic key sizes**] that meet the following [**standard**]:

Cryptographic operation	Algo	Key length (bits)	Standard
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Cryptographic operation	Algo	Key length (bits)	Standard
Secure Messaging with BAC - 3DES	3DES Retail MAC	112	[R34]
Secure Messaging with BAC - AES	AES CMAC	128, 192 or 256	[R34]

### FDP\_UIT.1/MP\_Add\_code Data exchange integrity

**FDP\_UIT.1.1/MP\_Add\_code** The TSF shall enforce the **Prepersonalization access control SFP** to **receive** user data in a manner protected from **modification** errors.

**FDP\_UIT.1.2/MP\_Add\_code [Editorially Refined]** The TSF shall be able to determine on receipt of user data, whether **modification of some of the pieces of the application sent by the TOE developer** has occurred.

#### Application Note

Modification errors should be understood as modification, substitution, unrecoverable ordering change of data and any other integrity error that may cause the additional code to be installed on the card to be different from the one sent by the TOE Developer.

This SFR control integrity of data import in phase 5, including the additional code but not only.

### FMT\_MTD.1/MP\_Add\_code Management of TSF data

**FMT\_MTD.1.1/MP\_Add\_code** The TSF shall restrict the ability to **[selection the [list of TSF data]** to **[authorized identified roles]**:

	List of TSF data	Authorised role
Activate	Additional code	TOE developer

#### Application note

The Activation of the additional code modify the TOE. This additional code is ciphered with the LSK\_LOAD (LSK and Derivation Data) and activated after the authentication of the TOE developer.

### FMT\_MTD.1/MP\_KEY\_READ\_Add\_code Management of TSF data

**FMT\_MTD.1.1/MP\_KEY\_READ\_Add\_code** The TSF shall restrict the ability to **read** the **[data]** to **[authorized identified roles]**:

TSF Data	Authorized Identified roles
LSK	None

### FMT\_SMR.1/MP\_Add\_code Security roles

**FMT\_SMR.1.1/MP\_Add\_code** The TSF shall maintain the roles

1. TOE developper

**FMT\_SMR.1.2/MP\_Add\_code** The TSF shall be able to associate users with roles.

### FPT\_EMS.1/MP\_Add\_code TOE Emanation

**FPT\_EMS.1.1/MP\_Add\_code** The TOE shall not emit **power variations, timing variations during command execution** in excess of **non useful information** enabling access to

1. LSK

**FPT\_EMS.1.2/MP\_Add\_code** The TSF shall ensure any **unauthorized users** are unable to use the following interface **smart card circuit contacts** to gain access to

1. LSK

### FTP\_ITC.1/MP\_Add\_code Inter-TSF trusted channel

**FTP\_ITC.1.1/MP\_Add\_code** The TSF shall provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.

**FTP\_ITC.1.2/MP\_Add\_code [Editorially Refined]** The TSF shall permit **the TOE Developer and Prepersonalizer** to initiate communication via the trusted channel.

**FTP\_ITC.1.3/MP\_Add\_code** The TSF shall initiate communication via the trusted channel for:

1. Additional code loading

9.1.2.2 Manufacturing and Personalization

**FCS\_CKM.1/MP Cryptographic key generation**

**FCS\_CKM.1.1** The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [**cryptographic key generation algorithm**] and specified cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic key generation algorithm	Key length (bits)	Standards
MSK derivation from initial MSK loaded in phase 1 using SHA 256	256	None

**FCS\_COP.1/MP\_ENC\_3DES Cryptographic operation**

**FCS\_COP.1.1/MP\_ENC\_3DES** The TSF shall perform [**cryptographic operation**] in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**cryptographic key sizes**] that meet the following [**standard**]:

Cryptographic operation	Algo	Key length (bits)	Standard
Secure Messaging – encryption and decryption	3DES in CBC mode	112	[R31]

**FCS\_COP.1/MP\_ENC\_AES Cryptographic operation**

**FCS\_COP.1.1/MP\_ENC\_AES** The TSF shall perform [**cryptographic operation**] in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**cryptographic key sizes**] that meet the following [**standard**]:

Cryptographic operation	Algo	Key length (bits)	Standard
Secure Messaging – encryption and decryption	AES in CBC mode	128, 192 and 256	[R34]

### FCS\_COP.1/MP\_MAC\_3DES Cryptographic operation

**FCS\_COP.1.1/MP\_MAC\_3DES** The TSF shall perform **[cryptographic operation]** in accordance with a specified cryptographic algorithm **[cryptographic algorithm]** and cryptographic key sizes **[cryptographic key sizes]** that meet the following **[standard]**:

Cryptographic operation	Algo	Key length (bits)	Standard
Secure Messaging – MAC	3DES RMAC	112	[R31]

### FCS\_COP.1/MP\_MAC\_AES Cryptographic operation

**FCS\_COP.1.1/MP\_MAC\_AES** The TSF shall perform **[cryptographic operation]** in accordance with a specified cryptographic algorithm **[cryptographic algorithm]** and cryptographic key sizes **[cryptographic key sizes]** that meet the following **[standard]**:

Cryptographic operation	Algo	Key length (bits)	Standard
Secure Messaging MAC	AES	128, 192 and 256	[R34]

### FCS\_COP.1/MP\_AUTH\_3DES Cryptographic operation

**FCS\_COP.1.1/MP\_AUTH\_3DES** The TSF shall perform **[cryptographic operation]** in accordance with a specified cryptographic algorithm **[cryptographic algorithm]** and cryptographic key sizes **[cryptographic key sizes]** that meet the following **[standard]**:

Cryptographic operation	Algo	Key length (bits)	Standard
Card Manufacturer Authentication (MSK)	3DES	112	[R31]

### FCS\_COP.1/MP\_AUTH\_AES Cryptographic operation

**FCS\_COP.1.1/MP\_AUTH\_AES** The TSF shall perform **[cryptographic operation]** in accordance with a specified cryptographic algorithm **[cryptographic algorithm]** and cryptographic key sizes **[cryptographic key sizes]** that meet the following **[standard]**:

Cryptographic operation	Algo	Key length (bits)	Standard
Card Manufacturer Authentication (MSK)	AES	128, 192 and 256	[R34]

### FCS\_COP.1/MP\_SHA Cryptographic operation

**FCS\_COP.1.1/MP\_SHA** The TSF shall perform [cryptographic operation] in accordance with a specified cryptographic algorithm [cryptographic algorithm] and cryptographic key sizes [cryptographic key sizes] that meet the following [standard]:

Cryptographic operation	Algo	Key length (bits)	Standard
Hashing	SHA256	None	[R26]

### FDP\_ACC.2/MP Complete access control

**FDP\_ACC.2.1/MP** The TSF shall enforce the **Prepersonalization Access Control** on **all subjects and all objects** and all operations among subjects and objects covered by the SFP.

**FDP\_ACC.2.2/MP** The TSF shall ensure that all operations between any subject controlled by the TSF and any object controlled by the TSF are covered by an access control SFP.

#### Application Note

This SFR enforces access control over all the operation performed in phase 5, including additional code loading but not only.

### FDP\_ACF.1/MP Security attribute based access control

**FDP\_ACF.1.1/MP** The TSF shall enforce the **Prepersonalization Access Control** to objects based on the following **Prepersonalizer Authentication (AS\_AUTH\_MSK\_STATUS)**.

**FDP\_ACF.1.2/MP** The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: **AS\_AUTH\_MSK\_STATUS=TRUE (EXTERNAL AUTHENTICATE)**.

**FDP\_ACF.1.3/MP** The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: **none**.

**FDP\_ACF.1.4/MP** The TSF shall explicitly deny access of subjects to objects based on the following additional rules: **none**.

Application Note

This SFR enforces access control over all the operation in phase 5, including additional code loading but not only.

**FDP\_ITC.1/MP Import of user data without security attributes**

**FDP\_ITC.1.1/MP** The TSF shall enforce the **Prepersonalization access control** when importing user data, controlled under the SFP, from outside of the TOE.

**FDP\_ITC.1.2/MP** The TSF shall ignore any security attributes associated with the user data when imported from outside the TOE.

**FDP\_ITC.1.3/MP** The TSF shall enforce the following rules when importing user data controlled under the SFP from outside the TOE: **none**.

Application Note

This SFR control import of data in phase 5, including the additional code but not only.

This SFR ensures also the MSK diversification, which is performed once, at first command, without any security requirements preliminary to this action.

**FDP\_UCT.1/MP Basic data exchange confidentiality**

**FDP\_UCT.1.1/MP** The TSF shall enforce the **Prepersonalization access control to receive** user data in a manner protected from unauthorised disclosure.

Application note

For the Additional code loading access control, the LSK\_LOAD is used to cipher the data transmitted.

This SFR control confidentiality of data import in phase 5, including the additional code but not only.

### FDP\_UIT.1/MP Data exchange integrity

**FDP\_UIT.1.1/MP** The TSF shall enforce the **Prepersonalization Access Control SFP** to **receive** user data in a manner protected from **modification** errors

**FDP\_UIT.1.2/MP [Editorially refined]** The TSF shall be able to determine on receipt of user data, whether **modification of some pieces of the application sent by the Prepersonalizer** has occurred

### FIA\_AFL.1/MP Authentication failure handling

**FIA\_AFL.1.1/MP** The TSF shall detect when **3** unsuccessful authentication attempts occur related to authentication of

#### 1. Prepersonalizer

**FIA\_AFL.1.2/MP** When the defined number of unsuccessful authentication attempts has been **met**, the TSF shall **forbid any authentication attempt as Personalizer**.

### FIA\_UAU.1/MP Timing of authentication

**FIA\_UAU.1.1/MP** The TSF shall allow **GET DATA, SELECT FILE** on behalf of the user to be performed before the user is authenticated.

**FIA\_UAU.1.2/MP** The TSF shall require each user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user.

### FIA\_UID.1/MP Timing of identification

**FIA\_UID.1.1/MP** The TSF shall allow **GET DATA, SELECT FILE** on behalf of the user to be performed before the user is identified.

**FIA\_UID.1.2/MP** The TSF shall require each user to be successfully identified before allowing any other TSF-mediated actions on behalf of that user.

### FIA\_UAU.4/MP\_3DES Single-use authentication mechanisms

**FIA\_UAU.4.1/MP\_3DES** The TSF shall prevent reuse of authentication data related to

#### 1. Authentication Mechanisms based on 3DES

### **FIA\_UAU.4/MP\_AES Single-use authentication mechanisms**

**FIA\_UAU.4.1/MP\_AES** The TSF shall prevent reuse of authentication data related to

#### **1. Authentication Mechanisms based on AES**

### **FIA\_UAU.5/MP\_3DES Multiple authentication mechanisms**

**FIA\_UAU.5.1/MP\_3DES** The TSF shall provide

#### **1. Symmetric Authentication Mechanism based on 3DES**

to support user authentication.

**FIA\_UAU.5.2/MP\_3DES** 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 the Personalization Agent Key**

### **FIA\_UAU.5/MP\_AES Multiple authentication mechanisms**

**FIA\_UAU.5.1/MP\_AES** The TSF shall provide

#### **1. Symmetric Authentication Mechanism based on AES**

to support user authentication.

**FIA\_UAU.5.2/MP\_AES** 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**

### **FMT\_MTD.1/MP Management of TSF data**

**FMT\_MTD.1.1/MP** The TSF shall **restrict the ability to switch the TOE life cycle from phase 5 to phase 6 to the Prepersonalizer.**

### **FTP\_ITC.1/MP Inter-TSF trusted channel**

**FTP\_ITC.1.1/MP** The TSF shall provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.



**FTP\_ITC.1.2/MP [Editorially Refined]** The TSF shall permit the **Prepersonalizer** to initiate communication via the trusted channel.

**FTP\_ITC.1.3/MP** The TSF shall initiate communication via the trusted channel for:

1. **Personalization Agent key storage**
2. **Life cycle transition from Prepersonalization to Personalization phase**

### FMT\_MTD.1/MP\_INI\_ENA Management of TSF data

**FMT\_MTD.1.1/MP\_INI\_ENA** The TSF shall **restrict** the ability to **write** the **Initialization Data** and **Prepersonalization Data** to the **Prepersonalizer**.

### FMT\_MTD.1/MP\_INI\_DIS Management of TSF data

**FMT\_MTD.1.1/MP\_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/MP\_KEY\_READ Management of TSF data

**FMT\_MTD.1.1/MP\_KEY\_READ** The TSF shall restrict the ability to **read** the **[data]** to **[authorized identified roles]**:

TSF Data	Authorized Identified roles
MSK	None
Personalization Agent Keys	None

### FMT\_MTD.1/MP\_KEY\_WRITE Management of TSF data

**FMT\_MTD.1.1/MP\_KEY\_WRITE** The TSF shall restrict the ability to **write** the **[data]** to **[authorized identified roles]**:

TSF Data	Authorized Identified roles
MSK	IC manufacturer (created by the developer)
Personalization Agent Keys	None

### FAU\_SAS.1/MP Audit storage

**FAU\_SAS.1.1/MP** The TSF shall provide **the Manufacturer** with the capability to store **the IC Identification Data** in the audit records.

### FMT\_SMF.1/MP Specification of Management Functions

**FMT\_SMF.1.1/MP** The TSF shall be capable of performing the following management functions:

1. Initialization
2. Pre-personalization
3. Personalization

### FMT\_SMR.1/MP Security roles

**FMT\_SMR.1.1/MP** The TSF shall maintain the roles

1. Manufacturer

**FMT\_SMR.1.2/MP** The TSF shall be able to associate users with roles.

### FPT\_EMS.1/MP TOE Emanation

**FPT\_EMS.1.1/MP** The TOE shall not emit **power variations, timing variations during command execution** in excess of **non useful information** enabling access to

1. Prepersonalizer Key
2. Personalization Agent Key
3. MSK

**FPT\_EMS.1.2/MP** The TSF shall ensure any **unauthorized users** are unable to use the following interface **smart card circuit contacts** to gain access to

1. Prepersonalizer Key
2. Personalization Agent Key
3. MSK

## 9.1.3 Active Authentication SFR

### FCS\_COP.1/AA\_DSA Cryptographic operation

**FCS\_COP.1.1/AA\_DSA** The TSF shall perform [cryptographic operation] in accordance with a specified cryptographic algorithm [cryptographic algorithm] and cryptographic key sizes [cryptographic key sizes] that meet the following [standard]:

Operation	Algorithm	Key length (bits)	Standard
Digital Signature Creation	RSA signature (CRT or SFM) with SHA1, 224, 256, 384, 512	1024 to 4096 with a step of 256 bits	[R24]

### FCS\_COP.1/AA\_ECDSA Cryptographic operation

**FCS\_COP.1.1/AA\_ECDSA** The TSF shall perform [cryptographic operation] in accordance with a specified cryptographic algorithm [cryptographic algorithm] and cryptographic key sizes [cryptographic key sizes] that meet the following [standard]:

Operation	Algo	Key length (bits)	Standard
Digital Signature Creation	ECDSA with SHA1, 224, 256, 384, 512	192 to 521 over prime field curves	[R24] [R25] [R26] [R27]

### 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 verifying it, constitute the Active Authentication protocol.

### FDP\_ITC.1/AA Import of user data without security attributes

**FDP\_ITC.1.1/AA** The TSF shall enforce the **Active Authentication 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\_MTD.1/AA\_KEY\_READ Management of TSF data**

**FMT\_MTD.1.1/AA\_KEY\_READ** The TSF shall restrict the ability to **read** the **AAK** to **none**.

#### **FPT\_EMS.1/AA TOE Emanation**

**FPT\_EMS.1.1/AA** The TOE shall not emit **power variations, timing variations during command execution** in excess of **non useful information** enabling access to

**1. Active Authentication: Private Key (AAK)**

**FPT\_EMS.1.2/AA** The TSF shall ensure any **unauthorized users** are unable to use the following interface **smart card circuit contacts** to gain access to

**1. Active Authentication: Private Key (AAK)**

#### **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**.

#### **FMT\_MTD.1/AA\_KEY\_WRITE Management of TSF data**

**FMT\_MTD.1.1/AA\_KEY\_WRITE** The TSF shall restrict the ability to **write** the **AAK** to **Personalization Agent**.

## 9.1.4 Basic Access Control SFR

### 9.1.4.1 Common Basic Access Control SFR

#### FCS\_CKM.1/BAC Cryptographic key generation

**FCS\_CKM.1.1/BAC** The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [**cryptographic key generation algorithm**] and specified cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic key generation algorithm	Key length (bits)	Standards
Document Basic Access Key Derivation Algorithm	112	[R2]

#### FCS\_COP.1/BAC\_AUTH Cryptographic operation

**FCS\_COP.1.1/BAC\_AUTH** The TSF shall perform [**cryptographic operation**] in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**cryptographic key sizes**] that meet the following [**standard**]:

Cryptographic operation	Algo	Key length (bits)	Standard
Symmetric authentication, encryption and decryption	3DES	112	[R34]

#### FCS\_COP.1/BAC\_SHA Cryptographic operation

**FCS\_COP.1.1/BAC\_SHA** The TSF shall perform [**cryptographic operation**] in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**cryptographic key sizes**] that meet the following [**standard**]:

Cryptographic operation	Algo	Key length (bits)	Standard
Hashing	SHA1	None	[R26]

### FCS\_COP.1/BAC\_ENC Cryptographic operation

**FCS\_COP.1.1/BAC\_ENC** The TSF shall perform **[cryptographic operation]** in accordance with a specified cryptographic algorithm **[cryptographic algorithm]** and cryptographic key sizes **[cryptographic key sizes]** that meet the following **[standard]**:

Cryptographic operation	Algo	Key length (bits)	Standard
Secure Messaging (BAC) – encryption and decryption	3DES in CBC mode	112	[R34][R31]

### FCS\_COP.1/BAC\_MAC Cryptographic operation

**FCS\_COP.1.1/BAC\_MAC** The TSF shall perform **[cryptographic operation]** in accordance with a specified cryptographic algorithm **[cryptographic algorithm]** and cryptographic key sizes **[cryptographic key sizes]** that meet the following **[standard]**:

Cryptographic operation	Algo	Key length (bits)	Standard
Secure Messaging MAC	Retail MAC	112	[R31]

### FDP\_UCT.1/BAC Basic data exchange confidentiality

**FDP\_UCT.1.1/BAC** The TSF shall enforce the **Basic Access Control SFP** to **transmit and receive** user data in a manner protected from unauthorised disclosure.

### FDP\_UIT.1/BAC Data exchange integrity

**FDP\_UIT.1.1/BAC** The TSF shall enforce the **Basic Access Control SFP** to **transmit and receive** user data in a manner protected from **modification, deletion, insertion and replay** errors

**FDP\_UIT.1.2/BAC** The TSF shall be able to determine on receipt of user data, whether **modification, deletion, insertion and replay** has occurred

**FMT\_MTD.1/BAC\_KEY\_READ Management of TSF data**

**FMT\_MTD.1.1/BAC\_KEY\_READ** The TSF shall restrict the ability to **read** the [data] to [authorized identified roles]:

TSF Data	Authorized Identified roles
Document Access Keys	None

**FMT\_LIM.1/BAC Limited capabilities**

**FMT\_LIM.1.1/BAC** 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 disclosed**

**FMT\_LIM.2/BAC Limited availability**

**FMT\_LIM.2.1/BAC** 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 disclosed**

**FPT\_TST.1/BAC TSF testing**

**FPT\_TST.1.1/BAC** The TSF shall run a suite of self tests to demonstrate the correct operation of **the TSF, at the conditions:**

- **When performing a BAC authentication**

**FPT\_TST.1.2/BAC** The TSF shall provide authorised users with the capability to verify the integrity of **TSF data.**

**FPT\_TST.1.3/BAC** The TSF shall provide authorised users with the capability to verify the integrity of **stored TSF executable code.**

### FMT\_MTD.1/BAC\_KEY\_WRITE Management of TSF data

FMT\_MTD.1.1/BAC\_KEY\_WRITE The TSF shall restrict the ability to [selection the [list of TSF data] to [authorized identified roles]:

	List of TSF data	Authorised role
Write	Document Basic Access Keys	Personalization Agent

### 9.1.5 Chip Authentication SFR

#### FIA\_API.1/CA Authentication Proof of Identity

FIA\_API.1.1/CA The TSF shall provide a **Chip Authentication protocol according to [R38]** to prove the identity of the TOE.

#### FCS\_CKM.1/CA\_DH\_SM\_3DES Cryptographic key generation

FCS\_CKM.1.1/CA\_DH\_SM\_3DES The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [**cryptographic key generation algorithm**] and specified cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic key generation algorithm	Key length (bits)	Standards
Algorithm based on the Key Diffie-Hellman key derivation protocol compliant to PKCS#3	112	[R2]

#### FCS\_CKM.1/CA\_DH\_SM\_AES Cryptographic key generation

FCS\_CKM.1.1/CA\_DH\_SM\_AES The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [**cryptographic key generation algorithm**] and specified cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic key generation algorithm	Key length (bits)	Standards
Algorithm based on the Key Diffie-Hellman key derivation protocol compliant to PKCS#3	128, 192, 256	[R2]



### FCS\_CKM.1/CA\_ECDH\_SM\_3DES Cryptographic key generation

**FCS\_CKM.1.1/CA\_ECDH\_SM\_3DES** The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [**cryptographic key generation algorithm**] and specified cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic key generation algorithm	Key length (bits)	Standards
Algorithm based on ECDH key derivation protocol compliant to ISO 15946	112	[R2]

### FCS\_CKM.1/CA\_ECDH\_SM\_AES Cryptographic key generation

**FCS\_CKM.1.1/CA\_ECDH\_SM\_AES** The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [**cryptographic key generation algorithm**] and specified cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic key generation algorithm	Key length (bits)	Standards
Algorithm based on ECDH key derivation protocol compliant to ISO 15946	128, 192, 256	[R2]

### FCS\_COP.1/CA\_SHA\_SM\_3DES Cryptographic key generation

**FCS\_COP.1.1/CA\_SHA\_SM\_3DES** The TSF shall perform **hashing** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
SHA1	None	[R26]

### FCS\_COP.1/CA\_SHA\_SM\_AES Cryptographic key generation

**FCS\_COP.1.1/CA\_SHA\_SM\_AES** The TSF shall perform **hashing** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length	Standards
-------------------------	------------	-----------

	(bits)	
SHA1 and SHA256	None	[R26]

#### FCS\_COP.1/CA\_SYM\_SM\_3DES Cryptographic key generation

**FCS\_COP.1.1/CA\_SYM\_SM\_3DES** The TSF shall perform **SM encryption and decryption** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
3DES CBC mode	112	[R26]

#### FCS\_COP.1/CA\_SYM\_SM\_AES Cryptographic key generation

**FCS\_COP.1.1/CA\_SYM\_SM\_AES** The TSF shall perform **SM encryption and decryption** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
AES	128, 192 and 256	[R26]

#### FCS\_COP.1/CA\_MAC\_SM\_3DES Cryptographic key generation

**FCS\_COP.1.1/CA\_MAC\_SM\_3DES** The TSF shall perform **SM message authentication code** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
3DES Retail MAC	112	[R38]

### FCS\_COP.1/CA\_MAC\_SM\_AES Cryptographic key generation

**FCS\_COP.1.1/CA\_MAC\_SM\_AES** The TSF shall perform **SM message authentication code** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
AES CMAC	128, 192 and 256	[R38]

### FIA\_UAU.1/CA Timing of authentication

**FIA\_UAU.1.1/CA** 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/CA** The TSF shall require each user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user.

### FIA\_UAU.5/CA\_3DES Multiple authentication mechanisms

**FIA\_UAU.5.1/CA\_3DES** The TSF shall provide

1. Secure Messaging in MAC-ENC mode
2. Symmetric Authentication Mechanism based on 3DES

to support user authentication.

**FIA\_UAU.5.2/CA\_3DES** The TSF shall authenticate any user's claimed identity according to the

1. 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

### FIA\_UAU.5/CA\_AES Multiple authentication mechanisms

**FIA\_UAU.5.1/CA\_AES** The TSF shall provide

1. Secure Messaging in MAC-ENC mode
  2. Symmetric Authentication Mechanism based on AES
- to support user authentication.

**FIA\_UAU.5.2/CA\_AES** The TSF shall authenticate any user's claimed identity according to the

1. 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

### **FIA\_UAU.6/CA Re-authenticating**

**FIA\_UAU.6.1/CA** The TSF shall re-authenticate the user under the conditions **each command sent to the TOE after successful run of the CA shall be verified as being sent by the inspection system**

### **FIA\_UID.1/CA Timing of identification**

**FIA\_UID.1.1/CA** 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/CA** The TSF shall require each user to be successfully identified before allowing any other TSF-mediated actions on behalf of that user.

### **FPT\_EMS.1/CA TOE Emanation**

**FPT\_EMS.1.1/CA** The TOE shall not emit **power variations, timing variations during command execution** in excess of **non useful information** enabling access to

1. Chip Authentication: Session Keys, Private Key (CAK)

**FPT\_EMS.1.2/CA** The TSF shall ensure any **unauthorized users** are unable to use the following interface **smart card circuit contacts** to gain access to

1. Active Authentication: Session Keys, Private Key (CAK)

### FPT\_TST.1/CA TSF testing

**FPT\_TST.1.1/CA** The TSF shall run a suite of self tests to demonstrate the correct operation of **the TSF, at the conditions:**

- **When performing the Chip Authentication**

**FPT\_TST.1.2/CA** The TSF shall provide authorised users with the capability to verify the integrity of **TSF data.**

**FPT\_TST.1.3/CA** The TSF shall provide authorised users with the capability to verify the integrity of **stored TSF executable code.**

### FMT\_MTD.1/CA\_KEY\_WRITE Management of TSF data

**FMT\_MTD.1.1/CA\_KEY\_WRITE** The TSF shall restrict the ability to **write** the **CAK** to **Personalization Agent.**

### FMT\_MTD.1/CA\_KEY\_READ Management of TSF data

**FMT\_MTD.1.1/CA\_KEY\_READ** The TSF shall restrict the ability to **read** the **CAK** to **none.**

### FDP\_UCT.1/CA Basic data exchange confidentiality

**FDP\_UCT.1.1/CA [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 protocol.**

### FDP\_UIT.1/CA Data exchange integrity

**FDP\_UIT.1.1/CA [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 protocol**

**FDP\_UIT.1.2/CA [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 protocol**

### 9.1.6 Terminal Authentication SFR

#### FCS\_COP.1/TA\_SHA\_RSA Cryptographic key generation

**FCS\_COP.1.1/TA\_SHA\_RSA** The TSF shall perform **hashing** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
SHA1, SHA256 and SHA 512	None	[R26]

#### FCS\_COP.1/TA\_SHA\_SM\_ECC Cryptographic key generation

**FCS\_COP.1.1/TA\_SHA\_SM\_ECC** The TSF shall perform **hashing** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
SHA1, SHA224, SHA256, SHA384 and SHA512	None	[R26]

#### FCS\_COP.1/TA\_SIG\_VER\_RSA Cryptographic key generation

**FCS\_COP.1.1/TA\_SIG\_VER\_RSA** The TSF shall perform **digital signature verification** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
RSA coupled with SHA	From 1024 to 4096, with a step of 256	[R38]

### FCS\_COP.1/TA\_SIG\_VER\_ECC Cryptographic key generation

FCS\_COP.1.1/TA\_SIG\_VER\_ECC The TSF shall perform **digital signature verification** in accordance with a specified cryptographic algorithm [**cryptographic algorithm**] and cryptographic key sizes [**key length**] that meet the following [**standard**]:

Cryptographic algorithm	Key length (bits)	Standards
ECC coupled with SHA	From 192 to 521	[R38]

### FIA\_UAU.4/TA Single-use authentication mechanisms

FIA\_UAU.4.1/TA The TSF shall prevent reuse of authentication data related to

1. Terminal Authentication Protocol

### FMT\_MTD.1/TA\_CVCA\_UPD Management of TSF data

FMT\_MTD.1.1/TA\_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/TA\_DATE Management of TSF data

FMT\_MTD.1.1/TA\_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

### FPT\_TST.1/TA TSF testing

FPT\_TST.1.1/TA The TSF shall run a suite of self tests to demonstrate the correct operation of **the TSF**, at the conditions:

- When using the CVCA Root key
- When verifying a certificate with an extracted public key  $\mu$
- When performing a Terminal authentication

**FPT\_TST.1.2/TA** The TSF shall provide authorised users with the capability to verify the integrity of TSF data.

**FPT\_TST.1.3/TA** The TSF shall provide authorised users with the capability to verify the integrity of stored TSF executable code.

### **FMT\_SMR.1/TA Security roles**

**FMT\_SMR.1.1/TA** The TSF shall maintain the roles

- 1. Country Verifying Certification Authority**
- 2. Document Verifier**
- 3. Domestic Extended Inspection System**
- 4. Foreign Extended Inspection System**

**FMT\_SMR.1.2/TA** The TSF shall be able to associate users with roles.

### **FMT\_MTD.1/TA\_CVCA\_INI Management of TSF data**

**FMT\_MTD.1.1/TA\_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

## **9.1.7 Extended Access Control SFR**

### **FDP\_ACC.1/EAC Subset access control**

**FDP\_ACC.1.1/EAC** 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** of the logical MRTD

### **FDP\_ACF.1/EAC Security attribute based access control**

**FDP\_ACF.1.1/EAC** The TSF shall enforce the **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**

**3. Security attributes**

- a. Authentication status of terminals**
- b. Terminal Authorization**

**FDP\_ACF.1.2/EAC** 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 read the data of the EF.COM, EF.SOD, EF.DG1 to EF.DG16 of the logical MRTD**
- 2. The successfully authenticated EIS 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 EIS 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/EAC** The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: **none**.

**FDP\_ACF.1.4/EAC** 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**

**Application Note:**

Note the BAC mechanism controls the read access of the EF.COM, EF.SOD, EF.DG1, EF.DG2, EF.DG5 to EF.DG16 of the logical MRTD. According to P.BAC-PP this security features of the MRTD are not subject of this protection profile.

## FMT\_MTD.3/EAC Secure TSF data

**FMT\_MTD.3.1/EAC [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.

## FIA\_UAU.5/EAC Multiple authentication mechanisms

**FIA\_UAU.5.1/EAC** The TSF shall provide

1. **Terminal Authentication Protocol**
  2. **Secure messaging in MAC-ENC mode**
- to support user authentication.

**FIA\_UAU.5.2/EAC** The TSF shall authenticate any user's claimed identity according to the

1. **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**

## FMT\_LIM.1/EAC Limited capabilities

**FMT\_LIM.1.1/EAC** 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. Sensitive User Data (EF.DG3 and EF.DG4) to be disclosed (not available for BAC)**

## FMT\_LIM.2/EAC Limited availability

**FMT\_LIM.2.1/EAC** 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 disclosed**

## 9.2 Security Assurance Requirements

The security assurance requirement level is EAL5+ augmented with ALC\_DVS.2, AVA\_VAN.5.

## 10 TOE SUMMARY SPECIFICATION

### 10.1 TOE Summary Specification

#### Access Control in reading

This function controls access to read functions 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 following keys are never readable:

- BAC keys
- Chip Authentication keys,
- Active Authentication private key
- Personalization Agent keys
- MSK and LSK
- CVCA 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 & DG4), the Document Security Object, EF.CVA, EF.COM only after BAC authentication and through a valid secure channel
- When the EAC was successfully performed, the terminal can only read the DG3 & DG4 provided the access rights are sufficient through a valid secure channel

In the personalization phase

- The Personalization 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 memory 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 additional code.

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 [R38]

In the personalization phase

- The Personalization 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).

### **Active Authentication**

This security functionality ensures the Active Authentication is performed as described in [R38]. (if it is activated by the personalizer).

### **EAC mechanism**

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

- It handles the certificate verification
- 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 Personalization Agent loaded during the personalization phase. Furthermore, this security functionalities ensures the authentication is performed as described in [R4].

This security functionalities 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.

### **Personalization**

This security functionality ensures the TOE, when delivered to the Personalization 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. This TSF can use a Secure Messaging described in the TSF Secure Messaging.

### **Physical protection**

This security functionality protects the TOE against physical attacks.

### Prepersonalization

This security functionality ensures the TOE, when delivered to the Prepersonalization 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. This function is in charge of pre-initializing the product and loading additional code if needed. This TSF is conformant with [R44]. This TSF can use a Secure Messaging described in the TSF Secure Messaging.

### 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.

### Secure Messaging

This security functionality ensures the confidentiality, authenticity & integrity of the communication between the TOE and the IFD. After a successful BAC authentication, a secure channel is established based on Triple DES algorithm, and after a successful Chip Authentication, a secure channel is established based on Triple DES/AES algorithms.

This security functionality ensures

- No commands were inserted, modified nor deleted within the data flow
- The data exchanged remain confidential

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

This Secure Messaging can be combined with the Active Authentication.

This TSF can provide a GP Secure Messaging (SCP02 or SCP03) for the Prepersonalization or Personalization.

### Self tests

The TOE performs self tests to verify the integrity on the TSF data:

- Before the TSF data usage
- The additional code integrity is checked at each POWER ON of the card
- The integrity of keys and sensitive data is ensured

## 11 RATIONALES

Threats	Security Objectives
<a href="#">T.Read Sensitive Data</a>	<a href="#">OT.Sens Data Conf</a> , <a href="#">OE.Authoriz Sens Data</a> , <a href="#">OE.Ext Insp Systems</a>
<a href="#">T.Forgery</a>	<a href="#">OT.AC Pers</a> , <a href="#">OE.Personalization</a> , <a href="#">OT.Data Int</a> , <a href="#">OT.Prot Phys-Tamper</a> , <a href="#">OE.Exam MRTD</a> , <a href="#">OE.Exam MRTD AA</a> , <a href="#">OE.Pass Auth Sign</a> , <a href="#">OE.Pass Auth Verif</a>
<a href="#">T.Counterfeit</a>	<a href="#">OT.CA Proof</a> , <a href="#">OE.Auth Key MRTD</a> , <a href="#">OE.Exam MRTD</a> , <a href="#">OT.AA Proof</a> , <a href="#">OE.Activ Auth Verif</a> , <a href="#">OT.Data Int AA</a>
<a href="#">T.Abuse-Func</a>	<a href="#">OT.Prot Abuse-Func</a> , <a href="#">OE.Personalization</a>
<a href="#">T.Information Leakage</a>	<a href="#">OT.Prot Inf Leak</a>
<a href="#">T.Phys-Tamper</a>	<a href="#">OT.Prot Phys-Tamper</a>
<a href="#">T.Malfunction</a>	<a href="#">OT.Prot Malfunction</a>
<a href="#">T.Unauthorized Load</a>	<a href="#">OT.Secure Load ACode</a>
<a href="#">T.Bad Activation</a>	<a href="#">OT.Secure AC Activation</a>
<a href="#">T.TOE Identification Forgery</a>	<a href="#">OT.TOE Identification</a>

**Table 13- Threats and Security Objectives – coverage**

OSP	Security Objectives
<a href="#">P.BAC-PP</a>	<a href="#">OE.BAC-PP</a>
<a href="#">P.Sensitive Data</a>	<a href="#">OT.Sens Data Conf</a> , <a href="#">OE.Authoriz Sens Data</a> , <a href="#">OE.Ext Insp Systems</a>
<a href="#">P.Manufact</a>	<a href="#">OT.Identification</a>
<a href="#">P.Personalization</a>	<a href="#">OT.AC Pers</a> , <a href="#">OT.Identification</a> , <a href="#">OE.Personalization</a>
<a href="#">P.Activ Auth</a>	<a href="#">OT.AA Proof</a>

**Table 14 - OSPs and Security Objectives – Coverage**

Assumptions	OE
<a href="#">A.MRTD Manufact</a>	<a href="#">OE.MRTD Manufact</a>
<a href="#">A.MRTD Delivery</a>	<a href="#">OE.MRTD Delivery</a>
<a href="#">A.Pers Agent</a>	<a href="#">OE.Personalization</a>
<a href="#">A.Insp Sys</a>	<a href="#">OE.Exam MRTD</a> , <a href="#">OE.Prot Logical MRTD</a>
<a href="#">A.Signature PKI</a>	<a href="#">OE.Exam MRTD</a> , <a href="#">OE.Pass Auth Verif</a> , <a href="#">OE.Activ Auth Sign</a>
<a href="#">A.Auth PKI</a>	<a href="#">OE.Authoriz Sens Data</a> , <a href="#">OE.Ext Insp Systems</a>
<a href="#">A.Insp Sys AA</a>	<a href="#">OE.Exam MRTD AA</a> , <a href="#">OE.Prot Logical MRTD AA</a>

**Table 15 - Assumptions and OE – Coverage**

The other rationales are available in the complete ST.

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## 13 ACRONYMS

AA	Active Authentication
BAC	Basic Access Control
CC	Common Criteria Version 3.1 revision 4
CPLC	Card personalization 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/O	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
OCR	Optical Character Recognition
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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