

LDS V10.1 Applet in BAC Configuration with CA and AA

Public Security Target



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1 Introduction

This Security Target aims to satisfy the requirements of Common Criteria level EAL4+, augmented with ADV_FSP.5, ADV_INT.2, ADV_TDS.4, ALC_DVS.2, ALC_CMS.5, ALC_TAT.2 and ATE_DPT.3 in defining the security enforcing functions of the Target Of Evaluation and describing the environment in which it operates. The basis for this composite evaluation is the composite evaluation of open platform *COSMO V8.2* and configurable Java Card application, LDS V10.1.

The LDS V10.1 can have different configurations as described in Section 2.1. The present ST considers the configuration BAC, CA and AA (Configuration 3 in Table 6).

It is activated in ROM during pre-personalization phase.

The LDS V10.1 works on the ID-One Cosmo v8.2 Platform. The platform is covered by the Security Target [54].

1.1 Security target Reference

The Security target is identified as follows:

Title	LDS V10.1 in BAC Configuration with CA and AA – Public Security Target
ST Identification	FQR 550 0075 Ed 4
CC Version	3.1 Revision 5
Assurance Level	EAL4 augmented with ADV_FSP.5, ADV_INT.2, ADV_TDS.4, ALC_DVS.2, ALC_CMS.5, ALC_TAT.2 and ATE_DPT.3
ITSEF	CEA-LETI
Certification Body	ANSSI
Compliant To Protection Profile	PP-BAC [47]

Table 1: ST Reference

1.2 TOE Reference

TOE Commercial Name	LDS V10.1 in BAC Configuration with AA and CA on ID-One Cosmo V8.2
Applet Code Version	06 70 01 2F
Platform Codop Identification	09 47 41
Guidance Documents	[60], [61], [55], [56], [57] and [58]
Platform Name	ID-One Cosmo v8.2 Platform
Platform Certificate	ANSSI-CC-2020/26
Communication Protocol	Contact, Contactless and Dual
IC Identifier	NXP Secure Smart Card Controller P6022y VB
IC Certificate	BSI-DSZ-CC-1059-V3-2019 BSI-DSZ-CC-1059-2018

Table 2: TOE REFERENCES

Note: For the LDS applet to function in the certified configuration, the patch code identified in the table above needs to be present in the platform. Its presence can be checked as described in Section 3.1 of [60] or Section 2.2 of [61].

1.3 TOE Identification

The aim of the paragraphs is to allow the user to identify uniquely the TOE. The TOE is composed of application [LDS V10.1 Security Target BAC, CA and AA] and a COSMO v8.2 platform on the IC.

1.3.1 TOE Identification

This chapter presents the means to identify the evaluated application and the Platform.

The [LDS V10.1 Security Target BAC, CA and AA] installation command **shall** use the executable load File AID and module AID

Name	Value
Executable Load File (ELF) AID	A0000000770100000710000000000005
Executable Module AID	A0000000770100000710000100000005
Application AID	A0000002471001

Table 3 – AID LDS V10.1 Security Target BAC, CA and AA application

1.3.2 Platform Identification

In order to assure the authenticity of the card, the product identification shall be verified by analysing:

Platform Name	ID-One Cosmo v8.2 Platform
Mask / Hardware Identification	091121
Label GIT code	IDOne_Cosmo_V8.2_091121
IC reference version	NXP P60D145
IC configuration	NXP P6022y VB
IC ST identification	<ol style="list-style-type: none"> 1. NXP Secure Smart Card Controller P6022y VB Security Target Lite Rev. 2.6 — 23 August 2019 BSI-DSZ-CC-1059-V3-2019 2. NXP Secure Smart Card Controller P6022y VB Security Target Lite Rev. 2.1 - 6 April 2018 BSI-DSZ-CC-1059-2018
IC EAL	EAL6 with augmentations: ALC_FLR.1 and ASE_TSS.2
IC certificate	BSI-DSZ-CC-1059-V3-2019 BSI-DSZ-CC-1059-2018

Table 4: Platform Identification

The evaluated platform allows the loading of patch. The patch reference is specified in the platform ST for ID-One Cosmo v8.2 Platform and the associated platform certificate.

1.3.3 Configuration of the platform

In the present evaluation, the loading of application (Java Card Applets) on the platform at use phase is allowed. It can be forbidden if requested by the product issuer.

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[61] FQR 220 1425 Ed3 – AGD_OPE

1.5 Definitions

DES	Data Encryption Standard
DF	Dedicated File
DH	Diffie Hellman
EAL	Evaluation Assurance Level
EF	Elementary File
EEPROM	Electrically Erasable Programmable Read Only Memory
FID	File identifier
GP	Global Platform
IC	Integrated Chip
ICC	Integrated Chip card
IFD	Interface Device
MAC	Message Authentication code
PIN	Personal Identification Number
PKI	Public Key Infrastructure
ROM	Read Only Memory
RSA	Rivest Shamir Adleman
RSA CRT	Rivest Shamir Adleman – Chinese Remainder Theorem
SCP	Secure Channel Protocol
SHA	Secure hashing Algorithm
TOE	Target of evaluation

1.6 Technical terms definition

Term	Definition
Active Authentication	Security mechanism defined in [6] option by which means the MRTD's chip proves and the inspection system verifies the identity and authenticity of the MRTD's chip as part of a genuine MRTD issued by a known State or Organization.
Audit records	Write-only-once non-volatile memory area of the MRTDs chip to store the Initialization Data and Pre-personalization Data.
Authenticity	Ability to confirm the MRTD and its data elements on the MRTD's chip were created by the issuing State or Organization.
Basic Access Control (BAC)	Security mechanism defined in [6] by which means the MRTD's chip proves and the inspection system protects their communication by means of secure messaging with Document Basic Access Keys (see there).
Basic Inspection System (BIS)	An inspection system which implements the terminals part of the Basic Access Control Mechanism and authenticates itself to the MRTD's chip using the Document Basic Access Keys derived from the printed MRZ data for reading the logical MRTD.
Biographical data (biodata)	The personalized details of the MRTD holder of the document appearing as text in the visual and machine readable zones on the biographical data page of a passport book or on a travel card or visa.
Biometric reference data	Data stored for biometric authentication of the MRTD holder in the MRTD's chip as (i) digital portrait and (ii) optional biometric reference data.
Counterfeit	An unauthorized copy or reproduction of a genuine security document made by whatever means.

Term	Definition
Country Signing CA Certificate (Ccsca)	Self-signed certificate of the Country Signing CA Public Key (KPU_CSCA) issued by CSCA stored in the inspection system.
Document Basic Access Keys	Pair of symmetric (two-key) Triple-DES keys used for secure messaging with encryption (key KENC) and message authentication (key KMAC) of data transmitted between the MRTD's chip and the inspection system. It is drawn from the printed MRZ of the passport book to authenticate an entity able to read the printed MRZ of the passport book.
Document Security Object (SOD)	A RFC3369 CMS Signed Data Structure, signed by the Document Signer (DS). Carries the hash values of the LDS Data Groups. It is stored in the MRTD's chip. It may carry the Document Signer Certificate (CDS).
Eavesdropper	A threat agent with Enhanced-Basic attack potential reading the communication between the MRTD's chip and the inspection system to gain the data on the MRTD's chip.
Enrolment	The process of collecting biometric samples from a person and the subsequent preparation and storage of biometric reference templates representing that person's identity.
Extended Access Control (EAC)	Security mechanism identified in [48] by which means the MRTD's chip (i) verifies the authentication of the inspection systems authorized to read the optional biometric reference data, (ii) controls the access to the optional biometric reference data and (iii) protects the confidentiality and integrity of the optional biometric reference data during their transmission to the inspection system by secure messaging. The Personalization Agent may use the same mechanism to authenticate themselves with Personalization Agent Private Key and to get write and read access to the logical MRTD and TSF data.
Extended Inspection System (EIS)	A role of a terminal as part of an inspection system which is in addition to Basic Inspection System authorized by the issuing State or Organization to read the optional biometric reference data and supports the terminals part of the Extended Access Control Authentication Mechanism.
Forgery	Fraudulent alteration of any part of the genuine document, e.g. changes to the biographical data or the portrait.
Global Interoperability	The capability of inspection systems (either manual or automated) in different States throughout the world to exchange data, to process data received from systems in other States, and to utilize that data in inspection operations in their respective States. Global interoperability is a major objective of the standardized specifications for placement of both eye-readable and machine readable data in all MRTDs.
IC Dedicated Support Software	That part of the IC Dedicated Software (refer to above) which provides functions after TOE Delivery. The usage of parts of the IC Dedicated Software might be restricted to certain phases.
IC Dedicated Test Software	That part of the IC Dedicated Software (refer to above) which is used to test the TOE before TOE Delivery but which does not provide any functionality thereafter.
IC Identification Data	The IC manufacturer writes a unique IC identifier to the chip to control the IC as MRTD material during the IC manufacturing and the delivery process to the MRTD manufacturer (i.e MRTD packaging responsible).
Impostor	A person who applies for and obtains a document by assuming a false name and identity, or a person who alters his or her physical appearance to represent himself or herself as another person for the purpose of using that person's document.

Term	Definition
Improperly document person	A person who travels, or attempts to travel with: (a) an expired travel document or an invalid visa; (b) a counterfeit, forged or altered travel document or visa; (c) someone else's travel document or visa; or (d) no travel document or visa, if required.
Initialisation	Process of writing Initialisation Data (see below) to the TOE.
Initialization Data	Any data defined by the TOE Manufacturer and injected into the non-volatile memory by the Integrated Circuits manufacturer (Phase 2). These data are for instance used for traceability and for IC identification as MRTD's material (IC identification data).
Inspection	The act of a State examining an MRTD presented to it by a traveler (the MRTD holder) and verifying its authenticity.
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.
Integrated Circuit (IC)	Electronic component(s) designed to perform processing and/or memory functions. The MRTD's chip is a integrated circuit.
Integrity	Ability to confirm the MRTD and its data elements on the MRTD's chip have not been altered from that created by the issuing State or Organization
Issuing Organization	Organization authorized to issue an official travel document (e.g. the United Nations Organization, issuer of the Laissez-passer).
Issuing State	The Country issuing the MRTD.
Logical Data Structure (LDS)	The collection of groupings of Data Elements stored in the optional capacity expansion technology. The capacity expansion technology used is the MRTD's chip.
Logical MRTD	Data of the MRTD holder stored according to the Logical Data Structure, as specified by ICAO on the contactless integrated circuit. It presents contactless readable data including (but not limited to) <ul style="list-style-type: none"> (1) personal data of the MRTD holder, (2) the digital Machine Readable Zone Data (digital MRZ data, EF.DG1), (3) the digitized portraits (EF.DG2), (4) the biometric reference data of finger(s) (EF.DG3) or iris image(s) (EF.DG4) or both and (5) the other data according to LDS (EF.DG5 to EF.DG16). (6) EF.COM and EF.SOD
Logical travel document	Data stored according to the Logical Data Structure as specified by ICAO in the contactless integrated circuit including (but not limited to) <ul style="list-style-type: none"> (1) data contained in the machine-readable zone (mandatory), (2) digitized photographic image (mandatory) and (3) fingerprint image(s) and/or iris image(s) (optional).
Machine Readable Travel Document (MRTD)	Official document issued by a State or Organization which is used by the holder for international travel (e.g. passport, visa, official document of identity) and which contains mandatory visual (eye readable) data and a separate mandatory data summary, intended for global use, reflecting essential data elements capable of being machine read.
Machine Readable Visa (MRV)	A visa or, where appropriate, an entry clearance (hereinafter collectively referred to as visas) conforming to the specifications contained herein, formulated to improve facilitation and enhance security for the visa holder. Contains mandatory visual (eye readable) data and a separate mandatory data summary capable of being machine read. The MRV is normally a label which is attached to a visa page in a passport.
Machine Readable Zone (MRZ)	Fixed dimensional area located on the front of the MRTD or MRP Data Page or, in the case of the TD1, the back of the MRTD, containing mandatory and optional data for machine reading using OCR methods.

Term	Definition
Machine-verifiable biometrics feature	A unique physical personal identification feature (e.g. an iris pattern, fingerprint or facial characteristics) stored on a travel document in a form that can be read and verified by machine.
MRTD application	Non-executable data defining the functionality of the operating system on the IC as the MRTD's chip. It includes - the file structure implementing the LDS - the definition of the User Data, but does not include the User Data itself (i.e. content of EF.DG1 to EF.DG14, EF.DG 16, EF.COM and EF.SOD) and - the TSF Data including the definition the authentication data but except the authentication data itself.
MRTD Basic Access Control	Mutual authentication protocol followed by secure messaging between the inspection system and the MRTD's chip based on MRZ information as key seed and access condition to data stored on MRTD's chip according to LDS.
MRTD holder	The rightful holder of the MRTD for whom the issuing State or Organization personalized the MRTD.
MRTD's Chip	A contactless integrated circuit chip complying with ISO/IEC 14443 and programmed according to the Logical Data Structure as specified by ICAOT.
MRTD's chip Embedded Software	Software embedded in a MRTD's chip and not being developed by the IC Designer. The MRTD's chip Embedded Software is designed in Phase 1 and embedded into the MRTD's chip in Phase 2 of the TOE life-cycle.
Optional biometric reference data	Data stored for biometric authentication of the MRTD holder in the MRTD's chip as (i) encoded finger image(s) (EF.DG3) or (ii) encoded iris image(s) (EF.DG4) or (iii) both. Note that the European commission decided to use only finger print and not to use iris images as optional biometric reference data.
Passive authentication	(i) verification of the digital signature of the Document Security Object and (ii) comparing the hash values of the read LDS data fields with the hash values contained in the Document Security Object.
Personalization	The process by which the portrait, signature and biographical data are applied to the document. This may also include the optional biometric data collected during the "Enrolment" (Step 6).
Personalization Agent	The agent acting on the behalf of the issuing State or Organization to personalize the MRTD for the holder by (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) or (ii) the encoded iris image(s) and (iii) writing these data on the physical and logical MRTD for the holder.
Personalization Agent Authentication Information	TSF data used for authentication proof and verification of the Personalization Agent.
Personalization Agent Key	Symmetric cryptographic authentication key used (i) by the Personalization Agent to prove their identity and get access to the logical MRTD and (ii) by the MRTD's chip to verify the authentication attempt of a terminal as Personalization Agent according to the SFR FIA_UAU.4/BAC, FIA_UAU.5/BAC and FIA_UAU.6/BAC.
Physical travel document	Travel document in form of paper, plastic and chip using secure printing to present data including (but not limited to) (1) biographical data, (2) data of the machine-readable zone, (3) photographic image and (4) other data.
Pre-Personalisation	Process of writing Pre-Personalisation Data to the TOE including the creation of the MRTD Application (Step 5)

Term	Definition
Pre-personalization Data	Any data that is injected into the non-volatile memory of the TOE by the MRTD Manufacturer (i.e IC manufacturer) (Phase 2) for traceability of non-personalized MRTD's and/or to secure shipment within or between life cycle phases 2 and 3. It contains (but is not limited to) the Active Authentication Key Pair and the Personalization Agent Key Pair.
Pre-personalized MRTD's chip	MRTD's chip equipped with an unique identifier and an unique asymmetric Active Authentication Key Pair of the chip.
Primary Inspection System (PIS)	An inspection system that contains a terminal for the contactless communication with the MRTD's chip and does not implement the terminals part of the Basic Access Control Mechanism.
random identifier	Random identifier used to establish a communication to the TOE in Phase 3 and 4 preventing the unique identification of the MRTD and thus participates in the prevention of traceability.
Receiving State	The Country to which the Traveler is applying for entry.
reference data	Data enrolled for a known identity and used by the verifier to check the verification data provided by an entity to prove this identity in an authentication attempt.
secondary image	A repeat image of the holder's portrait reproduced elsewhere in the document by whatever means.
Secure messaging in encrypted mode	Secure messaging using encryption and message authentication code according to ISO/IEC 7816-4
Skimming	Imitation of the inspection system to read the logical MRTD or parts of it via the contactless communication channel of the TOE without knowledge of the printed MRZ data.
Travel document	A passport or other official document of identity issued by a State or Organization, which may be used by the rightful holder for international travel.
Traveler	Person presenting the MRTD to the inspection system and claiming the identity of the MRTD holder.
TSF data	Data created by and for the TOE, that might affect the operation of the TOE.
Unpersonalized MRTD	The MRTD that contains the MRTD Chip holding only Initialization Data and Pre-personalization Data as delivered to the Personalisation Agent from the Manufacturer.
User data	Data created by and for the user, that does not affect the operation of the TSF.
Verification	The process of comparing a submitted biometric sample against the biometric reference template of a single enrollee whose identity is being claimed, to determine whether it matches the enrollee's template.
Verification data	Data provided by an entity in an authentication attempt to prove their identity to the verifier. The verifier checks whether the verification data match the reference data known for the claimed identity.

Table 5: Technical Terms Definition

2 Target of Evaluation

The product **LDS V10.1** is a multi-applicative Java Card product, 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 **Pre-Personalization/Personalization phases** of the product [60].

The product supports the storage and retrieval of structured information compliant to the Logical Data Structure as specified in [44]. It also provides standard authentication protocols, namely Basic Access Control [47], Supplementary Access Control [53] and Extended Access Control [48], and Basic Access Protection.

It can host two types of applications as mentioned above, namely the **IDL** and **MRTD**. 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 loaded on the platform, for details see ST [54].

The LDS V10.1 product architecture can be viewed as shown in the following figure:

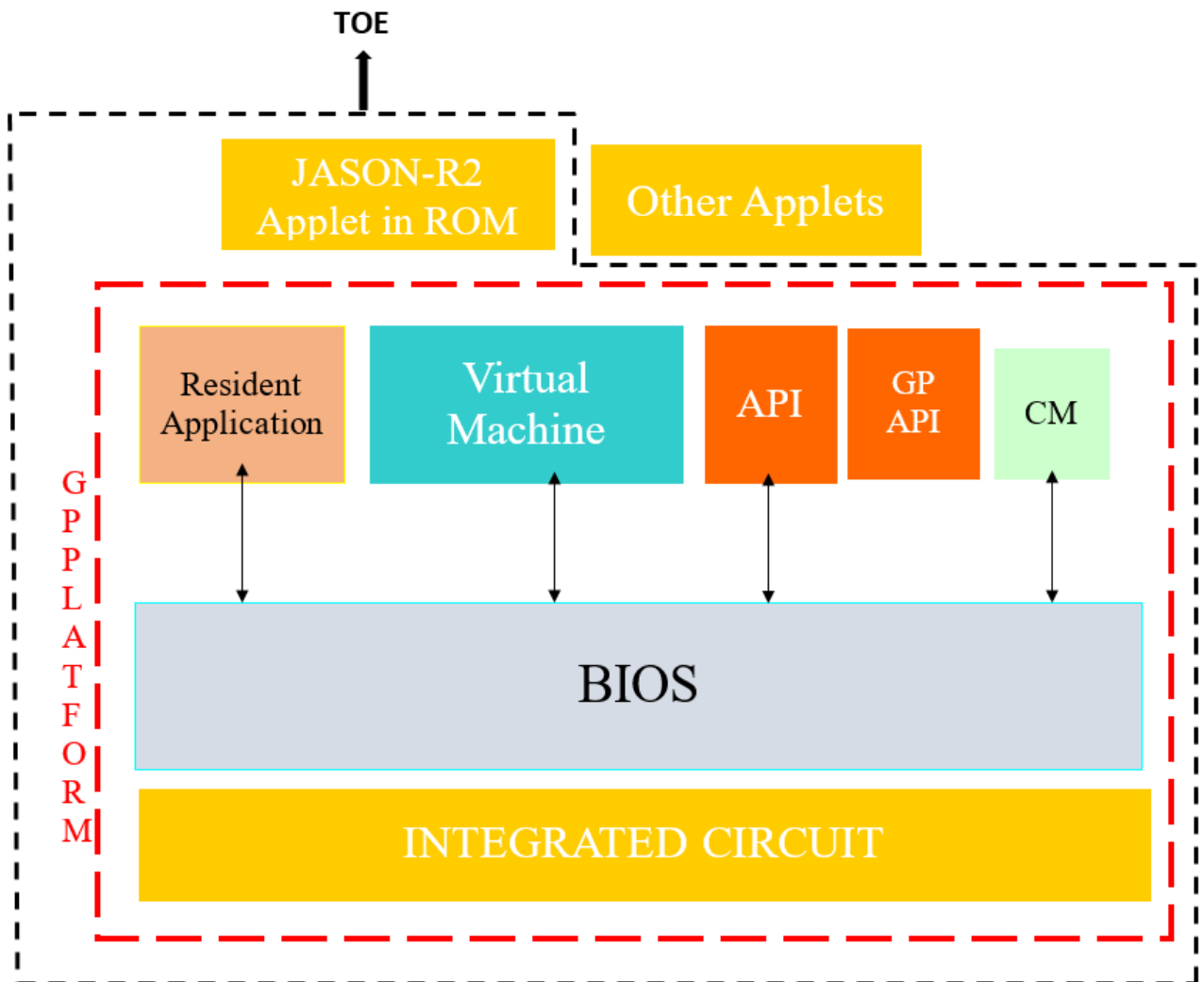


Figure1: TOE Limits

2.1 TOE Overview

The TOE described in this security target is the BAC TOE of the product, conformant to **Configuration 3**. The TOE is composed of the functions: BAC, EAC, AA, CAM, PACE which are all presented in the chapter TOE architecture. Only some parts are in the scope of the evaluation of the present configuration.

Different configurations of the TOE are under evaluation. This ST considers only BAC with AA and CA.

Configuration	PP Conformity	Extensions
1	PP 0068 (PACE)	AA CA CAM
2	PP0056v2 (EAC with PACE)	AA CAM PACE-CAM/TA without CA BAC de-activation SM (DES + AES) on read DG3+DG4 After EAC
3	PP 0055 (BAC)	AA + CA
4	PP0056v1 (EAC)	AA SM (DES + AES) on read DG3+DG4 after EAC BAC

Table 6: 4 Configurations of the LDS application

Except the present evaluation, limited to EAL4 augmented with ADV_FSP.5, ADV_INT.2, ADV_TDS.4, ALC_DVS.2, ALC_CMS.5, ALC_TAT.2, and ATE_DPT.3 all other configurations aim the level EAL5 with the 2 augmentations: ALC_DVS.2 and AVA_VAN.5.

The BAC TOE is instantiated during the application Pre-Personalization with the creation of the MF / DF required for the BAC configuration.

In the use phase of the product, and for interoperability purposes, the MRTD will most likely support BAC, PACE and EAC.

- If the terminal reads the content of the MRTD by performing BAC then EAC, the security of the MRTD will be covered by the security evaluation of the TOE described by the ST claiming compliance [54] and the TOE described by the ST claiming compliance to PP EAC assuming PACE is not supported (as not used for the inspection procedure).
- If the terminal reads the content of the MRTD by performing PACE then EAC, the security of the MRTD will be covered by the security evaluation of the TOE described by the ST claiming compliance to PP with PACE assuming BAC is not supported (as not used for the inspection procedure).

The TOE life cycle is described in § 3.

The TOE identification is described in § 1.3.1.

The TOE scope encompasses the following features:

- Basic Access Control
- Active Authentication
- Chip Authentication

Nevertheless, the TOE in the LDS application embeds other secure functionalities they are not in the scope of this evaluation and are in the scope of other evaluations.

2.1.1 Physical scope

The TOE is physically made up of several components hardware and software. Once constructed, the TOE is a bare microchip with its external interfaces for communication. The physical medium on which the microchip is mounted is not part of the target of evaluation because it does not alter nor modify any security functions of the TOE.

The TOE may be used on several physical medium within an inlay, or eCover; in a plastic card.

The physical form of the module is depicted in Figure below. The cryptographic boundary of the module is the surface and edges of the die and associated bond pads, shown as circles in the following figure.

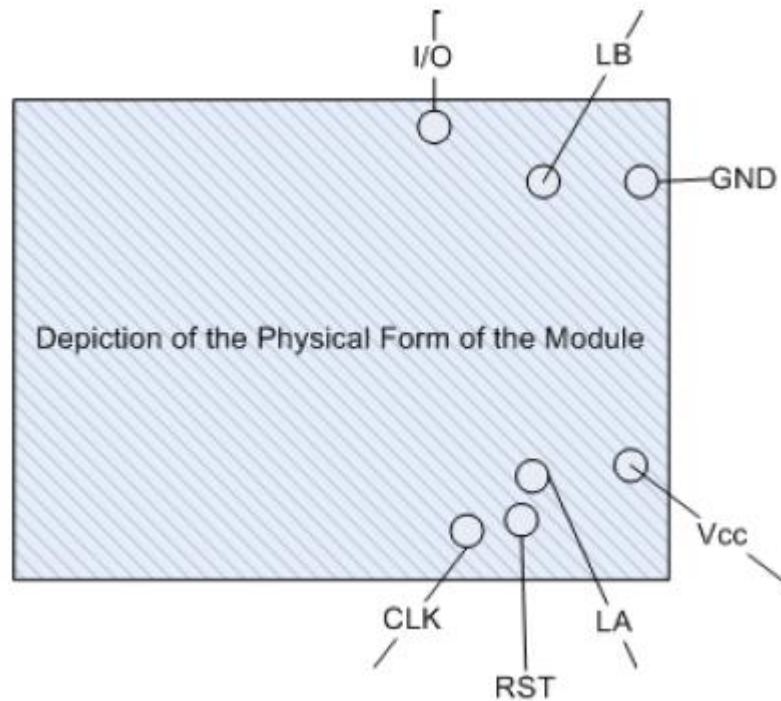


Figure 2: Physical Form

The contactless ports of the module require connection to an antenna. The module relies on [ISO7816] and [ISO14443] card readers and antenna connections as input/output devices.

Port	Description	Logical Interface Type
VCC, GND	ISO 7816: Supply voltage	Power (not available in contactless-only configurations)
RST	ISO 7816:Reset	Control in (not available in contactless-only configurations)
CLK	ISO 7816: Clock	Control in (not available in contactless-only configurations)
I/O	ISO 7816: Input/ Output	Control in, Data in, Data out, Status out (not available in contactless-only configurations)
LA, LB	ISO 14443: Antenna	Power, Control in, Data in, Data out, Status out (Not available in Contact-only configurations)

Table 7: Ports and Interfaces

2.1.2 Required non-TOE hardware/software/firmware

The TOE is an MRTD. It is an independent product and does not need any additional hardware/software/firmware to ensure its security.

In order to be powered up and to be able to communicate the TOE needs a card reader.

2.1.3 TOE Usage and major security features

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 [44][45][46] 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.

2.2 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 Basic Access Control according to 'ICAO Doc 9303'[43] . The TOE allows also Active Authentication and Chip Authentication.

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
- Cosmo V8.2 Platform
- API
- LDS V10.1 application
- Associated guidance documentation

The platform provides an operational environment for the application: all cryptographic algorithm implementations and associated self-tests, random number and key generation, card lifecycle management, and key storage and protection are provided by the platform. The code for this functionality is contained in the platform ROM. However, the factory configuration of the module constrains the module to the set of services provided by the platform's Card Manager (implementing a standard set of GlobalPlatform services),

The applet may be used on a contact mode compliant to ISO/IEC 7816-3 specification or on contactless mode compliant to ISO/IEC 14443 specification.

2.3 TOE Architecture

The TOE is a smartcard, composed of IC, Java Card Platform and the LDS application. Other applications may reside in the TOE.

2.3.1 *Integrated Circuit*

The TOE is embedded on NXP chips; more information on the chips is given in the related public Security Target identified in table 3 of chapter 1.3.2.

2.3.2 *Java Card Platform*

The Operating System is based on Java Card Technology and Global Platform technology. His main responsibilities are:

- **providing interface between the Integrated Circuit and the applet**
- **providing to the applet, basic services to access to memories and all needed cryptographic operations**
- **ensuring global management of the card (loading, installation and deletion of applets) and monitor the security of the card (data integrity and physical attacks counter-measures). For details see [54].**

2.3.3 *Application Functionalities*

This application stores the personal information related to the cardholder of an MRTD or an IDL. It also allows governmental organizations to retrieve these pieces of data.

The applet supports the authentication mechanisms described in ICAO and EAC specifications and ISO/IEC 18013-3 ISO Compliant Driving License specification with a fully configurable access control management over the EFs (EFs).

The applet may be used on a contact mode (compliant to ISO/IEC 7816-3 specification) and/or contactless mode (compliant to ISO/IEC 14443 specification).

The compliancy of the applet to LDS, EAC, or IDL, is achieved provided a correct personalization is performed. The correct authentication mechanisms and access conditions over the EFs must be assigned.

In summary, the applet supports the following authentication mechanisms stated in the ICAO specifications (for MRTD) and the ISO Compliant Driving License standard (for IDL):

- Active Authentication (AA)
- Basic Access Control (BAC) / Basic Access Protection Mode 1 (BAP1)
- Password Authenticated Connection Establishment (PACE)
- Extended Access Control (EAC)
- Chip Authentication Mapping (CAM)

All authentication mechanisms are listed in the following chapters, all are part of the product but only some are part of the present evaluation.

2.3.3.1 Active Authentication (AA)

Active Authentication is an authentication mechanism ensuring the chip is genuine. It uses a challenge-response protocol between the IS and the chip.

Active Authentication is realized with the INTERNAL AUTHENTICATE command.

The key and algorithms supported are the following:

RSA ISO/IEC 9796-2 with a key length of 1024 bits, 1536 bits or 2048 bits and hashing algorithm of SHA1 or SHA2.

ECDSA over prime field curves with hashing algorithm of SHA1 or SHA2 and the key sizes 192 to 512.

AES-256 using ISO/IEC 9797-1 M2 padding method.

TDES with double and triple length keys using ISO/IEC 9797-1 M2 padding method.

2.3.3.2 Basic Access Control (BAC)

The protocol for Basic Access Control is specified by ICAO [47] 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 [41] 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 Basic Access Control (BAC) is a security feature that is supported by the TOE. The inspection system: Reads the printed data in the MRZ (for 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 purpose of this mechanism is to ensure that the holder gives access to the IS to the logical MRTD (data stored in the chip); It is achieved by a mutual authentication.

Once the mutual authentication is performed, a secure messaging is available to protect the communication between the chip and the IS.

This table lists the supported configurations for BAC protocol:

Configuration	Key Algo	Key Length	Hash Algo	MAC Algo
BAC	3DES 2Key	16-bytes	SHA-1	Retail MAC

Table 8: BAC Configuration

2.3.3.3 Terminal Authentication

The Terminal Authentication Protocol is a two move challenge-response protocol that provides explicit unilateral authentication of the terminal.

This protocol enables the MRTD chip to verify that the terminal is entitled to access sensitive data. As the terminal may access sensitive data afterwards, all further communication MUST be protected appropriately. Terminal Authentication therefore also authenticates an ephemeral public key chosen by the terminal that was used to set up Secure Messaging with Chip Authentication. The MRTD chip MUST bind the terminal's access rights to Secure Messaging established by the authenticated ephemeral public key of the terminal.

2.3.3.4 Chip Authentication

The Chip Authentication Protocol is an ephemeral-static Diffie-Hellman key agreement protocol that provides secure communication and unilateral authentication of the MRTD chip.

The protocol establishes Secure Messaging between an MRTD chip and a terminal based on a static key pair stored on the MRTD chip. Chip Authentication is an alternative to the optional ICAO Active Authentication, i.e. it enables the terminal to verify that the MRTD chip is genuine but has two advantages over the original protocol:

Challenge Semantics are prevented because the transcripts produced by this protocol are non-transferable. Besides authentication of the MRTD chip this protocol also provides strong session keys.

The protocol in version 1 provides implicit authentication of both the MRTD chip itself and the stored data by performing Secure Messaging using the new session keys.

The protocol in Version 2 provides explicit authentication of the MRTD chip by verifying the authentication token and implicit authentication of the stored data by performing Secure Messaging using the new session keys.

2.3.3.5 Password Authenticated Connection Establishment (PACE)

PACE is an access control mechanism that is supplemental to BAC. It is a cryptographically stronger access control mechanism than BAC since it uses asymmetric cryptography compared to BAC's symmetric cryptography.

PACE is realized through 5 commands:

1. MSE SET – AT command
2. GENERAL AUTHENTICATE command – Encrypted Nonce
3. GENERAL AUTHENTICATE command – Map Nonce
4. GENERAL AUTHENTICATE command – Perform Key Agreement
5. GENERAL AUTHENTICATE command – Mutual Authentication

Once the mutual authentication is performed, a secure messaging is available to protect the communication between the chip and the IS.

This table lists the supported configurations for PACE protocol:

Configuration	Mapping	Key Algo	Key Length (in bytes)	Secure Messaging	Auth. Token	Hash Algo
PACE-ECDH-GM-3DES	Generic	3DES 2Key	16	CBC / Retail MAC	Retail MAC	SHA-1
PACE-ECDH-GM-AES-128	Generic	AES	16	CBC / CMAC	CMAC	SHA-1
PACE-ECDH-GM-AES-192	Generic	AES	24	CBC / CMAC	CMAC	SHA-256
PACE-ECDH-GM-AES-256	Generic	AES	32	CBC / CMAC	CMAC	SHA-256
PACE-ECDH-IM-3DES	Integrated	3DES 2Key	16	CBC / Retail MAC	Retail MAC	SHA-1

PACE-ECDH-IM-AES-128	Integrated	AES	16	CBC / CMAC	CMAC	SHA-1
PACE-ECDH-IM-AES-192	Integrated	AES	24	CBC / CMAC	CMAC	SHA-256
PACE-ECDH-IM-AES-256	Integrated	AES	32	CBC / CMAC	CMAC	SHA-256
PACE-ECDH-CAM-AES-128	Chip Authentication	AES	16	CBC / CMAC	CMAC	SHA-1
PACE-ECDH-CAM-AES-192	Chip Authentication	AES	24	CBC / CMAC	CMAC	SHA-256
PACE-ECDH-CAM-AES-256	Chip Authentication	AES	32	CBC / CMAC	CMAC	SHA-256

Table 9: PACE Configuration

2.3.3.6 Extended Access Control (EAC)

EAC is an authentication protocol based on a PKI infrastructure. It further ensures that the IS is authorized to read and/or update data stored in the applet. This authentication mechanism generates a strong secure messaging session through the step of Chip Authentication.

This mechanism is realized by the following steps:

1. Chip Authentication (CA) Chip Authentication is achieved by using a `MANAGE SECURITY ENVIRONMENT – SET – Key Agreement Template (MSE SET KAT)` command or by using a `MANAGE SECURITY ENVIRONMENT – SET – Authentication Template (MSE SET AT)` command followed by `GENERAL AUTHENTICATE` command.

The Chip Authentication mechanism enables the authentication of the chip by using an authenticated DH scheme. It may be realized in two ways:

- Classical DH (DH El Gamal) with key length of 1024, 1536, or 2048 bits
 - DH over Elliptic curves over prime fields (ECDH) with the key length supported by the underlying Java Card platform.
2. Certificate Chain Handling

The certificate chain is processed through a series of `MANAGE SECURITY ENVIRONMENT – SET – Digital Signature Template (MSE SET DST)` and `PERFORM SECURITY OPERATION – Verify Certificate (PSO VERIFY)` commands.

The chain is done to extract a key from the IS certificate, the key which will be used in the Terminal Authentication.

3. Terminal Authentication (TA)
Terminal Authentication is achieved by using an `EXTERNAL AUTHENTICATE` command.

The Terminal Authentication mechanism is an authentication of the IS based on a classical challenge/response scheme. The signature scheme may be: ECDSA SHA-1, ECDSA SHA-224, ECDSA SHA-256, ECDSA SHA-384, or ECDSA SHA-512 on elliptic curves over prime field with key length supported by the underlying Java Card platform
RSA SHA-1, SHA-256, or SHA-512 (PKCS#1 v1.5 or PKCS#1 v2.1 - PSS) with a key length of 1024, 1536, and 2048 bits.

2.3.3.7 PACE-CAM

The Chip Authentication Mapping is a new mapping for PACE which extends the Generic Mapping that integrates Chip Authentication into the PACE protocol. This mapping combines PACE and Chip Authentication

into one protocol PACE-CAM, which allows faster execution than the separate protocols (i.e. PACE + CA + TA).

PACE-CAM is realized the same way as § 2.3.3.6. The only difference is that the chip computes the Chip Authentication Data using the chip's static private key then sends this data to the terminal. The terminal verifies the authenticity of the chip using the recovered Chip Authentication Data.

2.3.3.8 Match On-Card (MOC) Verification

MOC verification may be used to grant some access rights to EFs.

This feature relies on the services provided by the CHV Server applet MOC verification is supported if the *CHV Configuration* is properly configured in the install parameter. Once the MOC verification is allowed the applet will permit the use of CHV-related commands that handles biometric and Global PIN credentials.

2.3.3.9 PIN

The product supports the management of card holder credentials such as Cardholder PIN and Global PIN which can be used to grant access rights to EFs or keys. The Cardholder PIN and Global PIN each have its PIN Unblocking Key (Cardholder PUK and Global PUK, respectively). These PINs and corresponding PUKs have to be initialized during personalization if they are used to protect access to EFs and keys.

2.3.3.10 Watermarking

The watermarking feature may be used to restrict the access to the plain image data of particular EF(s). Enabling the watermarking will cause the image data to be corrupted during the reading of the file contents.

The de-watermarking conditions should be configured accordingly and these conditions must be satisfied in order to grant access to the plain image data, details are in the dedicated security Target.

2.3.3.11 Secure Messaging

The TOE supports the ISO Secure Messaging. It provides a secure channel (i.e. encrypted and authenticated) between application and terminal. Secure Messaging can be set up by Chip Authentication, PACE, or Basic Access Control. The provided security level depends on the mechanism used to set up Secure Messaging.

A session is started when secure messaging is established. The session only ends with the release of secure messaging, e.g. by sending a command without secure messaging.

2.3.3.12 IDEMIA library

A dedicated cryptographic library has been developed and designed by IDEMIA.

This cryptographic library is embedded on the TOE to provide the highest security level and best tuned performances. It is implemented at the platform level and are already in the scope of the platform evaluation.

2.3.4 Mechanism included in the scope of the evaluation

All TOE functionalities are presented in the previous chapter.

The present evaluation includes the listed functionalities:

- BAC mechanism
- AA mechanism
- CA mechanism

2.4 TOE Guidance

The TOE is identified as follows:

Application Guidance	
TOE name (commercial name)	LDS V10.1 on ID-One Cosmo v8.2
Guidance document for preparation	AGD_PRE [60]
Guidance document for operational use	AGD_OPE [61]
Platform Guidance	
Guidance document for Platform Pre-personalisation	COSMO V8.2 Pre-Perso Guide[57]
Developer of sensitive applications*	COSMO V8.2 Security Recommendations [56]
Guidance for application developer*	COSMO V8.2 Reference Guide [58]
Guidance to Issuer of the platform that aims to load applications*	COSMO V8.1-N Application Loading Protection Guidance [55]

Table 10: TOE Guidance REFERENCES

An ST Lite version of this Security Target will also serve as a guidance document.

3 TOE Life Cycle

3.1 TOE Life Cycle Overview

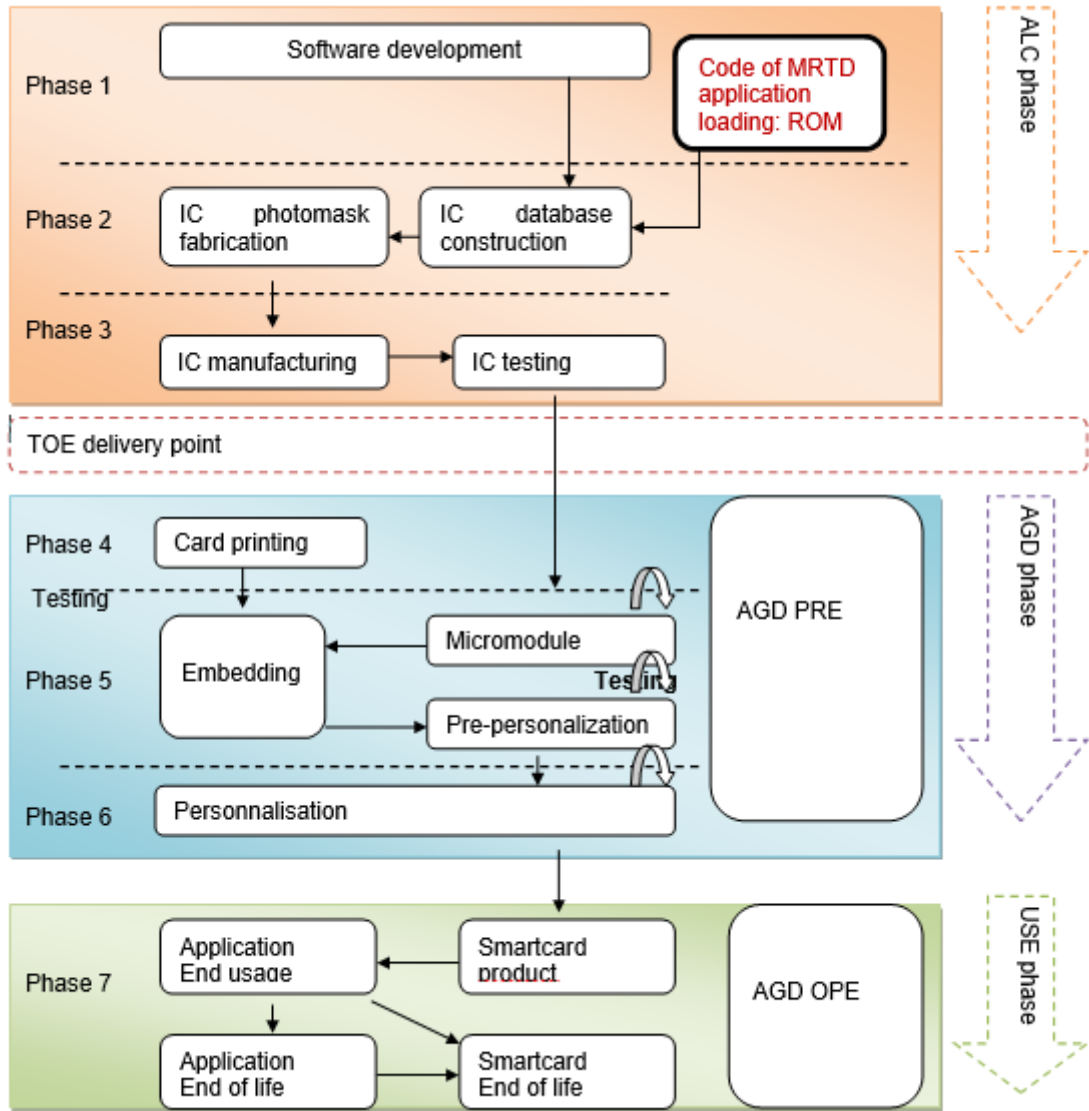


Figure 3: Smartcard product life-cycle for the TOE

The TOE life-cycle classically described in terms of four life-cycle phases is additionally subdivided into 7 steps.

The roles involved in the different steps are listed in the following table:

Roles	Subjects
IC manufacturer	NXP Semiconductors
TOE developer	IDEMIA
Manufacturer	NXP Semiconductors IDEMIA or another agent

Pre-personalizer	IDEMIA or another agent
Personalization Agent	IDEMIA or another agent

Table 11: 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, the Protection Profile lifecycle in phases, the TOE delivery point and the coverage:

Steps	Phase	Subject	Covered by
Step 1	Development	IDEMIA	ALC R&D sites
Step 2	Development	NXP Semiconductors	IC certification
Step 3	Manufacturing	NXP Semiconductors	IC certification
TOE delivery point			
Step 4	Manufacturing	MRD Manufacturer (Pre-personalizer)	AGD_PRE
Step 5	Manufacturing	MRD Manufacturer (Pre-personalizer)	AGD_PRE
Step 6	Personalization	Personalization Agent	AGD_PRE
Step 7	Operational Use	End user	AGD_OPE

Table 12: Subjects identification following life cycle steps

Details for each phase/step are presented in the following paragraphs.

3.2 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.

The TOE includes the LDS V10.1 application and the Platform.

The LDS Applet and the Platform are both developed at IDEMIA R&D Sites.

The sites are audited following MSSR last requirements.

(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.

3.3 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 adds initialization data in EEPROM and keys (MSK, LSK).

The end of step 3 is the TOE delivery.

(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 (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.

3.4 Phase 3 “Personalization of the travel document”

(Step6) The personalization of the travel document includes:

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.

3.4.1 Loading of application

The platform can host 2 kinds of applications: Evaluated sensitive applications and validated basic applications. Once the application is evaluated or validated, it is securely delivered to manufacturing site. This delivery ensures the integrity and confidentiality of the application code and data. Then applications code and data are securely stored.

The delivery, storage and loading of any application are covered by audited Organisational measures (ALC).

Applications can be loaded at pre issuance at step 5 or at step 6 or in post issuance.

3.4.2 Applet pre-personalisation (phase 6)

This phase is performed by the Personalisation Agent, which controls the TOE. During this phase, the Java Card applet is prepared as required by P.TOE_Construction.

All along this phase, the TOE is self-protected as it requires the authentication of the Personalisation Agent prior to any operation.

3.4.3 TOE personalisation (phase 6)

This phase is performed by the Personalisation Agent, which controls the TOE, which is in charge of the Java Card applet personalisation.

All along this phase, the TOE is self-protected as it requires the authentication of the Personalisation Agent prior to any operation.

This phase may not necessarily take place in a manufacturing site, but may be performed anywhere. The Personalisation Agent is responsible for ensuring a sufficient level of security during this phase.

The Java Card applet is personalized according to guidance document [57].

At the end of phase 6, the TOE is constructed.

3.5 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.

4 Conformance Claim

4.1 Conformance claim

This security target claims conformance to the Common Criteria version 3.1, revision 5 ([1][2][3]).
The conformance to the Common Criteria is claimed as follows:

CC	Conformance rationale
Part 1	Strict conformance
Part 2	Conformance to the extended ¹ part: FAU_SAS.1 "Audit Storage" FCS_RND.1 "Quality metric for random numbers" FMT_LIM.1 "Limited capabilities" FMT_LIM.2 "Limited availability" FPT_EMS.1 "TOE Emanation" FIA_API.1 "Authentication Proof of Identity"
Part 3	Strict conformance to Part 3. The product claims conformance to EAL 4, augmented with: ALC_DVS.2 "Sufficiency of security measures" ADV_FSP.5 "Complete semi-formal functional specification with additional error information" ADV_INT.2 "Well-structured internals" ADV_TDS.4 "Semiformal modular design" ALC_CMS.5 "Development tools CM coverage" ALC_TAT.2 "Compliance with implementation standards" ATE_DPT.3 "Testing: modular design"

Table 13 - Conformance Rationale

Remark:

For interoperability reasons it is assumed the receiving state cares for sufficient measures against eavesdropping within the operating environment of the inspection systems. Otherwise the TOE may protect the confidentiality of some less sensitive assets (e.g. the personal data of the TOE holder which are also printed on the physical TOE) for some specific attacks only against enhanced basic attack potential (AVA_VAN.3).

FIA_API.1 has been added to this security target for the needs of the Chip Authentication Protocol that is described in the PP EAC.

FPT_EMSEC.1 from [47] has been renamed to FPT_EMS.1, in order to keep the SFR formatting.

Moreover the security target claims compliance with Application note 10 [5].

4.2 Protection Profile claims

The Security Target claims strict conformance to the following PP written in CC3.1: [47] BAC- Machine readable travel documents with "ICAO Application", Basic Access control – BSI-PP-0055 v1.10 25th march 2009.

The protection profile [47] claims conformance to:

- Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and General Model; CCMB-2006-09-001, Version 3.1, Revision 1, September 2006,
- Common Criteria for Information Technology Security Evaluation, Part 2: Security Functional Components; CCMB-2007-09-002, Version 3.1, Revision 2, September 2007
- Common Criteria for Information Technology Security Evaluation, Part 3: Security Assurance Requirements; CCMB-2007-09-003, Version 3.1, Revision 2, September 2007.

1 The rationale for SFR addition is described in the relative PP

4.3 Additions

The rationale between the SPD, taking into account the additional elements of the SPD, the Objectives and Objectives on the operational environment are given in the paragraph Rationales.

4.3.1 SFR dispatch versus PP

The following table present a rationale between the SFR driven from the protection profile versus the SFR from this security target:

SFR from the PP	Dispatch in the ST (detailed SFR in chapter 8]
FAU_SAS.1	FAU_SAS.1
FCS_CKM.1	FCS_CKM.1/BAC
FCS_CKM.4	FCS_CKM.4/Global
FCS_COP.1/SHA	FCS_COP.1/BAC_SHA
FCS_COP.1/AUTH	FCS_COP.1/BAC_AUTH
FCS_COP.1/ENC	FCS_COP.1/BAC_ENC
FCS_COP.1/MAC	FCS_COP.1/BAC_MAC
FCS_RND.1	FCS_RND.1/Global
FIA_UID.1	FIA_UID.1/BAC
FIA_UAU.1	FIA_UAU.1/BAC
FIA_UAU.4	FIA_UAU.4/BAC
FIA_UAU.5	FIA_UAU.5/BAC
FIA_UAU.6	FIA_UAU.6/BAC
FIA_AFL.1	FIA_AFL.1/BAC
FDP_ACC.1	FDP_ACC.1/BAC
FDP_ACF.1	FDP_ACF.1/BAC
FDP_UCT.1	FDP_UCT.1/BAC
FDP_UIT.1	FDP_UIT.1/BAC
FMT_SMF.1	FMT_SMF.1
FMT_SMR.1	FMT_SMR.1/BAC
FMT_LIM.1	FMT_LIM.1/Global FMT_LIM.1/BAC
FMT_LIM.2	FMT_LIM.2/Global FMT_LIM.2/BAC
FMT_MTD.1/INI_ENA	FMT_MTD.1/INI_ENA
FMT_MTD.1/INI_DIS	FMT_MTD.1/INI_DIS
FMT_MTD.1/KEY_WRITE	FMT_MTD.1/BAC_KEY_WRITE
FMT_MTD.1/KEY_READ	FMT_MTD.1/BAC_KEY_READ
FPT_EMS.1	FPT_EMS.1/Global FPT_EMS.1/CA
FPT_FLS.1	FPT_FLS.1/Global
FPT_TST.1	FPT_TST.1/Global FPT_TST.1/CA FPT_TST.1/BAC
FPT_PHP.3	FPT_PHP.3.1/Global

Table 14: PP SFR

4.3.2 Overview of the SFR defined in this ST

Notation:

For optimisation and ease read, all the SFR presented in chapter Security Functional Requirements have extensions as presented here:

SFR (/Global) that are global to the product (shared between the various TOE)

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

4.3.3 Complete overview of the SFR

From the PP, the following table lists 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/ENC; FCS_COP.1/AUTH ; FCS_COP.1/MAC ; FCS_RND.1 ; FIA_UID.1; FIA_UAU.1 ; FIA_UAU.4 ; FIA_UAU.5 ; FIA_UAU.6 ; FIA_AFL.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/KEY_WRITE ; FMT_MTD.1/KEY_READ ; FPT_EMSEC.1 ; FPT_FLS.1; FPT_TST.1; FPT_PHP.3

Table 15 – SFR from the PP

The following table presents the additional SFRs and express its functionality.

Section	Additional SFR
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
Chip Authentication	FIA_API.1/CA ; FCS_CKM.1/CA ; FCS_COP.1/CA ; FIA_UAU.1/CA ; FIA_UAU.5/CA ; FIA_UAU.6/CA ; FIA_UID.1/CA ; FPT_TST.1/CA ; FMT_MTD.1/CA_KEY_WRITE ; FMT_MTD.1/CA_KEY_READ ; FDP_UCT.1/CA ; FDP_UIT.1/CA

Table 16: additional SFR

The following table presents Global SFR overview:

Global SFR	Additional SFR?	ST generic notation
FCS_CKM.4/Global	No	FCS_CKM.4
FCS_RND.1/Global	No	FCS_RND.1
FMT_LIM.1/Global	No	FMT_LIM.1
FMT_LIM.2/Global	No	FMT_LIM.2
FPT_EMS.1/Global	No	FPT_EMS.1
FPT_FLS.1/Global	No	FPT_FLS.1
FPT_TST.1/Global	No	FPT_TST.1
FPT_PHP.3/Global	No	FPT_PHP.3

Table 17 – Global SFR

The following table presents the dedicated SFRs for Active Authentication (AA)

Active Auth. SFR	AdditionalSFR?	ST generic notation
FCS_COP.1/AA_DSA	Yes	FCS_COP.1/AA
FCS_COP.1/AA_ECDSA		
FDP_DAU.1/AA	Yes	FDP_DAU.1/AA
FDP_ITC.1/AA	Yes	FDP_ITC.1/AA
FMT_MTD.1/AA_KEY_READ	Yes	FMT_MTD.1/AA_KEY_READ
FPT_EMS.1/AA	No	FPT_EMS.1
FMT_MOF.1/AA	Yes	FMT_MOF.1/AA
FMT_MTD.1/AA_KEY_WRITE	Yes	FMT_MTD.1/AA_KEY_WRITE

Table 18: Additional SFR for the Active Authentication

The following table presents the dedicated SFRs for Chip Authentication (CA)

CA SFR	Additional?	ST generic notation
FIA_API.1/CA	Yes	FIA_API.1/CA
FCS_CKM.1/CA_DH_SM_3DES FCS_CKM.1/CA_ECDH_SM_3DES FCS_CKM.1/CA_DH_SM_AES FCS_CKM.1/CA_ECDH_SM_AES	Yes	FCS_CKM.1/CA
FCS_COP.1/CA_SHA_SM_3DES FCS_COP.1/CA_SYM_SM_3DES FCS_COP.1/CA_MAC_SM_3DES FCS_COP.1/CA_SHA_SM_AES FCS_COP.1/CA_SYM_SM_AES FCS_COP.1/CA_MAC_SM_AES	Yes	FCS_COP.1/CA
FDP_ITC.1/CA	Yes	FDP_ITC.1/CA
FIA_UAU.1/CA	Yes	FIA_UAU.1/CA
FIA_UAU.5/CA_3DES FIA_UAU.5/CA_AES	Yes	FIA_UAU.5/CA
FIA_UAU.6/CA	Yes	FIA_UAU.6/CA
FIA_UID.1/CA	Yes	FIA_UID.1/CA
FPT_EMS.1/CA	No	FPT_EMS.1
FPT_TST.1/CA	Yes	FPT_TST.1/CA
FMT_MTD.1/CA_KEY_WRITE	Yes	FMT_MTD.1/CA_KEY_WRITE
FMT_MTD.1/CA_KEY_READ	Yes	FMT_MTD.1/CA_KEY_READ
FDP_UCT.1/CA	Yes	FDP_UCT.1/CA
FDP_UIT.1/CA	Yes	FDP_UIT.1/CA

Table 19: Additional SFR for the Chip Authentication

The following table presents the SFRs for BAC PP; all are issued from the PP.

BAC SFR	Additional?	ST generic notation
FCS_CKM.1/BAC	No	FCS_CKM.1
FCS_COP.1/BAC_AUTH FCS_COP.1/BAC_ENC FCS_COP.1/BAC_MAC	No	FCS_COP.1/AUTH FCS_COP.1/ENC FCS_COP.1/MAC
FCS_COP.1/BAC_SHA	No	FCS_COP.1/SHA
FDP_UCT.1/BAC	No	FDP_UCT.1
FDP_UIT.1/BAC	No	FDP_UIT.1
FMT_MTD.1/BAC_KEY_READ	No	FMT_MTD.1/ KEY_READ
FMT_LIM.1/BAC	No	FMT_LIM.1
FMT_LIM.2/BAC	No	FMT_LIM.2
FPT_TST.1/BAC	No	FPT_TST.1
FMT_MTD.1/ BAC_KEY_WRITE	No	FMT_MTD.1/KEY_WRITE
FDP_ACC.1/BAC	No	FDP_ACC.1
FDP_ACF.1/BAC	No	FDP_ACF.1
FMT_SMR.1/BAC	No	FMT_SMR.1
FIA_AFL.1/BAC	No	FIA_AFL.1
FIA_UAU.6/BAC	No	FIA_UAU.6
FIA_UID.1/BAC	No	FIA_UID.1
FIA_UAU.1/BAC	No	FIA_UAU.1
FIA_UAU.4/BAC	No	FIA_UAU.4
FIA_UAU.5/BAC	No	FIA_UAU.5

Table 20: BAC SFR overview

4.3.4 Overview of the additional protocols

4.3.4.1 Chip Authentication

The Chip Authentication has been added to this Security Target in order to reinforce the BAC authentication mechanism by ensuring the verification of the Card by the Terminal. For this addition, the TOE SPD has been refined and contains the following additions:

Additional Threats: **§ 5.3.2 Threats for CA**

Additional Objective: **§ 6.1.2 SO for CA**

Additional OE: **§ 6.2.2 OE for CA**

4.3.4.2 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 Objective: **§ 6.1.3 SO for AA**

Additional OE: **§ 6.2.3 OE for AA**

4.3.4.3 Pre-Personalization phase

The pre-personalization 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.

In order to be compliant with the CEM, a rationale is given for the additional Objectives on the Environment, such as to demonstrate that they neither mitigates a threat nor fulfil an OSP.

4.3.5 OE for CA rationale

OE.Exam_MRTD_CA, **OE.Prot_Logical_MRTD_CA** and **OE.Auth_Key_MRTD** define additional requirements on the operational environment for the Chip Authentication Protocol which is not in the original scope of the PP BAC. This OE is only linked to threat and OSP for the Chip Authentication and has no links with those of the PP.

4.3.6 OE for AA rationale

The objectives **OE.Exam_MRTD_AA**, **OE.Prot_Logical_MRTD_AA**, **OE.Activ_Auth_Verif** and **OE.Activ_Auth_Sign** define additional requirements on the operational environment for the Active Authentication Protocol which is not in the original scope of the PP BAC. This OE is only linked to threat and OSP for the Active Authentication and has no links with those of the PP.

4.3.7 Assumption for AA rationale

The **A.Insp_Sys_AA** **is added; this assumption is only linked to Active Authentication mechanism as the** Inspection System **has to implement** the mechanism and shall verify the authenticity of the MRTD's chip during inspection using the signature returned by the TOE during Active Authentication.

4.3.8 Assumption for CA rationale

The **A.Insp_Sys_CA**,

The assumption A.Insp_Sys_CA serves only the Chip authentication mechanism added in the scope of the evaluation. The inspection system shall implement the CA mechanism. The IS has to verify the authenticity of the MRTD during the inspection by establishing a secure messaging. This addition has no impact on the SPD of the PP BAC.

A.Signature_PKI

This assumption is only linked to the Chip authentication as the issuing and receiving States or Organizations shall establish a public key infrastructure for passive authentication i.e. digital signature creation and verification for the logical MRTD.

5 Security Problem Definition

5.1 Subjects

SFR	Before phase 5	Phase 5	Phase 6	Phase 7
PP BAC subjects				
Manufacturer	x	x		
Personalization Agent			x	
Terminal		x	x	x
Inspection System				x
MRTD Holder				x
Traveler				x
Attacker	x	x	x	x

5.1.1 PP BAC 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 [43].

Application Note

Personalization Agent is referred as the Personalizer in the Security Target.

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.

Application Note:

This security target does not distinguish between the BIS, GIS and EIS because the Extended Access Control is outside the scope.

MRTD Holder

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

Traveler

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

Attacker

Is a threat agent trying (i) to identify and to trace the movement of the MRTD’s chip remotely (i.e. without knowing or optically reading the printed MRZ data), (ii) to read or to manipulate the logical MRTD without authorization, or (iii) to forge a genuine MRTD.

Application Note

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.

Additional Subjects

5.2 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 [43]. 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.DG 16 contain personal data of the MRTD holder. The Chip Authentication Public Key (CAPK) in 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 Active Authentication Public Key (AAPK) Info in DG 15 is used by the inspection system for Active Authentication of the chip.

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
CPLC Data	Data uniquely identifying the chip. They are considered as user data as they enable to track the holder
Personnal Data of the MRTD holder (EF.DGx, except EF.DG15)	Contains identification data of the holder
Document Security Object (SOD) in EF.SOD	Contain a certificate ensuring the integrity of the file stored within the MRTD and their authenticity. It ensures the data are issued by a genuine country
Common data in EF.COM	Declare the data the travel document contains. This data is optional and may be absent in the TOE
Active Authentication Public Key in EF.DG15 (AAPK)	Contains public data enabling to authenticate the chip thanks to the Active Authentication
Chip Authentication Public Key in EF.DG14 (CAPK)	Contains public data enabling to authenticate the chip thanks to the Chip Authentication Protocol

Table 21 - User Data

TSF Data	Description
TOE_ID	Data enabling to identify the TOE

TSF Data	Description
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

Table 22 - 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 traveller to prove his possession of a genuine MRTD.

5.3 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.

5.3.1 Threats from the PP BAC

T.Chip_ID

Adverse action: An attacker trying to trace the movement of the MRTD by identifying remotely the MRTD's chip by establishing or listening to communications through the contactless communication interface.

Threat agent: having enhanced basic attack potential, not knowing the optically readable MRZ data printed on the MRTD data page in advance

Asset: Anonymity of user

T.Skimming

Adverse action: An attacker imitates an inspection system trying to establish a communication to read the logical MRTD or parts of it via the contactless communication channel of the TOE.

Threat agent: having enhanced basic attack potential, not knowing the optically readable MRZ data printed on the MRTD data page in advance.

Asset: confidentiality of logical MRTD data.

T.Eavesdropping

Adverse action: An attacker is listening to an existing communication between the MRTD's chip and an inspection system to gain the logical MRTD or parts of it. The inspection system uses the MRZ data printed on the MRTD data page but the attacker does not know these data in advance.

Threat agent: having enhanced basic attack potential, not knowing the optically readable MRZ data printed on the MRTD data page in advance.

Asset: confidentiality of logical MRTD 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.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.

5.3.2 Threats for CA

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

5.4 Organisational Security Policies

5.4.1 OSP from PP BAC

P.Manufact

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

P.Personalization

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

P.Personal_Data

The biographical data and their summary printed in the MRZ and stored on the MRTD's chip (EF.DG1), the printed portrait and the digitized portrait (EF.DG2), the biometric reference data of finger(s) (EF.DG3), the biometric reference data of iris image(s) (EF.DG4)³ and data according to LDS (EF.DG5 to EF.DG13, EF.DG16) stored on the MRTD's chip are personal data of the MRTD holder. These data groups are intended to be used only with agreement of the MRTD holder by inspection systems to which the MRTD is presented. The MRTD's chip shall provide the possibility for the Basic Access Control to allow read access to these data only for terminals successfully authenticated based on knowledge of the Document Basic Access Keys as defined in [47].

5.4.2 OSP for CA

P.Chip_Auth

The terminal implements the Chip Authentication protocol as described in [48] OSP for AA

P.Activ_Auth

The terminal implements the Active Authentication protocol as described in [47].

5.5 Assumptions

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

5.5.1 Assumptions from PP BAC

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 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.

A.BAC-Keys

The Document Basic Access Control Keys being generated and imported by the issuing State or Organization have to provide sufficient cryptographic strength. As a consequence of the "ICAO Doc 9303" [43], the Document Basic Access Control Keys are derived from a defined subset of the individual printed MRZ data. It has to be ensured that these data provide sufficient entropy to withstand any attack based on the decision that the inspection system has to derive Document Access Keys from the printed MRZ data with enhanced basic attack potential.

5.5.2 Assumptions for Chip Authentication

A.Insp_Sys_CA

The Inspection System implements the Chip Authentication Mechanism. The Inspection System verifies the authenticity of the MRTD's chip during inspection and establishes secure messaging with keys established by the Chip Authentication Mechanism.

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.

5.5.3 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.

6 Security Objectives

6.1 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.

6.1.1 SO from PP BAC

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 [43] 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 that the inspection system is able to detect any modification of the transmitted logical MRTD data.

OT.Data_Conf

The TOE must ensure the confidentiality of the logical MRTD data groups EF.DG1 to EF.DG16. Read access to EF.DG1 to EF.DG16 is granted to terminals successfully authenticated as Personalization Agent. Read access to EF.DG1, EF.DG2 and EF.DG5 to EF.DG16 is granted to terminals successfully authenticated as Basic Inspection System. The Basic Inspection System shall authenticate itself by means of the Basic Access Control based on knowledge of the Document Basic Access Key. The TOE must ensure the confidentiality of the logical MRTD data during their transmission to the Basic Inspection System.

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). In Phase 4 "Operational Use" the TOE shall identify itself only to a successful authenticated Basic Inspection System or Personalization Agent.

OT.Prot_Abuse-Func

After delivery of the TOE to the MRTD Holder, the TOE must prevent the abuse of test and support functions that may be maliciously used to (i) disclose critical User Data, (ii) manipulate critical User Data of the IC Embedded Software, (iii) manipulate Soft-coded IC Embedded Software or (iv) bypass, deactivate, change or explore security features or functions of the TOE. Details of the relevant attack scenarios depend, for instance, on the capabilities of the Test Features provided by the IC Dedicated Test Software which are not specified here.

OT.Prot_Inf_Leak

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

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

OT.Prot_Phys-Tamper

The TOE must provide protection of the confidentiality and integrity of the User Data, the TSF Data, and the MRTD's chip Embedded Software. This includes protection against attacks with 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 prioreverse-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.

6.1.2 SO for CA

OT.CA_Proof

The TOE must support the 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 [48]. The authenticity proof provided by the MRTD's chip shall be protected against attacks with high attack potential.

Application note:

The objective implies the MRTD's to have (i) a unique identity as given by the MRTD's Document Number, (ii) a secret to prove its identity by knowledge i.e. a private authentication key as TSF data. The TOE shall protect this TSF data to prevent their misuse. The terminal shall have the reference data to verify the authentication attempt of MRTD's chip i.e. a certificate for the Chip Authentication Public Key that matches the Chip Authentication Private Key of the MRTD's chip. This certificate is provided by (i) the Chip Authentication Public Key (EF.DG14) in the LDS [43] and (ii) the hash value of the Chip Authentication Public Key in the Document Security Object signed by the Document Signer.

OT.Data_Int_CA

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.

6.1.3 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 [43]. 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.

6.2 Security objectives for the Operational Environment

6.2.1 OE from PP BAC

6.2.1.1 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:
 - origin and shipment details
 - reception, reception acknowledgement
 - location material/information.

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

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

OE.Personalization

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

OE.Pass_Auth_Sign

The issuing State or Organization must (i) generate a cryptographic secure Country Signing CA Key Pair, (ii) ensure the secrecy of the Country Signing CA Private Key and sign Document Signer Certificates in a secure operational environment, and (iii) distribute the Certificate of the Country Signing CA Public Key to receiving States and Organizations maintaining its authenticity and integrity. The issuing State or Organization must (i) generate a cryptographic secure Document Signer Key Pair and ensure the secrecy of the Document Signer Private Keys, (ii) sign Document Security Objects of genuine MRTD in a secure operational environment only and (iii) distribute the Certificate of the Document Signer Public Key to receiving States and Organizations. The digital signature in the Document Security Object relates all data in the data in EF.DG1 to EF.DG16 if stored in the LDS according to [43].

OE.BAC-Keys

The Document Basic Access Control Keys being generated and imported by the issuing State or Organization have to provide sufficient cryptographic strength. As a consequence of the "ICAO Doc 9303" [43] the Document Basic Access Control Keys are derived from a defined subset of the individual printed MRZ data. It has to be ensured that these data provide sufficient entropy to withstand any attack based on the decision

that the inspection system has to derive Document Basic Access Keys from the printed MRZ data with enhanced basic attack potential.

6.2.1.2 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, and (ii) implements the terminal part of the Basic Access Control [43].

OE.Passive_Auth_Verif

The border control officer of the receiving State uses the inspection system to verify the traveler as MRTD holder. The inspection systems must have successfully verified the signature of Document Security Objects and the integrity data elements of the logical MRTD before they are used. The receiving States and Organizations must manage the Country Signing 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).

6.2.2 OE for CA**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.Exam_MRTD_CA

Additionally to the OE.Exam_MRTD, the inspection systems perform the Chip Authentication protocol to verify the Authenticity of the presented MRTD's chip.

OE.Prot_Logical_MRTD_CA

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 Chip Authentication Protocol.

Application note

The Inspection Systems follow the order (i) running the Basic Access Control Protocol, (ii) reading and verifying only those parts of the logical MRTD that are necessary to know for the Chip Authentication Mechanism (i.e. Document Security Object and Chip Authentication Public Key), (iii) running the Chip Authentication Protocol, and (iv) reading and verifying the less-sensitive data of the logical MRTD after Chip Authentication. The supposed sequence has the advantage that the less-sensitive data are protected by secure messaging with cryptographic keys based on the Chip Authentication Protocol which quality is under control of the TOE. The inspection system will prevent additionally eavesdropping to their communication with the TOE before secure messaging is successfully established based on the Chip Authentication Protocol. Note that reading the less sensitive data directly after Basic Access Control Mechanism is allowed and is not assumed as threat in this PP. But the TOE ensures that reading of sensitive data is possible after successful Chip Authentication.

6.2.3 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.

7 Extended requirements

7.1 Extended family FAU_SAS - Audit data storage

7.1.1 Extended components FAU_SAS.1

Description: see [47].

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 [47]

7.2 Extended family FCS_RND - Generation of random numbers

7.2.1 Extended component FCS_RND.1

Description: see [47]

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 [47]

7.3 Extended family FIA_API – Authentication proof of identity

7.3.1 Extended component FIA_API.1

Description: see [48]

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 [48]

7.4 Extended family FMT_LIM - Limited capabilities and availability

7.4.1 Extended component FMT_LIM.1

Description: see [47]

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 [47]

7.4.2 Extended component FMT_LIM.2

Description: See [47]

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 [47]

7.5 Extended family FPT_EMS - TOE Emanation

7.5.1 Extended component FPT_EMS.1

Description: see [47]

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 [47]

8 Security Requirements

8.1 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 applicable to all the passports configuration
- 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

8.1.1 Global SFR

This chapter covers the common SFR that are shared between the different parts of the embedded application 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. **Deterministic Hybrid random number as defined in [54]**
2. **The requirement of FIPS SP800-90 [18] 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**
2. **Personalization Agent Key**

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**

2. Personalization Agent Key

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.**

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**

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.

8.1.2 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) with SHA1, 224, 256, 384, 512	1024, 1536 and 2048.	[24]

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 512 over prime field curves	[24][28][29][30]

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**.

8.1.3 Basic Access Control SFR

8.1.3.1 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	[43]

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	[12]

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	[29]

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	[12] [43]

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	[23]

FDP_UCT.1/BAC Basic data exchange confidentiality

FDP_UCT.1.1/BAC The TSF shall enforce the **Basic Access Control SFP to be able 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 be able 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_WRITE Management of TSF data

FMT_MTD.1.1/BAC_KEY_WRITE The TSF shall restrict the ability to **write** the **[data]** to **[authorized identified roles]**:

TSF Data	Authorized Identified roles
Document Basic Access Keys	Personalization Agent

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 Basic Access Keys	None
Personalization Agent 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:**

- **At Reset**

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/INI_ENA Management of TSF data

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

FMT_MTD.1/INI_DIS Management of TSF data

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

FAU_SAS.1 Audit storage

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

8.1.3.2 Specific Basic Access Control SFR

FDP_ACC.1/BAC Complete access control

FDP_ACC.1.1/BAC The TSF shall enforce the **Basic Access Control SFP** on **terminals gaining write, read and modification access to data in the EF.COM, EF.SOD, EF.DG1 to EF.DG16 and all operations among subjects and objects covered by the SFP.**

FDP_ACF.1/BAC Security attribute based access control

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

- 1. Subjects:**

- a. **Personalization Agent**
 - b. **Basic Inspection System**
 - c. **Terminal**
2. **Objects:**
 - a. **data EF.DG1 to EF.DG16 of the logical MRTD**
 - b. **data in EF.COM**
 - c. **data in EF.SOD**
 3. **Security attributes:**
 - a. **authentication status of terminals**

FDP_ACF.1.2/BAC 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 Basic Inspection System is allowed to read the data in EF.COM, EF.SOD, EF.DG1, EF.DG2 and EF.DG5 to EF.DG16 of the logical MRTD**

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

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

1. **Any terminal is not allowed to modify any of the EF.DG1 to EF.DG16 of the logical MRTD**
2. **Any terminal is not allowed to read any of the EF.DG1 to EF.DG16 of the logical MRTD**
3. **The Basic Inspection System is not allowed to read the data in EF.DG3 and EF.DG4**

FMT_SMR.1/BAC Security roles

FMT_SMR.1.1/BAC The TSF shall maintain the roles

1. **Basic Inspection System**
2. **Manufacturer**
3. **Personalization Agent**

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

FMT_SMF.1 Specification of Management Functions

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

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

FIA_AFL.1/BAC Authentication failure handling

FIA_AFL.1.1/BAC The TSF shall detect **when an administrator configurable positive integer within range of acceptable values 0 to 15 consecutive** unsuccessful authentication attempts occur related to **BAC authentication protocol**.

FIA_AFL.1.2/BAC When the defined number of unsuccessful authentication attempts has been **met or surpassed**, the TSF shall **wait for an increasing time between receiving of the terminal challenge and sending of the TSF response during the BAC authentication attempts**.

FIA_UAU.6/BAC Re-authenticating

FIA_UAU.6.1/BAC The TSF shall re-authenticate the user under the conditions **each command sent to the TOE during a BAC mechanism based communication after successful authentication of the terminal with Basic Access Control Authentication Mechanism**.

FIA_UID.1/BAC Timing of identification

FIA_UID.1.1/BAC The TSF shall allow

1. **To read the Initialization Data in Phase 2 "Manufacturing"**

- 2. To read the random identifier in Phase 3 "Personalization of the MRTD"**
- 3. To read the random identifier in Phase 4 "Operational Use"**

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

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

FIA_UAU.1/BAC Timing of authentication

FIA_UAU.1.1/BAC The TSF shall allow

- 1. To read the Initialization Data in Phase 2 "Manufacturing"**
- 2. To read the random identifier in Phase 3 "Personalization of the MRTD"**
- 3. To read the random identifier in Phase 4 "Operational Use"**

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

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

FIA_UAU.4/BAC Single-use authentication mechanisms

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

- 1. Basic Access Control Authentication Mechanism**
- 2. Authentication Mechanisms based on AES**
- 3. Authentication Mechanisms based on 3DES**

FIA_UAU.5/BAC Multiple authentication mechanisms

FIA_UAU.5.1/BAC The TSF shall provide

- 1. Basic Access Control Authentication Mechanism**
- 2. Symmetric Authentication Mechanisms based on AES**
- 3. Symmetric Authentication Mechanisms based on 3DES**

to support user authentication.

FIA_UAU.5.2/BAC The TSF shall authenticate any user's claimed identity according to the following rule:

- 1. The TOE accepts the authentication attempt as Basic Inspection System only by means of the Basic Access Control Authentication Mechanism with the Document Basic Access Keys.**
- 2. The TOE accepts the authentication attempt as Personalization Agent by the Symmetric Authentication Mechanism with Personalization Agent Key.**

8.1.4 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 [48]** 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	[28]

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	[28]

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	[39]

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	[39]

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	[29]

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 (bits)	Standards
SHA1	None	[29]

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	[48]

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	[48]

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	[15]

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	[48]

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

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

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

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

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 following rule:

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 following rule:

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 th 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:**

- **At reset**

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

8.2 Security Assurance Requirements

The security assurance requirement level is EAL4 augmented with ALC_DVS.2, ADV_FSP.5, ADV_INT.2, ADV_TDS.4, ALC_CMS.5, ALC_TAT.2 and ATE_DPT.3.

8.2.1 Evaluation Assurance Level rationale

The following assurance packages are required:

Measures	Name
ADV	Development
AGD	Guidance
ALC	Life Cycle
ASE	Security target
ATE	Tests
AVA	Vulnerability

8.2.1.1 ADV: Development

The following components are included:

Measures	Level
ADV_ARC	1
ADV_FSP	5
ADV_IMP	1
ADV_INT	2
ADV_SPM	N/A
ADV_TDS	4

8.2.1.2 AGD: Guidance

The following components are included:

Measures	Level
AGD_OPE	1

AGD_PRE	1
---------	---

8.2.1.3 ALC: Life cycle

The following components are included:

Measures	Level
ALC_CMC	4
ALC_CMS	5
ALC_DEL	1
ALC_DVS	2 - augmented
ALC_FLR	N/A
ALC_LCD	1
ALC_TAT	2

8.2.1.4 ASE: Security target

The following components are included:

Measures	Level
ASE_CCL	1
ASE_ECD	1
ASE_INT	1
ASE_OBJ	2
ASE_REQ	2
ASE_SPD	1
ASE_TSS	1

8.2.1.5 ATE: Tests

The following components are included:

Measures	Level
ATE_COV	2
ATE_DPT	3
ATE_FUN	1
ATE_IND	2

8.2.2 Rationale for augmentation

8.2.2.1 ALC_DVS.2 Sufficiency of security measures

The selection of the component ALC_DVS.2 provides a higher assurance of the security of the MRTD's development and manufacturing especially for the secure handling of the MRTD's material.

The component ALC_DVS.2 augmented to EAL4 has no dependencies to other security requirements.

8.2.2.2 ADV_FSP.5 Complete semi-formal functional specification with additional error information

The TOE actually target an EAL5 + ALC_DVS.2 and AVA_VAN.5 and is only limited to EAL4+ due to the restriction of BAC PP on AVA_VAN level.

Other MRTDS TOE, except BAC and BAP are targeting the same physical scope are not affected by this limitation and provide the full EAL5+ set of SARs. This EAL5+ is required to reach a higher level of assurance due to sensitivity of ID documents.

8.2.2.3 ADV_INT.2 Well-structured internals

The TOE actually target an EAL5 + ALC_DVS.2 and AVA_VAN.5 and is only limited to EAL4+ due to the restriction of BAC PP on AVA_VAN level.

Other MRTDS TOE, except BAC and BAP are targeting the same physical scope are not affected by this limitation and provide the full EAL5+ set of SARs. This EAL5+ is required to reach a higher level of assurance due to sensitivity of ID documents.

8.2.2.4 ADV_TDS.4 Semiformal modular design

The TOE actually target an EAL5 + ALC_DVS.2 and AVA_VAN.5 and is only limited to EAL4+ due to the restriction of BAC PP on AVA_VAN level.

Other MRTDS TOE, except BAC and BAP are targeting the same physical scope are not affected by this limitation and provide the full EAL5+ set of SARs. This EAL5+ is required to reach an higher level of assurance due to sensitivity of ID documents.

8.2.2.5 ALC_CMS.5 Development tools CM coverage

The TOE actually target an EAL5 + ALC_DVS.2 and AVA_VAN.5 and is only limited to EAL4+ due to the restriction of BAC PP on AVA_VAN level.

Other MRTDS TOE, except BAC and BAP are targeting the same physical scope are not affected by this limitation and provide the full EAL5+ set of SARs. This EAL5+ is required to reach an higher level of assurance due to sensitivity of ID documents.

8.2.2.6 ALC_TAT.2 Compliance with implementation standards

The TOE actually target an EAL5 + ALC_DVS.2 and AVA_VAN.5 and is only limited to EAL4+ due to the restriction of BAC PP on AVA_VAN level.

Other MRTDS TOE, except BAC and BAP are targeting the same physical scope are not affected by this limitation and provide the full EAL5+ set of SARs. This EAL5+ is required to reach a higher level of assurance due to sensitivity of ID documents.

8.2.2.7 ATE_DPT.3 Testing: modular design

The TOE actually target an EAL5 + ALC_DVS.2 and AVA_VAN.5 and is only limited to EAL4+ due to the restriction of BAC PP on AVA_VAN level.

Other MRTDS TOE, except BAC and BAP are targeting the same physical scope are not affected by this limitation and provide the full EAL5+ set of SARs. This EAL5+ is required to reach a higher level of assurance due to sensitivity of ID documents.

9 TOE Summary Specification

9.1 TOE Summary

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

It controls access to the CPLC data as well:

It ensures the CPLC data can be read during the personalization phase

It ensures it cannot 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, the Document Security Object, EF.COM only after BAC authentication and 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).

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.

It ensures as well the CPLC data cannot be written anymore once the TOE is personalized.

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.

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 [49]. (if it is activated by the personalizer).

BAC mechanism

This security functionality ensures the BAC is correctly performed. It can only be performed once the TOE is personalized with the symmetric BAC keys the Personalization Agent loaded beforehand during the personalization phase. Furthermore, this security functionality ensures the session keys are destroyed at the end of each BAC session.

Chip Authentication

This security functionality ensures the Chip Authentication is performed as described. It could be used as an alternative of Active Authentication to reinforce the Authentication of the Chip. It differs from an EAC not performing the Terminal Authentication.

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. 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:

- At reset

9.1.1 Security functional requirements analysis

	FAU_SAS.1	FCS_CKM.1	FCS_CKM.4	FCS_COP.1/SHA	FCS_COP.1/ENC	FCS_COP.1/AUTH	FCS_COP.1/MAC	FCS_RND.1	FIA_AFL.1	FIA_UID.1	FIA_UAU.1	FIA_UAU.4	FIA_UAU.5	FIA_UAU.6	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/KEY_WRITE	FMT_MTD.1/KEY_READ	FPT_EMS.1	FPT_FLS.1	FPT_TST.1	FPT_PHP.3
Access Control in reading										X	X	X	X	X	X	X	X	X						X		X				
Access Control in writing															X				X				X		X					
Active Authentication				X	X	X		X							X	X									X	X	X			
BAC mechanism			X	X	X	X	X	X	X	X	X	X	X	X		X	X	X										X		
Chip Authentication																														
Personalization			X	X				X											X				X				X			
Physical protection	X																					X	X							X
Prepersonalization				X	X	X	X	X		X										X			X				X			
Safe state management	X																		X	X	X	X						X		
Secure Messaging		X	X		X		X	X		X	X	X	X	X																
Self tests								X																					X	

Table 23 - Link between SFR from BAC PP and TSF

	FCS_COP.1/AA	FDP_DAU.1/AA	FDP_ITC.1/AA	FMT_MOF.1/AA	FMT_MTD.1/AA_KEY_WRITE	FMT_MTD.1/AA_KEY_READ
Access Control in reading						X
Access Control in writing			X	X	X	
Active Authentication	X	X	X	X	X	X
BAC mechanism						
Personalization						
Physical protection						
Prepersonalization						
Safe state management						
Secure Messaging						
Self tests						

Table 24 - Link between SFR for AA and TSF

	FCS_CKM.1/CA	FCS_COP.1/CA	FDP_ITC.1/CA	FIA_UID.1/CA	FIA_UAU.1/CA	FIA_UAU.5/CA	FIA_UAU.6/CA	FIA_API.1/CA	FDP_UCT.1/CA	FDP_UIT.1/CA	FMT_MTD.1/CA_KEY_WRITE	FMT_MTD.1/CA_KEY_READ
Access Control in reading												
Access Control in writing												
Active Authentication												
BAC mechanism												
Chip Authentication	X	X	X	X	X	X	X	X	X	X	X	X
Personalization	X											
Physical protection												
Prepersonalization												



Safe state management												
Secure Messaging												
Self tests												

Table 25 : Link between SFR for CA and TSF



10 TOE Rationales Security Objectives rationale

10.1 Threats and Security Objectives

T.Chip_ID

The threat T.Chip_ID "Identification of MRTD's chip" addresses the trace of the MRTD movement by identifying remotely the MRTD's chip through the contactless communication interface. This threat is countered as described by the security objective OT.Identification by Basic Access Control using sufficiently strong derived keys as required by the security objective for the environment OE.BAC-Keys.

T.Skimming

The threat T.Skimming "Skimming digital MRZ data or the digital portrait" addresses the reading of the logical MRTD through the contactless interface or listening the communication between the MRTD's chip and a terminal. This threat is countered by the security objective OT.Data_Conf "Confidentiality of personal data" through Basic Access Control using sufficiently strong derived keys as required by the security objective for the environment OE.BAC-Keys.

T.Eavesdropping

The threat T.Eavesdropping "Eavesdropping to the communication between TOE and inspection system" addresses the reading of the logical MRTD through the contactless interface or listening the communication between the MRTD's chip and a terminal. This threat is countered by the security objective OT.Data_Conf "Confidentiality of personal data" through Basic Access Control using sufficiently strong derived keys as required by the security objective for the environment OE.BAC-Keys.

T.Forgery

The threat T.Forgery "Forgery of data on MRTD's chip" addresses the fraudulent alteration of the complete stored logical MRTD or any part of it. The security objective OT.AC_Pers "Access Control for Personalization of logical MRTD" requires the TOE to limit the write access for the logical MRTD to the trustworthy Personalization Agent (cf. OE.Personalization). The TOE will protect the integrity of the stored logical MRTD according to the security objective OT.Data_Int "Integrity of personal data" and OT.Prot_Phys-Tamper "Protection against Physical Tampering". The examination of the presented MRTD passport book according to OE.Exam_MRTD "Examination of the MRTD passport book", OE.Exam_MRTD_CA and OE.Exam_MRTD_AA shall ensure that passport book does not contain a sensitive contactless chip which may present the complete unchanged logical MRTD. The TOE environment will detect partly forged logical MRTD data by means of digital signature which will be created according to OE.Pass_Auth_Sign "Authentication of logical MRTD by Signature" and verified by the inspection system according to OE.Passive_Auth_Verif "Verification by Passive Authentication".

T.Abuse-Func

The threat T.Abuse-Func "Abuse of Functionality" addresses attacks using the MRTD's chip as production material for the MRTD and misuse of the functions for personalization in the operational state after delivery to MRTD holder to disclose or to manipulate the logical MRTD. This threat is countered by OT.Prot_Abuse-Func "Protection against Abuse of Functionality". Additionally this objective is supported by the security objective for the TOE environment: OE.Personalization "Personalization of logical MRTD" ensuring that the TOE security functions for the initialization and the personalization are disabled and the security functions for the operational state after delivery to MRTD holder are enabled according to the intended use of the TOE.

T.Information_Leakage



The threat T.Information_Leakage "Information Leakage from MRTD's chip" is typical for integrated circuits like smart cards under direct attack with high attack potential. The protection of the TOE against this threat is addressed by the directly related security objective OT.Prot_Inf_Leak "Protection against Information Leakage".

T.Phys-Tamper

The threat T.Phys-Tamper "Physical Tampering" is typical for integrated circuits like smart cards under direct attack with high attack potential. The protection of the TOE against this threat is addressed by the directly related security objective OT.Prot_Phys-Tamper "Protection against Physical Tampering".

T.Malfunction

The threat T.Malfunction "Malfunction due to Environmental Stress" is typical for integrated circuits like smart cards under direct attack with high attack potential. The protection of the TOE against this threat is addressed by the directly related security objective OT.Prot_Malfunction "Protection against Malfunctions".

T.Counterfeit

The threat T.Counterfeit "MRTD's chip" addresses the attack of unauthorized copy or reproduction of the genuine MRTD chip. This attack is thwarted by Active Authentication proving the authenticity of the chip as required by OT.AA_Proof and OT_Data_Int_AA using a authentication key pair to be generated by the issuing State or Organization. The Public Active Authentication Key has to be written into EF.DG15 and signed by means of Documents Security Objects, then . It is also covered by the Chip Authentication protocol OT.CA_Proof and OT_Data_Int_CA which is an alternative to the Active Authentication. The Public Chip Authentication Key has to be written into EF.DG14 and signed by means of Documents Security Objects as demanded by OE.Auth_Key_MRTD "MRTD Authentication Key". According to OE.Exam_MRTD_CA "Examination of the MRTD passport book" the General Inspection system has to perform the Chip Authentication Protocol to verify the authenticity of the MRTD's chip. OE.Activ_Auth_Verif covers also this threat enabling the possibility of performing an Active Authentication which reinforce the security associated to the communication.

10.2 Organisational Security Policies

P.Personalization

The OSP P.Personalization "Personalization of the MRTD by issuing State or Organization only" addresses the (i) the enrolment of the logical MRTD by the Personalization Agent as described in the security objective for the TOE environment **OE.Personalization** "Personalization of logical MRTD", and (ii) the access control for the user data and TSF data as described by the security objective OT.AC_Pers "Access Control for Personalization of logical MRTD". Note the manufacturer equips the TOE with the Personalization Agent Key(s) according to **OT.Identification** "Identification and Authentication of the TOE". The security objective **OT.AC_Pers** limits the management of TSF data and management of TSF to the Personalization Agent.

P.Personal_Data

The OSP P.Personal_Data "Personal data protection policy" requires the TOE (i) to support the protection of the confidentiality of the logical MRTD by means of the Basic Access Control and (ii) enforce the access control for reading as decided by the issuing State or Organization. This policy is implemented by the security objectives **OT.Data_Int** "Integrity of personal data", **OT.Data_Int_CA** and **OT.Data_Int_AA** describing the unconditional protection of the integrity of the stored data and during transmission. The security objective **OT.Data_Conf** "Confidentiality of personal data" describes the protection of the confidentiality.

P.Activ_Auth

The OSP P.Activ_Auth requires the implementation of the Active Authentication protocol as enforced by **OT.AA_Proof**.



P.Chip_Auth

The OSP P.Chip_Auth requires the implementation of the Chip Authentication protocol as enforced by **OT.CA_Proof**.

P.Manufact

The OSP P.Manufact "Manufacturing of the MRTD's chip" requires a unique identification of the IC by means of the Initialization Data and the writing of the Pre-personalization Data as being fulfilled by **OT.Identification**.

10.3 Assumptions

A.MRTD_Manufact

The assumption A.MRTD_Manufact "MRTD manufacturing on step 4 to 6" is covered by the security objective for the TOE environment **OE.MRTD_Manufact** "Protection of the MRTD Manufacturing" that requires to use security procedures during all manufacturing steps.

A.MRTD_Delivery

The assumption A.MRTD_Delivery "MRTD delivery during step 4 to 6" is covered by the security objective for the TOE environment **OE.MRTD_Delivery** "Protection of the MRTD delivery" that requires to use security procedures during delivery steps of the MRTD.

A.Pers_Agent

The assumption A.Pers_Agent "Personalization of the MRTD's chip" is covered by the security objective for the TOE environment **OE.Personalization** "Personalization of logical MRTD" including the enrolment, the protection with digital signature and the storage of the MRTD holder personal data.

A.Insp_Sys

The examination of the MRTD passport book addressed by the assumption A.Insp_Sys "Inspection Systems for global interoperability" is covered by the security objectives for the TOE environment **OE.Exam_MRTD** "Examination of the MRTD passport book". The security objectives for the TOE environment **OE.Prot_Logical_MRTD** "Protection of data from the logical MRTD" will require the Basic Inspection System to implement the Basic Access Control and to protect the logical MRTD data during the transmission and the internal handling.

A.BAC-Keys

The assumption A.BAC-Keys "Cryptographic quality of Basic Access Control Keys" is directly covered by the security objective for the TOE environment **OE.BAC-Keys** "Cryptographic quality of Basic Access Control Keys" ensuring the sufficient key quality to be provided by the issuing State or Organization.

A.Insp_Sys_CA

The examination of the MRTD passport book addressed by the assumption A.Insp_Sys_CA "Inspection Systems for global interoperability" is covered by the security objectives for the TOE environment **OE.Exam_MRTD_CA** "Examination of the MRTD passport book". The security objectives for the TOE environment **OE.Prot_Logical_MRTD_CA** "Protection of data from the logical MRTD" will require the Basic Inspection System to implement the Chip Authentication Protocol v1 and to protect the logical MRTD data during the transmission and the internal handling.

A.Insp_Sys_AA

The examination of the MRTD passport book addressed by the assumption A.Insp_Sys_AA "Inspection Systems for global interoperability" is covered by the security objectives for the TOE environment **OE.Exam_MRTD_AA** "Examination of the MRTD passport book". The security objectives for the TOE environment **OE.Prot_Logical_MRTD_AA** "Protection of data from the logical MRTD" will require

the Basic Inspection System to implement the Active Authentication Protocol and to protect the logical MRTD data during the transmission and the internal handling.

A.Signature_PKI

The assumption is directly covered by the security objective for the TOE environment

OE.Pass_Auth_Sign "Authentication of logical MRTD by Signature" covering the necessary procedures for the Country Signing CA Key Pair and the Document Signer Key Pairs. The implementation of the signature verification procedures is covered by **OE.Exam_MRTD_CA** "Examination of the MRTD passport book". The threat is also covered by **OE.Activ_Auth_Sign** covering the necessary procedures for the Active Authentication key pair establishment.

10.4 SPD and Security Objectives

Threats	Security Objectives
T.Chip_ID	OT.Identification, OE.BAC-Keys, OT.TOE_Identification
T.Skimming	OT.Data_Conf, OE.BAC-Keys
T.Eavesdropping	OT.Data_Conf, OE.BAC-Keys
T.Forgery	OT.AC_Pers, OE.Personalization, OT.Data_Int, OT.Prot_Phys-Tamper, OE.Exam_MRTD, OE.Exam_MRTD_CA, OE.Exam_MRTD_AA, OE.Pass_Auth_Sign, OE.Passive_Auth_Verif
T.Abuse-Func	OT.Prot_Abuse-Func, OE.Personalization
T.Information_Leakage	OT.Prot_Inf_Leak
T.Phys-Tamper	OT.Prot_Phys-Tamper
T.Malfunction	OT.Prot_Malfunction
T.Counterfeit	OT.AA_Proof, OT.Data_Int_AA, OT.CA_Proof, OT.Data_Int_CA, OE.Exam_MRTD_CA, OE.Activ_Auth_Verif, OE.Auth_Key_MRTD
T.Bad_Activation	OT.Secure_AC_Activation
T.TOE_Identification_Forgery	OT.TOE_Identification

Table 26- Threats and Security Objectives – coverage

The rational between the threats and the security objectives is presented in chapter 10.5

OSP	Security Objectives
P.Manufact	OT.Identification
P.Personalization	OT.AC_Pers, OT.Identification, OE.Personalization
P.Personal_Data	OT.Data_Int, OT.Data_Conf, OT.Data_Int_CA, OT.Data_Int_AA
P.Activ_Auth	OT.AA_Proof
P.Chip_Auth	OT.CA_Proof

Table 27: OSPs and Security Objectives – Coverage

Assumptions	OE
A.MRTD_Manufact	OE.MRTD_Manufact
A.MRTD_Delivery	OE.MRTD_Delivery
A.Pers_Agent	OE.Personalization
A.Insp_Sys	OE.Exam_MRTD, OE.Prot_Logical_MRTD
A.BAC-Keys	OE.BAC-Keys
A.Insp_Sys_CA	OE.Prot_Logical_MRTD_CA, OE.Exam_MRTD_CA
A.Insp_Sys_AA	OE.Exam_MRTD_AA, OE.Prot_Logical_MRTD_AA
A.Signature_PKI	OE.Exam_MRTD_CA, OE.Passive_Auth_Verif, OE.Activ_Auth_Sign

Table 28: Assumptions and OE – Coverage



10.5 Security requirements and security objectives

The following chapters present the rationales between security objective and security requirements. For ease reading some requirements are merged.

10.5.1 Rationale Security requirements and security objectives

OT.AC_Pers

The security objective OT.AC_Pers "Access Control for Personalization of logical MRTD" addresses the access control for the personalization of the MRTD, which consists in the writing of the logical MRTD data. The write access to the logical MRTD data are defined by **FDP_ACC.1** and **FDP_ACF.1** as follows: only the successfully authenticated Personalization Agent is allowed to write the data of the groups EF.DG1 to EF.DG16 of the logical MRTD only once.

The authentication of the terminal as Personalization Agent shall be performed by TSF according to SFR **FIA_UAU.4/BAC** and **FIA_UAU.5/BAC**. The Personalization Agent [can be authenticated either by using the BAC mechanism (**FCS_CKM.1**, **FCS_COP.1/SHA**, **FCS_RND.1** (for key generation), and **FCS_COP.1/ENC** as well as **FCS_COP.1/MAC**) with the personalization key or for reasons of interoperability with the [49] by] *is authenticated* using the symmetric authentication mechanism (**FCS_COP.1/AUTH**).

Note symmetric authentication mechanism is used for interoperability with the [49].

In case of using the BAC mechanism **FIA_UAU.6** describes the re-authentication and **FDP_UCT.1** and **FDP_UIT.1** the protection of the transmitted data by means of secure messaging implemented by the cryptographic functions according to **FCS_CKM.1**, **FCS_COP.1/SHA**, **FCS_RND.1** (for key generation), and **FCS_COP.1/ENC** as well as **FCS_COP.1/MAC** for the ENC_MAC_Mode.

FMT_SMR.1 lists the roles (including Personalization Agent) and **FMT_SMF.1** lists the TSF management functions (including Personalization) setting the Document Basic Access Keys according to **FMT_MTD.1/KEY_WRITE** as authentication reference data. **FMT_MTD.1/KEY_READ** prevents read access to the secret key of the Personalization Agent Keys and ensure together with **FCS_CKM.4**, **FPT_EMS.1**, **FPT_FLS.1** and **FPT_PHP.3** the confidentiality of these keys.

OT.Data_Int

The security objective OT.Data_Int "Integrity of personal data" requires the TOE to protect the integrity of the logical MRTD stored on the MRTD's chip against physical manipulation and unauthorized writing. The write access to the logical MRTD data is defined by **FDP_ACC.1** and **FDP_ACF.1** in the same way: only the Personalization Agent is allowed to write the data of the groups EF.DG1 to EF.DG16 of the logical MRTD (**FDP_ACF.1.2**, rule 1) and terminals are not allowed to modify any of the data groups EF.DG1 to EF.DG16 of the logical MRTD (cf. **FDP_ACF.1.4**).

FMT_SMR.1 lists the roles (including Personalization Agent) and **FMT_SMF.1** lists the TSF management functions (including Personalization). The authentication of the terminal as Personalization Agent shall be performed by TSF according to SRF **FIA_UAU.4/BAC**, **FIA_UAU.5/BAC** using the cryptographic operations defined of **FCS_COP.1/***.

Note that for interoperability reasons with the [49] Personalization Agent authentication is performed through **FCS_COP.1/AUTH**.

The security objective **OT.Data_Int** "Integrity of personal data" requires the TOE to ensure that the inspection system is able to detect any modification of the transmitted logical MRTD data b means of the BAC mechanism. **FIA_UAU.6**, **FDP_UCT.1** and **FDP_UIT.1** requires the protection of the transmitted data by means of secure messaging implemented by the cryptographic functions according to **FCS_CKM.1**, **FCS_COP.1/SHA**, **FCS_RND.1** (for key generation), and **FCS_COP.1/ENC** and **FCS_COP.1/MAC** for the ENC_MAC_Mode. **FMT_MTD.1/KEY_WRITE** requires the Personalization Agent to establish the Document Basic Access Keys in a way that they cannot be read by anyone in accordance to **FMT_MTD.1/KEY_READ**.



OT.Data_Conf

The security objective OT.Data_Conf "Confidentiality of personal data" requires the TOE to ensure the confidentiality of the logical MRTD data groups EF.DG1 to EF.DG16. **FIA_UID.1** and **FIA_UAU.1** allow only those actions before identification respective authentication which do not violate OT.Data_Conf. In case of failed authentication attempts **FIA_AFL.1** enforces additional waiting time prolonging the necessary amount of time for facilitating a brute force attack. The read access to the logical MRTD data is defined by the **FDP_ACC.1** and **FDP_ACF.1.2**: the successful authenticated Personalization Agent is allowed to read the data of the logical MRTD (EF.DG1 to EF.DG16). The successful authenticated Basic Inspection System is allowed to read the data of the logical MRTD (EF.DG1, EF.DG2 and EF.DG5 to EF.DG16). **FMT_SMR.1** lists the roles (including Personalization Agent and Basic Inspection System) and **FMT_SMF.1** lists the TSF management functions (including Personalization for the key management for the Document Basic Access Keys).

FIA_UAU.4 prevents reuse of authentication data to strengthen the authentication of the user.

FIA_UAU.5 enforces the TOE to accept the authentication attempt as Basic Inspection System only by means of the Basic Access Control Authentication Mechanism with the Document Basic Access Keys. Moreover, **FIA_UAU.6** requests secure messaging after successful authentication of the terminal with Basic Access Control Authentication Mechanism which includes the protection of the transmitted data in ENC_MAC_Mode by means of the cryptographic functions according to

FCS_COP.1/ENC and **FCS_COP.1/MAC** (cf. **FDP_UCT.1** and **FDP_UIT.1**) (for key generation), and **FCS_COP.1/ENC** and **FCS_COP.1/MAC** for the ENC_MAC_Mode. **FCS_CKM.1**, **FCS_CKM.4**, **FCS_COP.1/SHA** and **FCS_RND.1** establish the key management for the secure messaging keys. **FMT_MTD.1/KEY_WRITE** addresses the key management and **FMT_MTD.1/KEY_READ** prevents reading of the Document Basic Access Keys.

Note, neither the security objective OT.Data_Conf nor **FIA_UAU.5** requires the Personalization Agent to use the Basic Access Control Authentication Mechanism or secure messaging.

OT.Identification

The security objective OT.Identification "Identification and Authentication of the TOE" address the storage of the IC Identification Data uniquely identifying the MRTD's chip in its non-volatile memory. This will be ensured by TSF according to **FAU_SAS.1**.

Furthermore, the TOE shall identify itself only to a successful authenticated Basic Inspection System in Phase 4 "Operational Use". **FMT_MTD.1/INI_ENA** allows only the Manufacturer to write Initialization Data and Pre-personalization Data (including the Personalization Agent key).

FMT_MTD.1/INI_DIS allows the Personalization Agent to disable Initialization Data if their usage in the phase 4 "Operational Use" violates the security objective OT.Identification. **FIA_UID.1** and **FIA_UAU.1** do not allow reading of any data uniquely identifying the MRTD's chip before successful authentication of the Basic Inspection Terminal and will stop communication after unsuccessful authentication attempt. In case of failed authentication attempts **FIA_AFL.1** enforces additional waiting time prolonging the necessary amount of time for facilitating a brute force attack.

OT.Prot_Abuse-Func

The security objective OT.Prot_Abuse-Func "Protection against Abuse of Functionality" is ensured by **FMT_LIM.1** and **FMT_LIM.2** which prevent misuse of test functionality of the TOE or other features which may not be used after TOE Delivery.

OT.Prot_Inf_Leak

The security objective OT.Prot_Inf_Leak "Protection against Information Leakage" requires the TOE to protect confidential TSF data stored and/or processed in the MRTD's chip against disclosure 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, which is addressed by **FPT_EMS.1**, by forcing a malfunction of the TOE, which is addressed by **FPT_FLS.1** and **FPT_TST.1**, and/or by a physical manipulation of the TOE, which is addressed by **FPT_PHP.3**.

OT.Prot_Phys-Tamper



The security objective OT.Prot_Phys-Tamper "Protection against Physical Tampering" is covered by **FPT_PHP.3**.

OT.Prot_Malfunction

The security objective OT.Prot_Malfunction "Protection against Malfunctions" is covered by (i) **FPT_TST.1** which requires self tests to demonstrate the correct operation and tests of authorized users to verify the integrity of TSF data and TSF code, and (ii) **FPT_FLS.1** which requires a secure state in case of detected failure or operating conditions possibly causing a malfunction.

OT.AA_Proof

The security objective OT.AA_Proof is ensured by the Active Authentication Protocol activated by **FMT_MOF.1/AA** and provided by **FDP_DAU.1/AA, FDP_ITC.1/AA** proving the identity and authenticity of the TOE. The Active Authentication relies on **FCS_COP.1/AA** and **FCS_RND.1**. It is performed using a TOE internally stored confidential private key as required by **FMT_MTD.1/AA_KEY_WRITE** and **FMT_MTD.1/AA_KEY_READ**.

OT.Data_Int_AA

The security objective OT.AA_Proof is ensured by the Active Authentication Protocol activated by **FMT_MOF.1/AA** and provided by **FDP_DAU.1/AA and FDP_ITC.1/AA** proving the identity and authenticity of the TOE.

OT.CA_Proof

The security objective OT.CA_Proof is ensured by the Chip Authentication Protocol provided by **FCS_COP.1/CA** (for the derivation of the new session keys), **FIA_UID.1/CA** (for user to be successfully identified before allowing any other TSF-mediated actions on behalf of that user), **FIA_UAU.1/CA** (for user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user), **FDP_ITC.1/CA** (for enforcing **Chip Authentication Access Control SFP** when importing user data, controlled under the SFP, from outside of the TOE), **FIA_UAU.5/CA**(for secure messaging and symmetric authentication), **FIA_UAU.6/CA**(for re-authenticating the user), **FDP_UCT.1/CA and FDP_UIT.1/CA** (for enforcing Access control SFP from unauthorised disclosure) and **FIA_API.1/CA** (for providing chip authentication protocol). The Chip Authentication relies on **FCS_CKM.1/CA**(for the generation of shared secret), for the key session establishment. Session keys are securely erased by **FCS_CKM.4** in case of a bad SM, a card reset or a new Select. It is performed using a TOE internally stored confidential private key as required by **FMT_MTD.1/CA_KEY_WRITE** and **FMT_MTD.1/CA_KEY_READ**.

OT.Data_Int_CA

The security objective OT.Data_Int_CA is ensured by the Chip Authentication Protocol that constructs a trusted channel through the following SFR **FIA_UID.1/CA** (for user to be successfully identified before allowing any other TSF-mediated actions on behalf of that user), **FIA_UAU.1/CA** (for user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user), **FDP_ITC.1/CA** (for enforcing **Chip Authentication Access Control SFP** when importing user data, controlled under the SFP, from outside of the TOE), **FIA_UAU.5/CA**(for secure messaging and symmetric authentication), **FIA_UAU.6/CA**(for re-authenticating the user), **FDP_UCT.1/CA and FDP_UIT.1/CA** (for enforcing Access control SFP from unauthorised disclosure) and **FIA_API.1/CA** (for providing chip authentication protocol).

10.5.2 Matrix Security requirements and security objectives

SO	SFR
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SO	SFR
OT.AC_Pers	FDP_ACC.1, FDP_ACF.1, FIA_UAU.4/BAC, FIA_UAU.5/BAC, FCS_CKM.1, FCS_COP.1/SHA, FCS_RND.1, FCS_COP.1/ENC, FCS_COP.1/MAC, FCS_COP.1/AUTH, FIA_UAU.6, FDP_UCT.1, FDP_UIT.1, FMT_SMF.1, FMT_SMR.1, FMT_MTD.1/KEY_WRITE, FMT_MTD.1/KEY_READ, FCS_CKM.4, FPT_EMS.1, FPT_PHP.3, FPT_FLS.1
OT.Data_Int	FDP_ACC.1, FDP_ACF.1, FMT_SMR.1, FMT_SMF.1, FIA_UAU.4, FIA_UAU.5, FIA_UAU.6, FCS_COP.1/ENC, FCS_COP.1/MAC, FCS_COP.1/AUTH, FDP_UCT.1, FDP_UIT.1, FCS_CKM.1, FCS_COP.1/SHA, FCS_RND.1, FMT_MTD.1/KEY_WRITE, FMT_MTD.1/KEY_READ, FIA_UAU.4/BAC, FIA_UAU.5/BAC
OT.Data_Conf	FIA_UID.1, FIA_UAU.1, FIA_AFL.1, FDP_ACC.1, FDP_ACF.1, FMT_SMR.1, FMT_SMF.1, FIA_UAU.4, FIA_UAU.5, FIA_UAU.6, FCS_COP.1/ENC, FCS_COP.1/MAC, FDP_UCT.1, FDP_UIT.1, FCS_CKM.1, FCS_CKM.4, FCS_COP.1/SHA, FCS_RND.1, FMT_MTD.1/KEY_WRITE, FMT_MTD.1/KEY_READ
OT.Identification	FAU_SAS.1, FMT_MTD.1/INI_ENA, FMT_MTD.1/INI_DIS, FIA_UID.1, FIA_UAU.1, FIA_AFL.1
OT.Prot_Abuse- Func	FMT_LIM.1, FMT_LIM.2
OT.Prot_Inf_Leak	FPT_EMS.1, FPT_FLS.1, FPT_TST.1, FPT_PHP.3
OT.Prot_Phys- Tamper	FPT_PHP.3
OT.Prot_Malfunction	FPT_TST.1, FPT_FLS.1
OT.AA_Proof	FMT_MOF.1/AA, FDP_DAU.1/AA, FCS_COP.1/AA, FCS_RND.1, FMT_MTD.1/AA_KEY_WRITE, FMT_MTD.1/AA_KEY_READ, FDP_ITC.1/AA
OT.Data_Int_AA	FMT_MOF.1/AA, FDP_DAU.1/AA, FDP_ITC.1/AA
OT.CA_Proof	FCS_COP.1/CA, FIA_UID.1/CA, FIA_UAU.1/CA, FIA_UAU.5/CA, FIA_UAU.6/CA, FDP_UCT.1/CA, FDP_UIT.1/CA, FIA_API.1/CA, FCS_CKM.1/CA, FMT_MTD.1/CA_KEY_WRITE, FMT_MTD.1/CA_KEY_READ,
OT.Data_Int_CA	FIA_UID.1/CA, FIA_UAU.1/CA, FIA_UAU.5/CA, FIA_UAU.6/CA, FDP_UCT.1/CA, FDP_UIT.1/CA, FIA_API.1/CA, FDP_ITC.1/CA

Table 29: Security Requirements and Security Objectives Matrix

10.5.3 Dependencies justification SFRs

Requirements	CC Dependencies	Satisfied Dependencies
FAU_SAS.1	No dependencies	
FCS_CKM.1	(FCS_CKM.2 or FCS_COP.1) and (FCS_CKM.4)	FCS_CKM.4, FCS_COP.1/ENC, FCS_COP.1/MAC
FCS_CKM.4	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2)	FCS_CKM.1
FCS_COP.1/SHA	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.4 See justification
FCS_COP.1/ENC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1, FCS_CKM.4
FCS_COP.1/AUTH	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	See justification
FCS_COP.1/MAC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1, FCS_CKM.4
FCS_RND.1	No dependencies	
FIA_AFL.1	(FIA_UAU.1)	FIA_UAU.1
FIA_UID.1	No dependencies	
FIA_UAU.1	(FIA_UID.1)	FIA_UID.1

Requirements	CC Dependencies	Satisfied Dependencies
FIA_UAU.4	No dependencies	
FIA_UAU.5	No dependencies	
FIA_UAU.6	No dependencies	
FDP_ACC.1	(FDP_ACF.1)	FDP_ACF.1
FDP_ACF.1	(FDP_ACC.1) and (FMT_MSA.3)	FDP_ACC.1 See justification
FDP_UCT.1	(FDP_ACC.1 or FDP_IFC.1) and (FTP_ITC.1 or FTP_TRP.1)	FDP_ACC.1 See justification
FDP_UIT.1	(FDP_ACC.1 or FDP_IFC.1) and (FTP_ITC.1 or FTP_TRP.1)	FDP_ACC.1 See justification
FMT_SMF.1	No dependencies	
FMT_SMR.1	(FIA_UID.1)	FIA_UID.1
FMT_LIM.1	(FMT_LIM.2)	FMT_LIM.2
FMT_LIM.2	(FMT_LIM.1)	FMT_LIM.1
FMT_MTD.1/INI_ENA	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1
FMT_MTD.1/INI_DIS	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1
FMT_MTD.1/KEY_WRITE	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1
FMT_MTD.1/KEY_READ	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1
FPT_EMS.1	No dependencies	
FPT_FLS.1	No dependencies	
FPT_TST.1	No dependencies	
FPT_PHP.3	No dependencies	

Table 30 - SFRs dependencies

Requirements	CC Dependencies	Satisfied Dependencies
FCS_COP.1/AA	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FDP_ITC.1/AA , FCS_CKM.4
FDP_DAU.1/AA	No dependencies	
FDP_ITC.1/AA	(FDP_ACC.1 or FDP_IFC.1) and (FMT_MSA.3)	FDP_ACC.1 See justification
FMT_MOF.1/AA	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1
FMT_MTD.1/AA_KEY_WRITE	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1
FMT_MTD.1/AA_KEY_READ	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1

Table 31 - SFRs dependencies for additional AA SFR

Requirements	CC Dependencies	Satisfied Dependencies
FCS_CKM.1/CA	(FCS_CKM.2 or FCS_COP.1) and (FCS_CKM.4)	FCS_CKM.4, FCS_COP.1/CA
FCS_COP.1/CA	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.4, FDP_ITC.1/CA
FDP_ITC.1/CA	(FDP_ACC.1 or FDP_IFC.1) and (FMT_MSA.3)	FDP_ACC.1 See justification
FIA_UID.1/CA	No dependencies	
FIA_UAU.1/CA	(FIA_UID.1)	FIA_UID.1/CA
FIA_UAU.5/CA	No dependencies	
FIA_UAU.6/CA	No dependencies	
FIA_API.1/CA	No dependencies	
FDP_UCT.1/CA	(FDP_ACC.1 or FDP_IFC.1) and (FTP_ITC.1 or FTP_TRP.1)	FDP_ACC.1 See justification
FDP_UIT.1/CA	(FDP_ACC.1 or FDP_IFC.1) and (FTP_ITC.1 or FTP_TRP.1)	FDP_ACC.1 See justification
FMT_MTD.1/CA_KEY_WRITE	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1
FMT_MTD.1/CA_KEY_READ	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1, FMT_SMR.1



Requirements	CC Dependencies	Satisfied Dependencies
FPT_TST.1/CA	No dependencies	

Table 32 - SFRs for additional CA SFR

10.5.3.1 Rationale for the exclusion of dependencies

Dependency FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2 of FCS_COP.1/SHA is unsupported. The hash algorithm required by FCS_COP.1/SHA does not need any key material. Therefore neither a key generation (FCS_CKM.1) nor an import (FDP_ITC.1/2) is necessary.

The dependency FMT_MSA.3 of FDP_ACF.1, FDP_ITC.1/CA, FDP_ITC.1/AA is unsupported. The access control TSF according to FDP_ACF.1 uses security attributes which are defined during the personalization and are fixed over the whole life time of the TOE. No management of these security attribute (i.e. SFR FMT_MSA.1 and FMT_MSA.3) is necessary here.

The dependency FDP_ITC.1 or FDP_ITC.2 of FCS_COP.1/AUTH is unsupported. FCS_COP.1/AUTH uses the symmetric Personalization Key permanently stored during the Pre-Personalization process (cf. FMT_MTD.1/INI_ENA) by the manufacturer. Thus there is neither the necessity to generate or import a key during the addressed TOE lifecycle by the means of FCS_CKM.1 or FDP_ITC.

The dependency FCS_CKM.4 for FCS_COP.1/AUTH is not required since the key is permanently stored within the TOE, there is no need for key destruction.

The dependency FTP_ITC.1 or FTP_TRP.1 of FDP_UCT.1 is unsupported. FDP_UCT.1 requires the use of secure messaging between the MRTD and the BIS. There is no need for SFR FTP_ITC.1, e.g. to require this communication channel to be logically distinct from other communication channels since there is only one channel. Since the TOE does not provide a direct human interface a trusted path as required by FTP_TRP.1 is not applicable here.

The dependency FTP_ITC.1 or FTP_TRP.1 of FDP_UIT.1 is unsupported. FDP_UIT.1 required the use of secure messaging between the MRTD and the BIS. There is no need for SFR FTP_ITC.1, e.g. to require this communication channel to be logically distinct from other communication channels since there is only one channel. Since the TOE does not provide a direct human interface a trusted path as required by FTP_TRP.1 is not applicable here.

The dependency FTP_ITC.1 of FDP_UCT.1/CA and FDP_UIT.1/CA is unsupported. There is no need for FTP_ITC.1, e.g. to require this communication channel to be logically distinct from other communication channels since there is only one channel. Since the TOE does not provide a direct human interface a trusted path as required by FTP_TRP.1 is not applicable here.

10.5.4 SARs dependencies

Reqs	CC Dependencies	Satisfied Dependencies
ADV_ARC.1	(ADV_FSP.1) and (ADV_TDS.1)	ADV_FSP.4, ADV_TDS.3
ADV_FSP.4	(ADV_TDS.1)	ADV_TDS.3
ADV_IMP.1	(ADV_TDS.3) and (ALC_TAT.1)	ADV_TDS.3, ALC_TAT.1
ADV_TDS.3	(ADV_FSP.4)	ADV_FSP.4
AGD_OPE.1	(ADV_FSP.1)	ADV_FSP.4
AGD_PRE.1	No Dependencies	
ALC_CMC.4	(ALC_CMS.1) and (ALC_DVS.1) and (ALC_LCD.1)	ALC_CMS.4, ALC_DVS.2, ALC_LCD.1
ALC_CMS.4	No Dependencies	
ALC_DEL.1	No Dependencies	
ALC_DVS.2	No Dependencies	



Reqs	CC Dependencies	Satisfied Dependencies
ALC_LCD.1	No Dependencies	
ALC_TAT.1	(ADV_IMP.1)	ADV_IMP.1
ASE_CCL.1	(ASE_ECD.1) and (ASE_INT.1) and (ASE_REQ.1)	ASE_ECD.1, ASE_INT.1, ASE_REQ.2
ASE_ECD.1	No Dependencies	
ASE_INT.1	No Dependencies	
ASE_OBJ.2	(ASE_SPD.1)	ASE_SPD.1
ASE_REQ.2	(ASE_ECD.1) and (ASE_OBJ.2)	ASE_ECD.1, ASE_OBJ.2
ASE_SPD.1	No Dependencies	
ASE_TSS.1	(ADV_FSP.1) and (ASE_INT.1) and (ASE_REQ.1)	ADV_FSP.4, ASE_INT.1, ASE_REQ.2
ATE_COV.2	(ADV_FSP.2) and (ATE_FUN.1)	ADV_FSP.4, ATE_FUN.1
ATE_DPT.1	(ADV_ARC.1) and (ADV_TDS.2) and (ATE_FUN.1)	ADV_ARC.1, ADV_TDS.3, ATE_FUN.1
ATE_FUN.1	(ATE_COV.1)	ATE_COV.2
ATE_IND.2	(ADV_FSP.2) and (AGD_OPE.1) and (AGD_PRE.1) and (ATE_COV.1) and (ATE_FUN.1)	ADV_FSP.4, AGD_OPE.1, AGD_PRE.1, ATE_COV.2, ATE_FUN.1
AVA_VAN.3	(ADV_ARC.1) and (ADV_FSP.4) and (ADV_IMP.1) and (ADV_TDS.3) and (AGD_OPE.1) and (AGD_PRE.1) and (ATE_DPT.1)	ADV_ARC.1, ADV_FSP.4, ADV_IMP.1, ADV_TDS.3, AGD_OPE.1, AGD_PRE.1, ATE_DPT.1

Table 33 - SARs dependencies