



CombICA0 Applet in EAC with PACE Configuration on Cosmo v9 Public Security Target

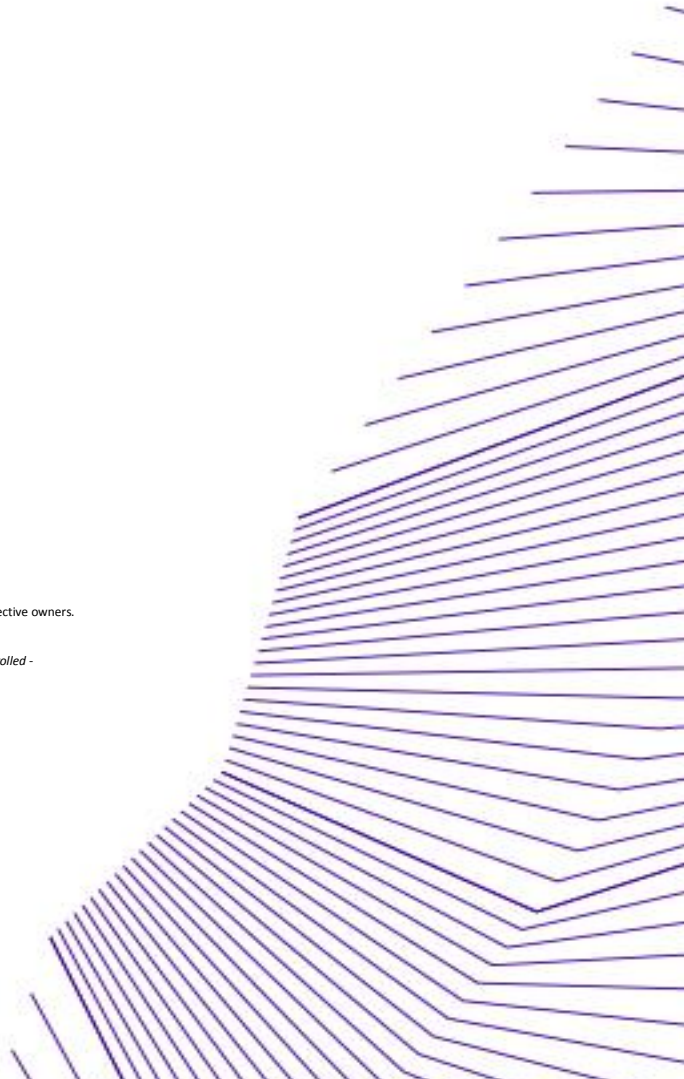
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1 GENERAL

1.1 Introduction

This public security target describes the security needs induced by the CombICAO Applet product in EAC with PACE configuration on IDEMIA underlying Java Card *ID-ONE Cosmo V9 Essential*, see 2.1.2 .

The objectives of this Security Target are:

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

1.2 Product overview

The product is designed to support the following usages:

1. **eMRTD as per [ICAO_9303]; scope of the current ST**
2. ISO compliant driving license as per [ISO/IEC_18013] and [ISO/IEC_19446]; (out of the scope of the current ST)
3. digital identity and electronic services; (out of the scope of the current ST)

It is achieved thanks to a flexible design allowing to “build” during personalization of the applet the required application(s) by configuring accordingly:

- the file system;
- authentication protocols;
- the user authentication credentials;
- Access conditions on files.

The product can be personalized to support an eMRTD application compliant with [ICAO_9303].

The TOE can be configured in four configurations ways.

However, the current ST addresses CombICAO Applet in eMRTD configuration (1) below.

- 1) CombICAO Applet product in **EAC** with **PACE** configuration,
- 2) CombICAO Applet product in **BAC** configuration with **CA**,
- 3) CombICAO Applet product in **EAC** configuration,
- 4) CombICAO Applet product in **PACE** configuration with **CA**.





2 ST INTRODUCTION

2.1 ST reference and TOE reference

2.1.1 ST reference

Title	CombICAO Applet in EAC with PACE configuration on Cosmo V9– Security Target
ST Identification	FQR 110 9318
ST Version	3
CC Version	3.1 revision 5
Authors	IDEMIA
ITSEF	BrightSight
Certification Body	TÜV Rheinland Nederland B.V.
EAL	EAL5 augmented with: <ul style="list-style-type: none"> • ALC_DVS.2 • AVA_VAN.5
PP	[PP_EACwPACE]

Table 1 ST reference

2.1.2 TOE reference

Product Name	CombICAO Applet
TOE Name	CombICAO Applet in EAC with PACE configuration on ID-ONE Cosmo V9 Essential
Developer Name	IDEMIA
TOE Identification	SAAAAR code: 203297
Platform Name	ID-One Cosmo V9 Essential Platform
Platform Identification	089233
Platform Certificate	[PTF_CERT]
Guidance Documents	[Applet_Perso_Guide], [Applet_User_Guide] [PTF_AGD_OPE], [PTF_AGD_PRE], [PTF_AGD1], [PTF_AGD2] and [PTF_AGD_SEC_AC]

Table 2 TOE reference

In order to assure the authenticity of the card, the **TOE Identification** shall be verified by analyzing the response of the command GET DATA, see section 4 of [Applet_Perso_Guide].





2.2 TOE overview

2.2.1 Usage and major security features of the TOE

A State or Organization issues MRTDs to be used by the holder for international travel. The traveler presents a MRTD to the inspection system to prove his or her identity. The MRTD in context of this Security Target contains (i) visual (eye readable) biographical data and portrait of the holder, (ii) a separate data summary (MRZ data) for visual and machine reading using OCR methods in the Machine readable zone (MRZ) and (iii) data elements on the MRTD's chip according to LDS for contactless machine reading. The authentication of the traveler is based on (i) the possession of a valid MRTD personalized for a holder with the claimed identity as given on the biographical data page and (ii) optional biometrics using the reference data stored in the MRTD. The issuing State or Organization ensures the authenticity of the data of genuine MRTD's. The receiving State trusts a genuine MRTD of an issuing State or Organization.

The MRTD is viewed as unit of

- (a) the **physical MRTD** as travel document in form of paper, plastic and chip. It presents visual readable data including (but not limited to) personal data of the MRTD holder
 - (1) the biographical data on the biographical data page of the passport book,
 - (2) the printed data in the Machine-Readable Zone (MRZ) and
 - (3) the printed portrait.

- (b) the **logical MRTD** as data of the MRTD holder stored according to the Logical Data Structure [ICAO_9303] as specified by ICAO on the contactless integrated circuit. It presents contactless readable data including (but not limited to) personal data of the MRTD holder
 - (1) the digital Machine Readable Zone Data (digital MRZ data, EF.DG1),
 - (2) the digitized portraits (EF.DG2),
 - (3) the optional biometric reference data of finger(s) (EF.DG3) or iris image(s) (EF.DG4) or both
 - (4) the other data according to LDS (EF.DG5 to EF.DG16) and
 - (5) 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 their data. The MRTD as the passport book 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 organizational security measures (e.g. control of materials, personalization procedures) [ICAO_9303]. These security measures include the binding of the MRTD's chip to the passport book.

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.

The ICAO defines the baseline security methods Passive Authentication and the optional advanced security methods Basic Access Control to the logical MRTD, Extended Access Control to and the Data Encryption of additional sensitive biometrics as optional security measure in the 'ICAO Doc 9303' [ICAO_9303]. The Passive Authentication Mechanism and the Data Encryption are performed completely and independently on the TOE by the TOE environment.

This Public Security Target addresses the protection of the logical travel document (i) in integrity by write-only-once access control and by physical means, and (ii) in confidentiality by the Extended





Access Control Mechanism. Also it addresses the Chip Authentication Version 1 described in [TR_03110] as an alternative to the Active Authentication stated in [ICAO_9303].

If BAC is supported by the TOE, the travel document has to be evaluated and certified separately. This is due to the fact that [PP_BAC] does only consider extended basic attack potential to the Basic Access Control Mechanism (i.e. AVA_VAN.3).

During the prepersonalization and personalisation, the Personalisation Agent, once authenticated, gets the rights (access control) for (1) reading and writing data,(2) instantiating the application, and (4) writing of personalization data. The Personalisation Agent can so create the file structure (MF / ADF) required for this configuration.

Mutatis mutandis, the TOE may also be used as an ISO driving license, compliant to ISO/IEC 18013 or ISO/IEC TR 19446 supporting BAP-1 (the same protocol as BAC but used in the context of driving license), AA and CA, as both applications (MRTD and IDL) share the same protocols and data structure organization. Therefore, in the rest of the document, the word "MRTD" MAY be understood either as a MRTD in the sense of ICAO, or a driving license compliant to ISO/IEC 18013 or ISO/IEC TR 19446 depending on the targeted usage envisioned by the issuer.

The table below indicates how terms and concept present in the current document shall be read when considering the TOE to be an ISO driving license:

MRTD	ISO driving licence
MRTD	IDL
ICAO	ISO/IEC
ICAO 9303	ISO/IEC 18013 or ISO/IEC TR 19446
BAC	BAP-1
DG3	DG7
DG4	DG8
DG15	DG13
MRZ or CAN	MRZ or SAI (Scanning area identifier)
Traveler	Holder

NB: the ISO driving license is out of the scope of the current ST and not evaluated.

The protection of the communication provided by Password Authenticated Connection Establishment (PACE) is a mandatory security feature of the TOE. The travel document shall strictly conform to the 'Common Criteria Protection Profile Machine Readable Travel Document using Standard Inspection Procedure with PACE ([PP_PACE]). Note that [PP_PACE] considers high attack potential.

For the PACE protocol according to [ICAO_TR_SAC], the following steps shall be performed:

- (i) the travel document's chip encrypts a nonce with the shared password, derived from the MRZ resp. CAN data and transmits the encrypted nonce together with the domain parameters to the terminal.
- (ii) The terminal recovers the nonce using the shared password, by (physically) reading the MRZ resp. CAN data.
- (iii) The travel document's chip and terminal computer perform a Diffie-Hellmann key agreement together with the ephemeral domain parameters to create a shared secret. Both parties derive the session keys KMAC and KENC from the shared secret.
- (iv) Each party generates an authentication token, sends it to the other party and verifies the received token.

After successful key negotiation the terminal and the travel document's chip provide private communication (secure messaging) [TR_03110], [ICAO_TR_SAC].





The Security Target requires the TOE to implement the Extended Access Control as defined in [TR_03110]. The Extended Access Control consists of two parts (i) the Chip Authentication Protocol Version 1 and (ii) the Terminal Authentication Protocol Version 1 (v.1). The Chip Authentication Protocol v.1 (i) authenticates the travel document's chip to the inspection system and (ii) establishes secure messaging which is used by Terminal Authentication v.1 to protect the confidentiality and integrity of the sensitive biometric reference data during their transmission from the TOE to the inspection system. Therefore Terminal Authentication v.1 can only be performed if Chip Authentication v.1 has been successfully executed. The Terminal Authentication Protocol v.1 consists of (i) the authentication of the inspection system as entity authorized by the receiving State or Organisation through the issuing State, and (ii) an access control by the TOE to allow reading the sensitive biometric reference data only to successfully authenticated authorized inspection systems. The issuing State or Organisation authorizes the receiving State by means of certification the authentication public keys of Document Verifiers who create Inspection System Certificates.

2.2.2 TOE type

The TOE is a composite product made up of an Embedded Software developed using Java Card technology, composed on a Java Card open platform. Both developed by IDEMIA.

The underlying Java Card open platform has already been certified, please see [PTF_CERT].

The TOE embedded is the dual (contactless and/or contact) integrated circuit chip of machine readable travel documents (MRTD's chip) programmed according to the Logical Data Structure (LDS) and providing :

- Password Authenticated Connection Establishment (PACE)
- Extended Access Control (EAC)
- Chip Authentication (CA)
- Terminal Authentication (TA)

Please refer to 2.3.2 TOE delivery section for more details on TOE deliveries

2.2.3 Required non-TOE hardware/Software/firmware

There is no explicit non-TOE hardware, software or firmware required by the TOE to perform its claimed security features. The TOE is defined to comprise the chip and the complete operating system and application. Note, the inlay holding the chip as well as the antenna and the booklet (holding the printed MRZ) are needed to represent a complete MRTD, nevertheless these parts are not inevitable for the secure operation of the TOE.

Note: In particular, the TOE may be used in contact mode, without any inlay or antenna.



2.3 TOE description

2.3.1 Physical scope of the TOE

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 as 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 are not part of the TOE.

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

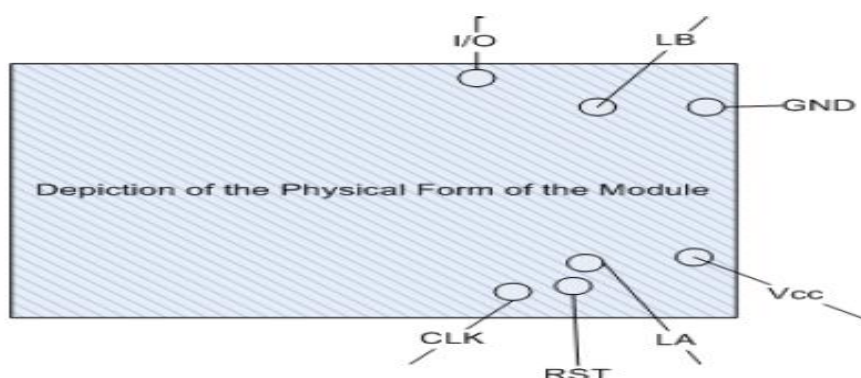


Figure 1 Physical Form of the Module

2.3.2 TOE delivery

The TOE is composed of:

- Circuitry of the MRTD's chip (the IC) :
- IC Dedicated Software with the parts IC Dedicated Test Software and IC Dedicated Support Software
- ID-ONE Cosmo V9 Essential: see [ST_PTF] and [PTF_CERT]
- CombICAO application
- Associated guidance documentation (delivered in electronic version)



This ST Lite will also be provided as a guidance document along with above-mentioned documents.

TOE Component	Identification	Form Factor of Delivery	Delivery method
CombICAO applet for MRTD	203297	ID1 or ID3 Passport booklets ID1 cards or ID3 holder pages Antenna ¹ inlays Chip in modules on a reel	CPS tool is used in the case of an Image delivery. Otherwise, trusted courier is used.
Personalizing Agent	[Applet_Perso_Guide]	Electronic doc	PGP-encrypted parts on USB or CD media, off-line registered distribution by trusted courier
End User of the TOE	[Applet_Uder_Guide]		
Underlying platform guidance	[PTF_AGD_OPE] [PTF_AGD1] [PTF_AGD2] [PTF_AGD_SEC_AC] [PTF_AGD_PRE]		

Form factor and Delivery Preparation:

1. As per the Software Development Process of IDEMIA, upon completion of development activities, particular applet will be uploaded into CPS in CAP file format. Before uploading, the applet will be verified through Oracle verifier and IDEMIA verifier.
2. During Release for Sample as project milestone, status of the applet in CPS will be changed into "Pilot version" to be used further for manufacturing samples.
3. During Software Delivery Review as the final R&D project milestone, status of the applet in CPS will be changed into "Industrial release" to be used further for mass production.

¹ The inlay production including the application of the antenna is not part of the TOE



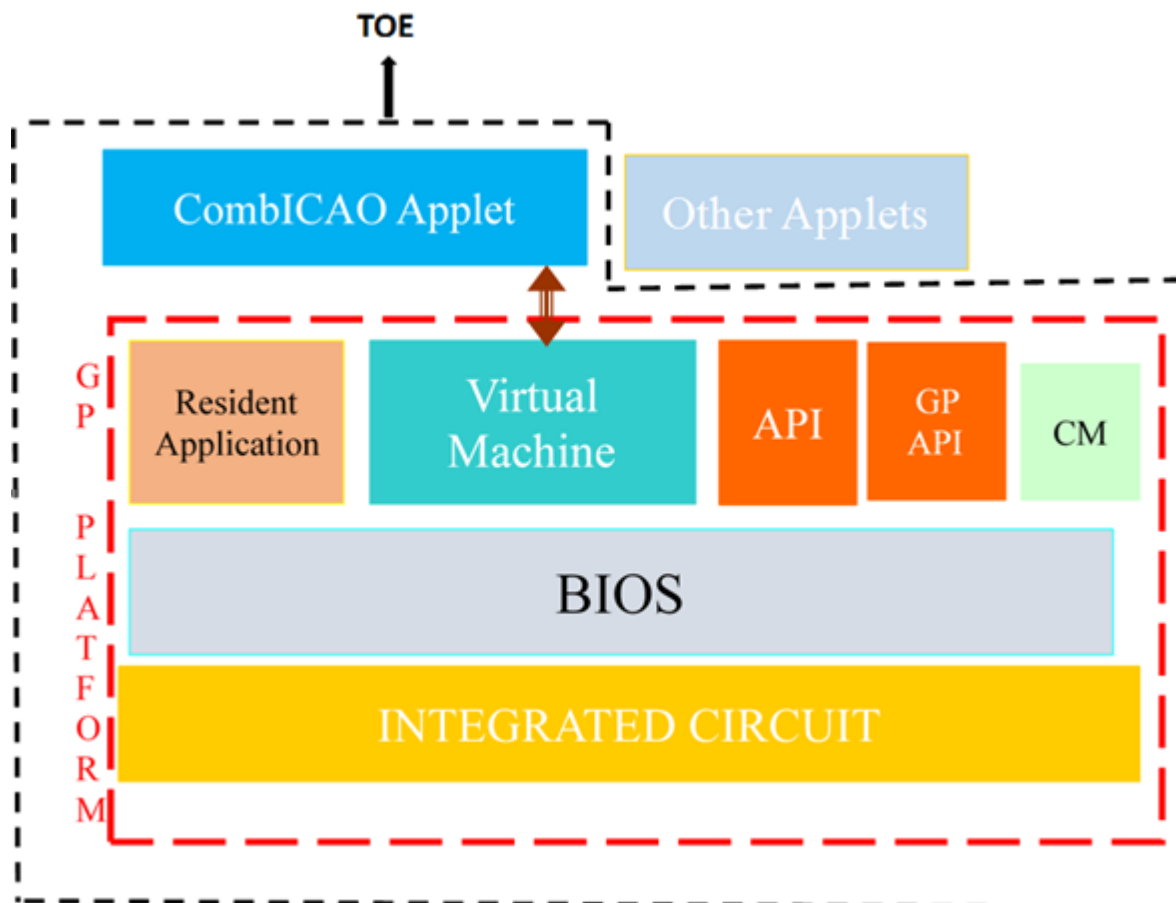


Figure 2 TOE Boundaries

2.3.3 Logical scope of the TOE

The TOE is a smartcard, composed of :

- IC,
- Java Card Open Platform (OS) and
- CombICAO application (data storage file structure)

The TOE scope encompasses the following features:

- Chip Authentication
- Terminal Authentication
- Password Authentication Connection Establishment (PACE v2)
- Prepersonalization phase
- Personalisation phase

The prepersonalization and personalisation are performed by the Manufacturer and the Personalisation Agent, which controls the TOE. All along this phase, the TOE is self-protected, as it requires the authentication of the Manufacturer and the Personalisation Agent prior to any operation. By being authenticated, the Personalisation Agent gets the rights (access control) for (1) reading and writing data,(2) instantiating the application, and (4) writing of personalization data. The Personalisation Agent can so create the file structure (MF / ADF) required for this configuration.

2.3.4 Authentication Protocols

2.3.4.1 Terminal Authentication (TA)

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.

Terminal Authentication v1 is part of the EACv1 procedure defined in [TR_03110].

2.3.4.2 Chip Authentication (CA)

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 (AA protocol is not supported by the TOE), 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.

Chip Authentication v1 is part of the EACv1 procedure defined in [TR_03110].

2.3.4.3 Password Authenticated Connection Establishment (PACE v2)

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 five 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-	Generic	AES	16	CBC / CMAC	CMAC	SHA-





AES-128						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 Authenticatio n	AES	16	CBC / CMAC	CMAC	SHA-1
PACE-ECDH-CAM-AES-192	Chip Authenticatio n	AES	24	CBC / CMAC	CMAC	SHA-256
PACE-ECDH-CAM-AES-256	Chip Authenticatio n	AES	32	CBC / CMAC	CMAC	SHA-256

Table 3 PACE configuration

2.3.5 Other features

2.3.5.1 Automatic BAC phasing out

The TOE also supports a mechanism allowing the automatic deactivation of the BAC protocol after the current date (of the TOE) has reached a reference date - chosen by the issuer and configured by the personalization Agent. The current date is the internal date updated through the EAC protocol. Thanks to this feature, it is possible to issue MRTD supporting both PACE and BAC as needed for interoperability reasons, and perform smooth phasing out of the BAC protocol in the medium term (due to its cryptographic weaknesses) during the life time of the issued MRTD, without having to wait for the complete renewal of issued MRTD (> 10 years).

The automatic BAC phasing out is part of the TOE.

2.3.5.2 Enhanced protection over Sensitive biometric data reading

The access to sensitive biometric data: the fingerprint and iris stored in DG3 and DG4 are protected in accordance with the requirements of the protection profile and specification. Beyond that, the TOE also provides a feature able to ensure a high level of confidentiality when reading these data. The TOE supports a mechanism enforcing to use a minimum cryptographic strength for the confidentiality, integrity and authenticity protection of these sensitive biometric data when being read. This may be useful for issuing authority that do not consider DES algorithm strong enough to ensure a sufficient level of confidentiality. This mechanism allows the TOE to enforce the terminal using a stronger algorithm such as AES 128, or 192 bits, or 256 bits when reading the sensitive biometric data, and deny access to them if this condition is not met (algorithm not strong enough).

The enhanced protection over sensitive biometric data reading is part of the TOE.



2.3.6 TOE life cycle

2.3.6.1 Life cycle overview

The following table presents the TOE roles and the corresponding subject:

Roles		Subject
IC developer		IC Manufacturer
TOE developer		IDEMIA
Manufacturer	IC manufacturer	IC Manufacturer
	MRTD packaging responsible	IDEMIA or another agent
	Embedded software loading responsible	IDEMIA
	Pre-personalization (Manufacturer Role) Agent	IDEMIA or another agent
Personalization Agent		IDEMIA or another agent

Table 4 Roles identification on the life cycle

Several life cycles are available, depending when the Flash Code is loaded.

The following tables present the subjects following TOE life cycle steps in accordance with the standard smart card life cycle [PP_IC], and describe for each of them, (1) the TOE delivery point and (2) the assurance coverage:

The TOE life cycle in the following figure distinguishes stages for development, production, preparation and operational use in accordance with the standard smart card life cycle [PP_IC].

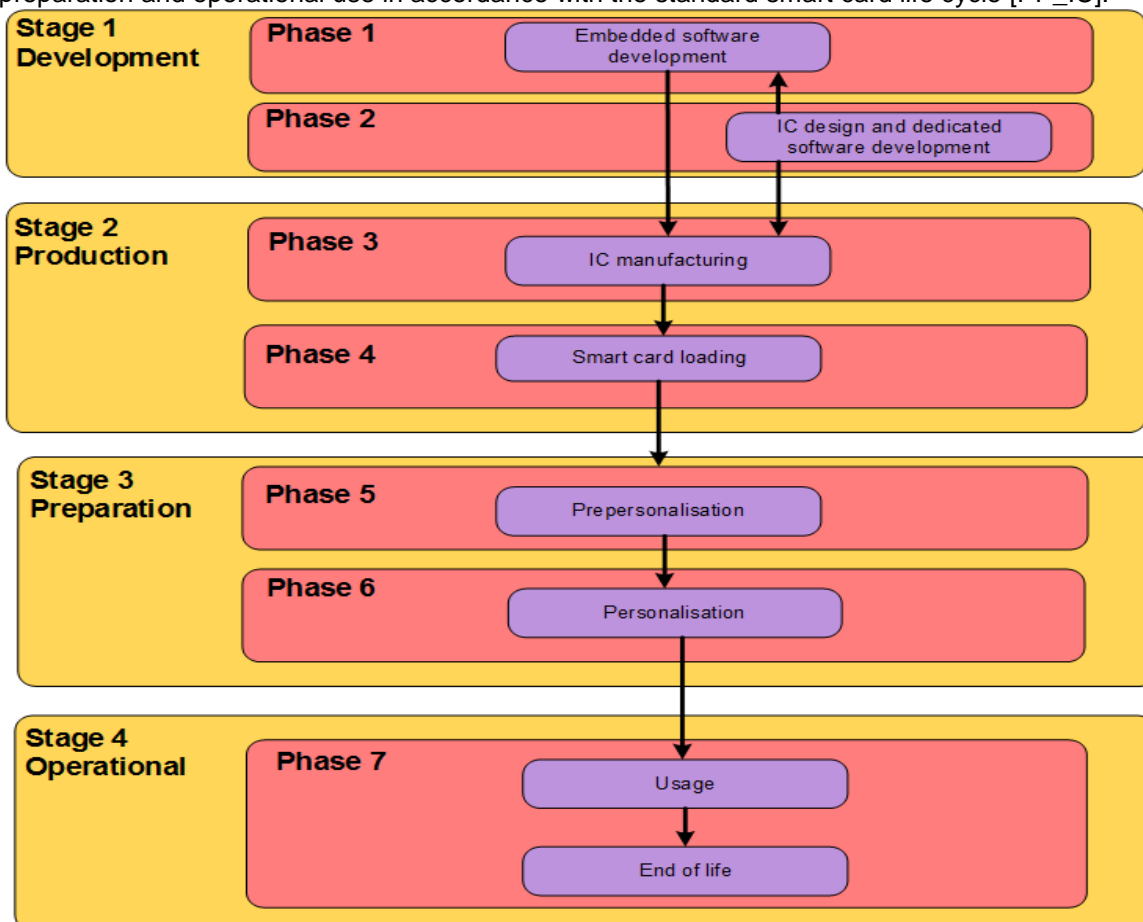


Figure 3 Life cycle Overview



2.3.7 Development Environment

In this environment, the following two phases take place:

- Phase 1: IC Embedded Software Development (Java Card Open Platform components and CombICAO applet)
- Phase 2: IC Development

The IC Embedded Software Developer is in charge of the specification, development and validation of the software (Java Card Open Platform and CombICAO applet).

The IC Developer designs the IC, develops the IC dedicated software and provides information, software or tools to the IC embedded software developer.

Roles, actors, sites and coverage for this environment of the product life-cycle are listed in the table below:

Role	Actor	Site	Covered by
CombICAO Applet Developer	IDEMIA	MANILA and Courbevoie R&D sites	ALC
Platform Developer	IDEMIA	IDEMIA R&D sites Refer to [PTF_CERT]	ALC
IC Developer	IC Manufacturer	IC Manufacturer Refer to [PTF_CERT]	ALC

2.3.8 Production Environment

In this environment, the following two phases take place:

- Phase 3: IC manufacturing
- Phase 4: Smart card loading

The IC manufacturer is responsible for producing the IC (manufacturing, testing, and initialisation). Depending on the intention:

- **(Option 1)** the developer sends the image (containing both the Java Card platform and the CombICAO applet) to be flashed in the IC to the IC manufacturer in the phase 3.

Or

- **(Option 2)** the platform developer sends the image (containing only the Java Card platform) to be flashed in the IC to the IC manufacturer in the phase 3. Once the Java Card platform has been loaded, the package of CombICAO is securely delivered from the applet developer to the smart card loader. The cap file of the applet is then loaded (using GP) in the Java Card platform by the smart card loader in phase 4 at IDEMIA audited site.

Or

- **(Option 3)** the developer sends the image (containing both the Java Card platform and the CombICAO applet) to be loaded in Flash (using the loader of the IC) to the smart card loader in phase 4.

Several life cycles are available, depending when the Flash Code is loaded. The following tables present roles, actors, sites and coverage for this for this environment of the product life-cycle and describe for each of them the TOE delivery point.





Role	Package to be loaded	Actor	Site	Covered by
IC manufacturer	Image containing both platform and applet	manufacturer	IC manufacturer production plants [PTF_CERT]	ALC
Smart card loader	-	-	-	-
TOE Delivery Point				

Table 5 Image containing both Java Card platform and applet is loaded at IC manufacturer (Option 1)

Role	Package to be loaded	Actor	Site	Covered by
IC manufacturer	Image containing only Java Card Platform	manufacturer	IC manufacturer production plants Refer to [PTF_CERT]	ALC
Smart card loader	Cap file of the applet	IDEMIA	IDEMIA plant (Shenzhen, Haarlem, Vitré)	ALC
TOE Delivery Point				

Table 6 Cap file of CombICAO applet is loaded (using GP) (Option 2)

Role	Package to be loaded	Actor	Site	Covered by
IC manufacturer	-	-	-	-
TOE Delivery Point				
Smart card loader	Image containing both the platform and applet	IDEMIA or another agent	Any	AGD

Table 7 Image containing both platform and applet is loaded through the loader of the IC (Option 3)

2.3.9 Preparation Environment

In this environment, the following two phases take place:

- Phase 5: Prepersonalisation of the applet
- Phase 6: Personalisation

The preparation environment may not necessarily take place in a manufacturing site, but may be performed anywhere. All along these two phases, the TOE is self-protected as it requires the authentication of the prepersonalisation agent or personalisation agent prior to any operation.

The CombICAO applet is prepersonalised and personalised according to [Applet_Perso_Guide].

At the end of phase 6, the TOE is constructed. These two phases are covered by [Applet_Perso_Guide] tasks of the TOE and [PTF_AGD_OPE] tasks of [PTF_CERT].

2.3.10 Operational Environment

The TOE is under the control of the User (Signatory and/or Administrator).

During this phase, the TOE may be used as described in [Applet_User_Guide] of the TOE.

This phase is covered by [Applet_User_Guide] tasks of the TOE and [PTF_AGD_OPE] tasks of [PTF_CERT].





3 Conformance claims

3.1 Common Criteria conformance

This Public Security Target claims conformance to [CC_2] and [CC_3].

The conformance to the CC is claimed as follows:

CC	Conformance Claim
Part 2	Conformance with extensions: <ul style="list-style-type: none"> FAU_SAS.1 "Audit storage", FCS_RND.1 "Quality metric for random numbers", FIA_API.1 "Authentication Proof of Identity", FMT_LIM.1 "Limited capabilities", FMT_LIM.2 "Limited availability", FPT_EMS.1 "TOE Emanation",
Part 3	Conformance with package EAL5 augmented with: <ul style="list-style-type: none"> ALC_DVS.2 "Sufficiency of security measures" defined in [CC_3], AVA_VAN.5 "Advanced methodical vulnerability analysis" defined in [CC_3]

Table 8 Common Criteria conformance claim

3.2 Protection Profile conformance

3.2.1 Overview

This ST claims strict conformance to the following Protection Profile (PP):

Title	Common Criteria Protection Profile — Machine Readable Travel Document with "ICAO Application", Extended Access Control with PACE (EAC PP)
CC Version	3.1 (Revision 3)
Assurance Level	The minimum assurance level for this PP is EAL4 augmented
Version Number	Version 1.3.2, 05 th December 2012
Registration	BSI-CC-PP-0056-V2-2012

Table 9 Protection Profile conformance

This ST also addresses the Manufacturing and Personalization phases at TOE level (cf. § 2.3.6).

The additions do not contradict any of the threats, assumptions, organisational policies, objectives or SFRs stated in the [PP_EACwPACE] that covers the advanced security methods PACE and EAC in operational use phase.

The following parts list assumptions, threats, OSP, OT and OE for this TOE (i.e. from [PP_EACwPACE] and additional).

3.2.2 Assumptions

The following Assumptions are assumed for this TOE:

- **A.Insp_Sys** "Inspection Systems for global interoperability" defined in [PP_EACwPACE],
- **A.Auth_PKI** "PKI for Inspection Systems" defined in [PP_EACwPACE],
- **A.Passive_Auth** "PKI for Passive Authentication" defined in [PP_EACwPACE],



3.2.3 Threats

The following threats are averted by this TOE:

- **T.Read Sensitive Data** “Read the sensitive biometric reference data” defined in [PP_EACwPACE],
- **T.Counterfeit** “Counterfeit of travel document chip data” defined in [PP_EACwPACE],
- **T.Skimming** “Skimming travel document / Capturing Card-Terminal Communication” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **T.Eavesdropping** “Eavesdropping on the communication between the TOE and the PACE terminal” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **T.Tracing** “Tracing travel document” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **T.Forgery** “Forgery of Data” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **T.Abuse-Func** “Abuse of Functionality” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **T.Information Leakage** “Information Leakage from travel document” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **T.Phys-Tamper** “Physical Tampering” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **T.Malfunction** “Malfunction due to Environmental Stress” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **T.Configuration** “*Tampering attempt of the TOE during preparation*” defined in this ST,
- **T. Forgery Supplemental Data** “*Forgery of supplemental data stored in the TOE*” defined in this ST,
- **T. BAC_breaking** “*BAC protocol is broken*” defined in this ST.

3.2.4 Organisational Security Policies

This TOE complies with the following OSP:

- **P.Sensitive Data** “*Privacy of sensitive biometric reference data*” defined in [PP_EACwPACE],
- **P.Personalisation** “*Personalisation of the travel document by issuing State or Organisation only*” defined in [PP_EACwPACE],
- **P.Pre-Operational** “*Pre-operational handling of the travel document*” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **P.Card_PKI** “*PKI for Passive Authentication (issuing branch)*” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **P.Trustworthy_PKI** “*Trustworthiness of PKI*” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **P.Manufact** “*Manufacturing of the travel document’s chip*” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **P.Terminal** “*Abilities and trustworthiness of terminals*” referenced in [PP_EACwPACE] and defined in [PP_PACE].

3.2.5 Security Objectives

The Security Objectives for this TOE are the following:

- **OT.Sens_Data_Conf** “*Confidentiality of sensitive biometric reference data*” defined in [PP_EACwPACE],
- **OT.Chip_Auth_Proof** “*Proof of the travel document’s chip authenticity*” defined in [PP_EACwPACE],
- **OT.Data_Integrity** “*Integrity of Data*” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OT.Data_Authenticity** “*Authenticity of Data*” referenced in [PP_EACwPACE] and defined in [PP_PACE],



- **OT.Data_Confidentiality** “Confidentiality of Data” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OT.Tracing** “Tracing travel document” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OT.Prot_Abuse-Func** “Protection against Abuse of Functionality” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OT.Prot_Inf_Leak** “Protection against Information Leakage” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OT.Prot_Phys-Tamper** “Protection against Physical Tampering” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OT.Prot_Malfunction** “Protection against Malfunctions” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OT.Identification** “Identification of the TOE” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OT.AC_Pers** “Access Control for Personalisation of logical MRTD” referenced in [PP_EACwPACE] and defined in [PP_PACE].
- **OT.Configuration** “Protection of the TOE preparation” defined in this ST,
- **OT.Update_File** “Modification of file in Operational Use Phase” defined in this ST,
- **OT.BAC_Expiration** “Automatic deactivation of BAC protocol” defined in this ST,
- **OT.AC_SM_Level** “Access control to sensitive biometric reference data according to SM level” defined in this ST.

The Security Objectives for the environment of this TOE are the following:

- **OE.Auth_Key_Travel_Document** “Travel document Authentication Key” defined in [PP_EACwPACE],
- **OE.Authoriz_Sens_Data** “Authorization for Use of Sensitive Biometric Reference Data” defined in [PP_EACwPACE],
- **OE.Exam_Travel_Document** “Examination of the physical part of the travel document” defined in [PP_EACwPACE],
- **OE.Prot_Logical_Travel_Document** “Protection of data from the logical travel document” defined in [PP_EACwPACE],
- **OE.Ext_Insp_Systems** “Authorization of Extended Inspection Systems” defined in [PP_EACwPACE],
- **OE.Legislative_Compliance** “Issuing of the travel document” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OE.Passive_Auth_Sign** “Authentication of travel document by Signature” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OE.Personalisation** “Personalisation of travel document” referenced in [PP_EACwPACE] and defined in [PP_PACE],
- **OE.Terminal** “Terminal operating” referenced in [PP_EACwPACE] and defined in [PP_PACE]
- **OE.Travel_Document_Holder** “Travel document holder Obligations” referenced in [PP_EACwPACE] and defined in [PP_PACE].

3.3 CC conformance and usage in real life

In the real life, 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 (1) the TOE described by the ST claiming compliance to [PP_BAC] and (2) 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_EACwPACE], assuming BAC is not supported (as not used for the inspection procedure).



4 Security Problem Definition

4.1 Assets

Overview

The following table presents the assets of the TOE and their corresponding phase(s) according to §1.3.6 TOE life cycle:

Asset	Step 5	Step 6	Step 7
Biometric Data	No	Yes	Yes
Personal Data	No	Yes	Yes
EF.COM	No	Yes	Yes
CA_SK	No	Yes	Yes
Session_K	Yes	Yes	Yes
PACE_Kmac	No	No	Yes
PACE_Kenc	No	No	Yes
ephem-Skpicc-PACE	No	No	Yes
PACE_PWD	No	Yes	Yes
Perso_K	No	Yes	No
LCS	Yes	Yes	Yes
Updatable data	No	Yes	Yes

Table: Assets of the TOE and their corresponding phase(s)

The assets to be protected by the TOE include the User Data on the travel document's chip, user data transferred between the TOE and the terminal, and travel document tracing data from the claimed [PP_PACE], chap 3.1.

4.1.1 Biometric Data

Biometric Data

The Biometric Data are the Logical MRTD sensitive User Data: sensitive biometric reference data (EF.DG3, EF.DG4).

Application Note:

(5 in [PP_EACwPACE]): Due to interoperability reasons the [ICAO_9303] requires that Basic Inspection Systems may have access to logical travel document data DG1, DG2, DG5 to DG16. The TOE is not in certified mode, if it is accessed using BAC [ICAO_9303]. Note that the BAC mechanism cannot resist attacks with high attack potential (cf. [PP_BAC]). If supported, it is therefore recommended to use PACE instead of BAC. If nevertheless BAC has to be used, it is recommended to perform Chip Authentication v.1 before getting access to data (except DG14), as this mechanism is resistant to high potential attacks.





4.1.2 Authenticity of the MRTDs chip

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

4.1.3 User data stored on the TOE

All data (being not authentication data) stored in the context of the ePassport application of the MRTD as defined in [ICAO_TR_SAC] and being allowed to be read out solely by an authenticated terminal acting as Basic Inspection System with PACE (in the sense of [ICAO_TR_SAC]).

This asset covers 'User Data on the MRTD's chip', 'Logical MRTD Data' and 'Sensitive User Data' in [PP_BAC].

It includes:

Personal Data

The Personal Data are the logical MRTD standard User Data of the MRTD holder (EF.DG1, EF.DG2, EF.DG5 to EF.DG13, EF.DG16).

EF.COM

The EF.COM is an elementary file containing the list of the existing elementary files (EF) with the user data.

4.1.4 User data transferred between the TOE and the terminal connected

All data (being not authentication data) being transferred in the context of the ePassport application of the MRTD as defined in [ICAO_TR_SAC] between the TOE and an authenticated terminal acting as Basic Inspection System with PACE (in the sense of [ICAO_TR_SAC]).

User data can be received and sent (exchange receive, send).

4.1.5 MRTD tracing data

Technical information about the current and previous locations of the MRTD gathered unnoticeable by the MRTD holder recognising the TOE not knowing any PACE password. TOE tracing data can be provided / gathered.

4.1.6 Accessibility to the TOE functions and data only for authorised subjects

Property of the TOE to restrict access to TSF and TSF-data stored in the TOE to authorised subjects only.

4.1.7 Genuineness of the TOE

Property of the TOE to be authentic in order to provide claimed security functionality in a proper way.

This asset also covers 'Authenticity of the MRTD's chip in [PP_BAC].





4.1.8 TOE intrinsic secret cryptographic keys

Permanently or temporarily stored secret cryptographic material used by the TOE in order to enforce its security functionality.

It includes:

Chip Authentication Private Key (CA_SK)

The Chip Authentication Private Key is used by the application to process Chip Authentication.

Secure Messaging session keys (Session_K)

Session keys are used to secure communication in confidentiality and authenticity.

PACE session keys (PACE-Kmac, PACE-Kenc)

PACE session keys are secure messaging keys for message authentication and for message encryption agreed between the TOE and a terminal as result of the PACE Protocol.

Ephemeral private key PACE (ephem-Skpicc-PACE)

The ephemeral PACE Authentication Key Pair is used for Key Agreement Protocol.

4.1.9 MRTD communication establishment authorisation data

Restricted-revealable authorisation information for a human user being used for verification of the authorisation attempts as authorised user (PACE password). These data are stored in the TOE and are not to be send to it.

It includes:

PACE password (PACE_PWD)

Password needed for PACE authentication, e.g. CAN or MRZ.

Personalization Agent keys (Perso_K)

This key set used for mutual authentication between the Personalization agent and the chip, and secure communication establishment.

TOE Life Cycle State (LCS)

This is the Life Cycle State of the TOE.

Updatable Data

Data other than Personal Data, Biometric Data, EF.COM, EF.SOD, CA_PK, CA_SK, Pre-Perso_K, Perso_K, Session_K, LCS and Configuration Data which can be modified in Operational Use phase.



4.2 Subjects

The following table presents the assets of the TOE and their corresponding phase(s) according to §1.2.1

Subject	Step 3	Step 4	Step 5	Step 6	Step 7
MRTD Holder	No	No	No	No	Yes
Traveler	No	No	No	No	Yes
Basic Inspection System with PACE	No	No	No	No	Yes
Document Signer	No	No	No	Yes	No
Country Signing Certification Authority	No	No	No	Yes	No
Personalization Agent	No	No	No	Yes	No
IC manufacturer (Manufacturer role)	Yes	No	No	No	No
MRTD packaging responsible (Manufacturer role)	No	Yes	No	No	No
Embedded software loading responsible (Manufacturer role)	No	Yes	No	No	No
Pre-personalization Agent (Manufacturer role)	No	No	Yes	No	No
Country Verifying Certification Authority	No	No	No	No	Yes
Document Verifier	No	No	No	No	Yes
Terminal	No	No	Yes	Yes	Yes
Inspection System	No	No	No	No	Yes
Attacker	Yes	Yes	Yes	Yes	Yes

Table – Subjects of the TOE and their corresponding phase(s)

MRTD Holder

MRTD holder is the travel document holder defined in [PP_PACE]:

A person for whom the travel document Issuer has personalised the travel document. This entity is commensurate with 'MRTD Holder' in [PP_BAC]. Please note that a travel document holder can also be an attacker.

Traveller

A person presenting the travel document to a terminal and claiming the identity of the travel document holder. This external entity is commensurate with 'Traveller' in [PP_BAC]. Please note that a travel document presenter can also be an attacker.

Basic Inspection System with PACE (BIS-PACE)

A technical system being used by an inspecting authority and verifying the travel document presenter as the travel document holder (for ePassport: by comparing the real biometric data (face) of the travel document presenter with the stored biometric data (DG2) of the travel document holder).



BIS-PACE implements the terminal's part of the PACE protocol and authenticates itself to the travel document using a shared password (PACE password) and supports Passive Authentication.

See also par. 1.2.5 in [PP_PACE].

Document Signer (DS)

An organisation enforcing the policy of the CSCA and signing the Document Security Object stored on the travel document for passive authentication. A Document Signer is authorised by the national CSCA issuing the Document Signer Certificate, see [ICAO_9303]. This role is usually delegated to a Personalisation Agent.

Country Signing Certification Authority (CSCA)

An organisation enforcing the policy of the travel document Issuer with respect to confirming correctness of user and TSF data stored in the travel document. The CSCA represents the country specific root of the PKI for the travel document and creates the Document Signer Certificates within this PKI. The CSCA also issues the self-signed CSCA Certificate having to be distributed by strictly secure diplomatic means, see [ICAO_9303], 5.5.1.

Personalisation Agent

An organisation acting on behalf of the travel document Issuer to personalise the travel document for the travel document holder by some or all of the following activities: (i) establishing the identity of the travel document holder for the biographic data in the travel document, (ii) enrolling the biometric reference data of the travel document holder, (iii) writing a subset of these data on the physical travel document (optical personalisation) and storing them in the travel document (electronic personalisation) for the travel document holder as defined in [ICAO_9303], (iv) writing the document details data, (v) writing the initial TSF data, (vi) signing the Document Security Object defined in [ICAO_9303] (in the role of DS). Please note that the role 'Personalisation Agent' may be distributed among several institutions according to the operational policy of the travel document Issuer. This entity is commensurate with 'Personalisation agent' in [PP_BAC].

IC Manufacturer

This additional subject is a refinement of the role Manufacturer as described in [PP_PACE]. It is the manufacturer of the IC.

If scheme 1 is applied (cf. § 1.3.6), this subject is responsible for the embedded software downloading in the IC. This subject does not use Flash loader, even if it is embedded in the IC

MRTD packaging responsible

This additional subject is a refinement of the role Manufacturer as described in [PP_PACE]. This subject is responsible for the combination of the IC with hardware for the contactless and/or contact interface.

Embedded software loading responsible

This additional subject is a refinement of the role Manufacturer as described in [PP_PACE]. This subject is responsible for the embedded software loading when scheme 2 is applied (cf. § 1.3.6). This subject does not exist if scheme 1 is applied (cf. § 1.3.6). This subject used the Flash loader embedded in the IC.



Pre-personalization Agent

This additional subject is a refinement of the role Manufacturer as described in [PP_PACE]. This subject is responsible for the preparation of the card, i.e. creation of the MF and MRTD ADF. He also sets Personalization Agent keys and Configuration data.

Country Verifying Certification Authority (CVCA)

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

Document Verifier (DV)

The Document Verifier (DV) enforces the privacy policy of the receiving State with respect to the protection of sensitive biometric reference data to be handled by the Extended Inspection Systems. The Document Verifier manages the authorization of the Extended Inspection Systems for the sensitive data of the travel document in the limits provided by the issuing States or Organisations in the form of the Document Verifier Certificates.

Terminal

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

Note: as the TOE may also be used in contact mode, the terminal may also communicate using the contact interface.

Inspection system (IS)

A technical system used by the border control officer of the receiving State (i) examining an travel document presented by the traveler and verifying its authenticity and (ii) verifying the traveler as travel document holder.

The Extended Inspection System (EIS) performs the Advanced Inspection Procedure (figure1) and therefore (i) contains a terminal for the communication with the travel document's chip, (ii) implements the terminals part of PACE and/or BAC; (iii) gets the authorization to read the logical travel document either under PACE or BAC by optical reading the travel document providing this information, (iv) implements the Terminal Authentication and Chip Authentication Protocols both Version 1 according to [TR_03110] and (v) is authorized by the issuing State or Organisation through the Document Verifier of the receiving State to read the sensitive biometric reference data. Security attributes of the EIS are defined by means of the Inspection System Certificates. BAC may only be used if supported by the TOE. If both PACE and BAC are supported by the TOE and the BIS, PACE must be used.

Attacker

Additionally to the definition from [PP_PACE], chap 3.1 the definition of an attacker is refined as followed: A threat agent trying (i) to manipulate the logical travel document without authorization, (ii) to read sensitive biometric reference data (i.e. EF.DG3, EF.DG4), (iii) to forge a genuine travel document, or (iv) to trace a travel document.

Application Note:



(7 in [PP_EACwPACE]): An impostor is attacking the inspection system as TOE IT environment independent on using a genuine, counterfeit or forged travel document. Therefore the impostor may use results of successful attacks against the TOE but the attack itself is not relevant for the TOE.

4.3 Threats

T.Read_Sensitive_Data

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

Threat agent: having high attack potential, knowing the PACE Password, being in possession of a legitimate travel document.

Asset: confidentiality of logical travel document sensitive user data (i.e. biometric reference).

T.Counterfeit

Adverse action: AAn attacker with high attack potential produces an unauthorized copy or reproduction of a genuine travel document's chip to be used as part of a counterfeit travel document. This violates the authenticity of the travel document's chip used for authentication of a traveler by possession of a travel document. The attacker may generate a new data set or extract completely or partially the data from a genuine travel document's chip and copy them to another appropriate chip to imitate this genuine travel document's chip.

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

Asset: authenticity of user data stored on the TOE

T.Skimming

Adverse action: An attacker imitates an inspection system in order to get access to the user data stored on or transferred between the TOE and the inspecting authority connected via the contactless/contact interface of the TOE..

Threat agent: having high attack potential, cannot read and does not know the correct value of the shared password (PACE password) in advance

Asset: confidentiality of logical travel document data

Application Note:

Application Note (10 in [PP_PACE]): A product using BIS-BAC cannot avert this threat in the context of the security policy defined in [PP_PACE].

Application Note (11 in [PP_PACE]): MRZ is printed and CAN is printed or stuck on the travel document. Please note that neither CAN nor MRZ effectively represent secrets, but are restricted-revealable, cf. OE.Travel_Document_Holder.



T.Eavesdropping

Adverse action: An attacker is listening to the communication between the travel document and the PACE authenticated BIS-PACE in order to gain the user data transferred between the TOE and the terminal connected.

Threat agent: having high attack potential, cannot read and does not know the correct value of the shared password (PACE password) in advance.

Asset: confidentiality of logical travel document data.

Application Note:

Application Note (12 in [PP_PACE]): A product using BIS-BAC cannot avert this threat in the context of the security policy defined in [PP_PACE]

T.Tracing

Adverse action: An attacker tries to gather TOE tracing data (i.e. to trace the movement of the travel document) unambiguously identifying it remotely by establishing or listening to a communication via the contactless/contact interface of the TOE.

Threat agent: having high attack potential, cannot read and does not know the correct value of the shared password (PACE password) in advance.

Asset: privacy of the travel document holder.

Application Note:

Application Note (13 in [PP_PACE]): This Threat completely covers and extends "T.Chip-ID" from [PP_BAC].

Application Note (14 in [PP_PACE]): A product using BAC (whatever the type of the inspection system is: BIS-BAC) cannot avert this threat in the context of the security policy defined in [PP_PACE], see also the par. 1.2.5 in [PP_PACE].

Application Note (15 in [PP_PACE]): Since the Standard Inspection Procedure does not support any unique-secret-based authentication of the travel document's chip (no Chip Authentication), a threat like T.Counterfeit (counterfeiting travel document) cannot be averted by the current TOE.

Application Note: As our TOE supports Chip Authentication in addition to Standard Inspection Procedure, the previous application note extracted from PP does not apply.

T.Forgery

Adverse action: An attacker fraudulently alters the User Data or/and TSF-data stored on the travel document or/and exchanged between the TOE and the terminal connected in order to outsmart the PACE authenticated BIS-PACE by means of changed travel document holder's related reference data (like biographic or biometric data). The attacker does it in such a way that the terminal connected perceives these modified data as authentic one.

Threat agent: having high attack potential.

Asset: integrity of the travel document.

T.Abuse-Func

Adverse action: An attacker may use functions of the TOE which shall not be used in TOE operational phase in order (i) to manipulate or to disclose the User Data stored in the TOE, (ii) to manipulate or to disclose the TSF-data stored in the TOE or (iii) to manipulate (bypass, deactivate or modify) soft-coded security functionality of the TOE. This threat



addresses the misuse of the functions for the initialisation and personalisation in the operational phase after delivery to the travel document holder.

Threat agent: having high attack potential, being in possession of one or more legitimate travel documents integrity and authenticity of the travel document, availability of the functionality of the travel document

Asset: integrity and authenticity of the travel document, availability of the functionality of the travel document.

Application Note:

Application Note (16 in [PP_PACE]): Details of the relevant attack scenarios depend, for instance, on the capabilities of the test features provided by the IC Dedicated Test Software being not specified here.

T.Information_Leakage

Adverse action: An attacker may exploit information leaking from the TOE during its usage in order to disclose confidential User Data or/and TSF-data stored on the travel document or/and exchanged between the TOE and the terminal connected. The information leakage may be inherent in the normal operation or caused by the attacker.

Threat agent: having high attack potential.

Asset: confidentiality of User Data and TSF-data of the travel document.

Application Note:

Application Note (17 in [PP_PACE]): 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 Differential Electromagnetic Analysis (DEMA) and Differential Power Analysis (DPA). Moreover the attacker may try actively to enforce information leakage by fault injection (e.g. Differential Fault Analysis).

T.Phys-Tamper

Adverse action: An attacker may perform physical probing of the travel document in order (i) to disclose the TSF-data, or (ii) to disclose/reconstruct the TOE's Embedded Software. An attacker may physically modify the travel document in order to alter (I) its security functionality (hardware and software part, as well), (ii) the User Data or the TSF-data stored on the travel document.

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

Asset: integrity and authenticity of the travel document, availability of the functionality of the travel document, confidentiality of User Data and TSF-data of the travel document.

Application Note:

Application Note (18 in [PP_PACE]): Physical tampering may be focused directly on the disclosure or manipulation of the user data (e.g. the biometric reference data for the inspection system) or the TSF data (e.g. authentication key of the travel document) 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 a direct interaction with the travel document's internals. Techniques





commonly employed in IC failure analysis and IC reverse engineering efforts may be used. Before that, hardware security mechanisms and layout characteristics need to be identified. Determination of software design including treatment of the user data and the 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.

T.Malfunction

Adverse action: An attacker may cause a malfunction the travel document's hardware and Embedded Software by applying environmental stress in order to (i) deactivate or modify security features or functionality of the TOE' hardware or to (ii) circumvent, deactivate or modify security functions of the TOE's Embedded Software. This may be achieved e.g. by operating the travel document outside the normal operating conditions, exploiting errors in the travel document's Embedded Software or misusing administrative functions. To exploit these vulnerabilities an attacker needs information about the functional operation having information about the functional operation.

Threat agent: having high attack potential, being in possession of one or more legitimate travel documents, having information about the functional operation

Asset: integrity and authenticity of the travel document, availability of the functionality of the travel document, confidentiality of User Data and TSF-data of the travel document

Application Note:

Application note (19 in [PP_PACE]): A malfunction of the TOE may also be caused using a direct interaction with elements on the chip surface. This is considered as being a manipulation (refer to the threat T.Phys-Tamper) assuming a detailed knowledge about TOE's internals

T.Configuration

Adverse action: An attacker may access to the TOE at Manufacturing and Personalization phases (steps 5 and 6) to try 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.

Threat agent: having high attack potential, being in possession of one or more MRTD in Pre-personalization or Personalization phases.

Asset: authenticity of logical MRTD data.

T. Forgery_Supplemental_Data

Adverse action: An attacker alters fraudulently the data stored in files other than EF.DG1 to EF.DG16, EF.COM and EF document security object. This may lead the extended inspection system (EIS) using these data to be deceived

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

Asset: authenticity of data stored in files other than EF.DG1 to EF.DG16, EF.COM and EF document security object

T. BAC_breaking

Adverse action: An attacker manages to break the BAC protocol using cryptanalysis means and powerful computation capacity leading to threaten (1) the non traceability and (2) confidentiality of data. The attacker is able to intercept and record a log of BAC transaction during inspection at a border control. Then using computation capacity, he is



able to perform reverse engineering over the logs, to break the protocol within a few minutes or less and get (1) the MRZ value, and (2) the log of plain text exchanged between the MRTD and the inspection system. This leads the attacker to (1) get the holder information and use it, and (2) trace the holder in real time.

Threat agent: having high attack potential, being able to intercept transaction with MRTDs.

Asset: confidentiality of data read from the MRTD, traceability of the MRTD

4.4 Organisational Security Policies

P.Sensitive_Data

The biometric reference data of finger(s) (EF.DG3) and iris image(s) (EF.DG4) are sensitive private personal data of the travel document holder. The sensitive biometric reference data can be used only by inspection systems which are authorized for this access at the time the travel document is presented to the inspection system (Extended Inspection Systems). The issuing State or Organisation authorizes the Document Verifiers of the receiving States to manage the authorization of inspection systems within the limits defined by the Document Verifier Certificate. The travel document's chip shall protect the confidentiality and integrity of the sensitive private personal data even during transmission to the Extended Inspection System after Chip Authentication Version 1.

P.Personalisation

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

P.Pre-Operational

- 1) The travel document Issuer issues the travel document and approves it using the terminals complying with all applicable laws and regulations.
- 2) The travel document Issuer guarantees correctness of the user data (amongst other of those, concerning the travel document holder) and of the TSF-data permanently stored in the TOE.
- 3) The travel document Issuer uses only such TOE's technical components (IC) which enable traceability of the travel documents in their manufacturing and issuing life cycle phases, i.e. before they are in the operational phase, cf. sec. 1.2.3 in [PP_PACE].
- 4) If the travel document Issuer authorises a Personalisation Agent to personalise the travel document for travel document holders, the travel document Issuer has to ensure that the Personalisation Agent acts in accordance with the travel document Issuer's policy.

P.Card_PKI

- 1) The travel document Issuer shall establish a public key infrastructure for the passive authentication, i.e. for digital signature creation and verification for the travel document. For this aim, he runs a Country Signing Certification Authority (CSCA). The travel document Issuer shall publish the CSCA Certificate (CCSCA).
- 2) The CSCA shall securely generate, store and use the CSCA key pair. The CSCA shall keep the CSCA Private Key secret and issue a self-signed CSCA Certificate (CCSCA) having



to be made available to the travel document Issuer by strictly secure means, see [ICAO_9303], 5.5.1. The CSCA shall create the Document Signer Certificates for the Document Signer Public Keys (CDS) and make them available to the travel document Issuer, see [ICAO_9303], 5.5.1.

3) A Document Signer shall (i) generate the Document Signer Key Pair, (ii) hand over the Document Signer Public Key to the CSCA for certification, (iii) keep the Document Signer Private Key secret and (iv) securely use the Document Signer Private Key for signing the Document Security Objects of travel documents.

Application Note:

The description below states the responsibilities of involved parties and represents the logical, but not the physical structure of the PKI. Physical distribution ways shall be implemented by the involved parties in such a way that all certificates belonging to the PKI are securely distributed / made available to their final destination, e.g. by using directory services.

P.Trustworthy_PKI

The CSCA shall ensure that it issues its certificates exclusively to the rightful organisations (DS) and DSs shall ensure that they sign exclusively correct Document Security Objects to be stored on the travel document.

P.Manufact

The Initialization Data are written by the IC Manufacturer to identify the IC uniquely. The travel document Manufacturer writes the Pre-personalisation Data which contains at least the Personalisation Agent Key.

P.Terminal

The Basic Inspection Systems with PACE (BIS-PACE) shall operate their terminals as follows:

- 1) The related terminals (basic inspection system, cf. above) shall be used by terminal operators and by travel document holders as defined in [ICAO_9303].
- 2) They shall implement the terminal parts of the PACE protocol [ICAO_TR_SAC], of the Passive Authentication [ICAO_9303] and use them in this order²⁸. The PACE terminal shall use randomly and (almost) uniformly selected nonces, if required by the protocols (for generating ephemeral keys for Diffie-Hellmann).
- 3) The related terminals need not to use any own credentials.
- 4) They shall also store the Country Signing Public Key and the Document Signer Public Key (in form of CCSCA and CDS) in order to enable and to perform Passive Authentication (determination of the authenticity of data groups stored in the travel document, [ICAO_9303]).
- 5) The related terminals and their environment shall ensure confidentiality and integrity of respective data handled by them (e.g. confidentiality of PACE passwords, integrity of PKI certificates, etc.), where it is necessary for a secure operation of the TOE according to [PP_PACE].



4.5 Assumptions

A.Insp_Sys

The Extended Inspection System (EIS) for global interoperability (i) includes the Country Signing CA Public Key and (ii) implements the terminal part of PACE [ICAO_TR_SAC] and/or BAC [PP_BAC]. BAC may only be used if supported by the TOE. If both PACE and BAC are supported by the TOE and the IS, PACE must be used. The EIS reads the logical travel document under PACE or BAC and performs the Chip Authentication v.1 to verify the logical travel document and establishes secure messaging. EIS supports the Terminal Authentication Protocol v.1 in order to ensure access control and is authorized by the issuing State or Organisation through the Document Verifier of the receiving State to read the sensitive biometric reference data.

Justification: The assumption A.Insp_Sys does not confine the security objectives of the [PP_PACE] as it repeats the requirements of P.Terminal and adds only assumptions for the Inspection Systems for handling the EAC functionality of the TOE.

A.Auth_PKI

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

Justification: This assumption only concerns the EAC part of the TOE. The issuing and use of card verifiable certificates of the Extended Access Control is neither relevant for the PACE part of the TOE nor will the security objectives of the [PP_PACE] be restricted by this assumption. For the EAC functionality of the TOE the assumption is necessary because it covers the pre-requisite for performing the Terminal Authentication Protocol Version 1.

A.Passive_Auth

The issuing and receiving States or Organisations establish a public key infrastructure for passive authentication i.e. digital signature creation and verification for the logical travel document. The issuing State or Organisation 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 travel documents. The CA creates the Document Signer Certificates for the Document Signer Public Keys that are distributed to the receiving States and Organisations. It is assumed that the Personalisation Agent ensures that the Document Security Object contains only the hash values of genuine user data according to [ICAO_9303].

5 Security Objectives

5.1 Security Objectives for the TOE

OT.Sens_Data_Conf

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

OT.Chip_Auth_Proof

The TOE must support the Inspection Systems to verify the identity and authenticity of the travel document's chip as issued by the identified issuing State or Organisation by means of the Chip Authentication Version 1 as defined in [TR_03110]. The authenticity proof provided by travel document's chip shall be protected against attacks with high attack potential.

Application Note:

The OT.Chip_Auth_Proof implies the travel document's chip to have (i) a unique identity as given by the travel document'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 travel document's chip i.e. a certificate for the Chip Authentication Public Key that matches the Chip Authentication Private Key of the travel document's chip. This certificate is provided by (i) the Chip Authentication Public Key (EF.DG14) in the LDS defined in [ICAO_9303] and (ii) the hash value of DG14 in the Document Security Object signed by the Document Signer.

OT.Data_Integrity

Integrity of Data

The TOE must ensure integrity of the User Data and the TSF-data stored on it by protecting these data against unauthorised modification (physical manipulation and unauthorised modifying).The TOE must ensure integrity of the User Data and the TSF-data during their exchange between the TOE and the terminal connected (and represented by PACE authenticated BIS-PACE) after the PACE Authentication.

OT.Data_Authenticity

Authenticity of Data The TOE must ensure authenticity of the User Data and the TSF-data stored on it by enabling verification of their authenticity at the terminal-side.The TOE must ensure authenticity of the User Data and the TSF-data during their exchange between the TOE and the terminal connected (and represented by PACE authenticated BIS-PACE) after the PACE Authentication. It shall happen by enabling such a verification

at the terminal-side (at receiving by the terminal) and by an active verification by the TOE itself (at receiving by the TOE).

OT.Data_Confidentiality

Confidentiality of Data

The TOE must ensure confidentiality of the User Data and the TSF-data by granting read access only to the PACE authenticated BIS-PACE connected. The TOE must ensure confidentiality of the User Data and the TSF-data during their exchange between the TOE and the terminal connected (and represented by PACE authenticated BIS-PACE) after the PACE Authentication.

OT.Tracing

Tracing travel document

The TOE must prevent gathering TOE tracing data by means of unambiguous identifying the travel document remotely through establishing or listening to a communication via the contactless/contact interface of the TOE without knowledge of the correct values of shared passwords (PACE passwords) in advance.

Application Note:

Since the Standard Inspection Procedure does not support any unique-secret-based authentication of the travel document's chip (no Chip Authentication), a security objective like OT.Chip_Auth_Proof (proof of travel document authenticity) cannot be achieved by the current TOE.

As our TOE supports Chip Authentication in addition to Standard Inspection Procedure, the previous application note extracted from PP does not apply.

OT.Prot_Abuse-Func

Protection against Abuse of Functionality

The TOE must prevent that functions of the TOE, which may not be used in TOE operational phase, can be abused in order (i) to manipulate or to disclose the User Data stored in the TOE, (ii) to manipulate or to disclose the TSF-data stored in the TOE, (iii) to manipulate (bypass, deactivate or modify) soft-coded security functionality of the TOE.

OT.Prot_Inf_Leak

Protection against Information Leakage

The TOE must provide protection against disclosure of confidential User Data or/and TSF-data stored and/or processed by the travel document

- o 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,
- o by forcing a malfunction of the TOE and/or
- o by a physical manipulation of the TOE.

Application Note:

This objective pertains to measurements with subsequent complex signal processing due to normal operation of the TOE or operations enforced by an attacker.

OT.Prot_Phys-Tamper

Protection against Physical Tampering





The TOE must provide protection of confidentiality and integrity of the User Data, the TSF-data and the travel document's Embedded Software by means of

- o measuring through galvanic contacts representing a direct physical probing on the chip's surface except on pads being bonded (using standard tools for measuring voltage and current) or
- o measuring not using galvanic contacts, but other types of physical interaction between electrical charges (using tools used in solid-state physics research and IC failure analysis),
- o manipulation of the hardware and its security functionality, as well as
- o controlled manipulation of memory contents (User Data, TSF-data) with a prior
- o reverse-engineering to understand the design and its properties and functionality.

OT.Prot_Malfunction

Protection against Malfunctions

The TOE must ensure its correct operation. The TOE must prevent its operation outside the normal operating conditions where reliability and secure operation have not been proven or tested. This is to prevent functional errors in the TOE. The environmental conditions may include external energy (esp. electromagnetic) fields, voltage (on any contacts), clock frequency or temperature. The following TOE security objectives address the aspects of identified threats to be countered involving TOE's environment.

OT.Identification

IIentification of the TOE

The TOE must provide means to store Initialisation and Pre-Personalisation Data in its non-volatile memory. The Initialisation Data must provide a unique identification of the IC during the manufacturing and the card issuing life cycle phases of the travel document. The storage of the Pre-Personalisation data includes writing of the Personalisation Agent Key(s).

OT.AC_Pers

Personalization of the Electronic Document

The TOE must ensure that the logical travel document data in EF.DG1 to EF.DG16, the Document Security Object according to LDS [ICAO_9303] and the TSF data can be written by authorized Personalisation Agents only. The logical travel document data in EF.DG1 to EF.DG16 and the TSF data may be written only during and cannot be changed after personalisation of the document.

Application Note:

The OT.AC_Pers implies that the data of the LDS groups written during personalisation for travel document holder (at least EF.DG1 and EF.DG2) can not be changed using write access after personalisation.

OT.Configuration

Protection of the TOE preparation

During Pre-personalization and Personalization phases, the TOE must control the access to its sensitive information and its functions and must provide the means to secure exchanges using cryptographic functions. It must also ensure secure erasing of useless keys.



OT.Update_File***Modification of file in Operational Use Phase***

During Operational Use phase, the TOE must allow the modification of Updatable Data if the write access to these objects is fulfilled by the Terminal.

OT.BAC_Expiration***Automatic deactivation of BAC protocol*****OT.AC_SM_Level*****Access control to sensitive biometric reference data according to SM level*****OT.Chip_Auth_Proof_PACE_CAM**

The TOE must support the terminals to verify the identity and authenticity of the electronic document's chip as issued by the identified issuing State or Organization by means of the PACE-Chip Authentication Mapping (PACE-CAM) as defined in [ICAO_9303]. The authenticity proof provided by electronic document's chip shall be protected against attacks with high attack potential.

5.2 Security Objectives for the Operational Environment

5.2.1 Issuing State or Organisation

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

OE.Auth_Key_Travel_Document***Travel document Authentication Key***

The issuing State or Organisation has to establish the necessary public key infrastructure in order to (i) generate the travel document's Chip Authentication Key Pair, (ii) sign and store the Chip Authentication Public Key in the Chip Authentication Public Key data in EF.DG14 and (iii) support inspection systems of receiving States or Organisations to verify the authenticity of the travel document's chip used for genuine travel document by certification of the Chip Authentication Public Key by means of the Document Security Object.

Justification: This security objective for the operational environment is needed additionally to those from [PP_PACE] in order to counter the Threat T.Counterfeit as it specifies the pre-requisite for the Chip Authentication Protocol Version 1 which is one of the additional features of the TOE described only in this Protection Profile and not in [PP_PACE].

OE.Authoriz_Sens_Data***Authorization for Use of Sensitive Biometric Reference Data***

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



Justification: This security objective for the operational environment is needed additionally to those from [PP_PACE] in order to handle the Threat T.Read_Sensitive_Data, the Organisational Security Policy P.Sensitive_Data and the Assumption A.Auth_PKI as it specifies the pre-requisite for the Terminal Authentication Protocol v.1 as it concerns the need of an PKI for this protocol and the responsibilities of its root instance. The Terminal Authentication Protocol v.1 is one of the additional features of the TOE described only in this Protection Profile and not in [PP_PACE].

5.2.2 Receiving State or Organisation

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

OE.Exam_Travel_Document

Examination of the physical part of the travel document

The inspection system of the receiving State or Organisation must examine the travel document presented by the traveller to verify its authenticity by means of the physical security measures and to detect any manipulation of the physical part of the travel document. The Basic Inspection System for global interoperability (i) includes the Country Signing CA Public Key and the Document Signer Public Key of each issuing State or Organisation, and (ii) implements the terminal part of PACE [ICAO_TR_SAC] and/or the Basic Access Control [ICAO_9303]. Extended Inspection Systems perform additionally to these points the Chip Authentication Protocol Version 1 to verify the Authenticity of the presented travel document's chip.

Justification: This security objective for the operational environment is needed additionally to those from [PP_PACE] in order to handle the Threat T.Counterfeit and the Assumption A.Insp_Sys by demanding the Inspection System to perform the Chip Authentication protocol v.1. OE.Exam_Travel_Document also repeats partly the requirements from OE.Terminal in [PP_PACE] and therefore also counters T.Forgery and A.Passive_Auth from [PP_PACE]. This is done because a new type of Inspection System is introduced in [PP_EACwPACE] as the Extended Inspection System is needed to handle the additional features of a travel document with Extended Access Control.

OE.Prot_Logical_Travel_Document

Protection of data from the logical travel document

The inspection system of the receiving State or Organisation ensures the confidentiality and integrity of the data read from the logical travel document. The inspection system will prevent eavesdropping to their communication with the TOE before secure messaging is successfully established based on the Chip Authentication Protocol Version 1.

Justification: This security objective for the operational environment is needed additionally to those from [PP_PACE] in order to handle the Assumption A.Insp_Sys by requiring the Inspection System to perform secure messaging based on the Chip Authentication Protocol v.1.

OE.Ext_Insp_Systems

Authorization of Extended Inspection Systems

The Document Verifier of receiving States or Organisations authorizes Extended Inspection Systems by creation of Inspection System Certificates for access to sensitive biometric reference data of the logical travel document. The Extended Inspection System authenticates themselves to the travel document's chip for access to the sensitive





biometric reference data with its private Terminal Authentication Key and its Inspection System Certificate.

Justification: This security objective for the operational environment is needed additionally to those from [PP_PACE] in order to handle the Threat T.Read_Sensitive_Data, the Organisational Security Policy P.Sensitive_Data and the Assumption A.Auth_PKI as it specifies the pre-requisite for the Terminal Authentication Protocol v.1 as it concerns the responsibilities of the Document Verifier instance and the Inspection Systems.

5.2.3 Travel document Issuer as the general responsible

The travel document Issuer as the general responsible for the global security policy related will implement the following security objectives for the TOE environment:

OE.Legislative_Compliance

Issuing of the travel document

The travel document Issuer must issue the travel document and approve it using the terminals complying with all applicable laws and regulations.

5.2.4 Travel document Issuer and CVCA: travel document's PKI (issuing) branch

The travel document Issuer and the related CSCA will implement the following security objectives for the TOE environment:

OE.Passive_Auth_Sign

Authentication of travel document by Signature

The travel document Issuer has to establish the necessary public key infrastructure as follows: the CSCA acting on behalf and according to the policy of the travel document Issuer must (i) generate a cryptographically secure CSCA Key Pair, (ii) ensure the secrecy of the CSCA Private Key and sign Document Signer Certificates in a secure operational environment, and (iii) publish the Certificate of the CSCA Public Key (CCSCA). Hereby authenticity and integrity of these certificates are being maintained. A Document Signer acting in accordance with the CSCA policy must (i) generate a cryptographically secure Document Signing Key Pair, (ii) ensure the secrecy of the Document Signer Private Key, (iii) hand over the Document Signer Public Key to the CSCA for certification, (iv) sign Document Security Objects of genuine travel documents in a secure operational environment only. The digital signature in the Document Security Object relates to all hash values for each data group in use according to [ICAO_9303]. The Personalisation Agent has to ensure that the Document Security Object contains only the hash values of genuine user data according to [ICAO_9303]. The CSCA must issue its certificates exclusively to the rightful organisations (DS) and DSs must sign exclusively correct Document Security Objects to be stored on travel document.

OE.Personalisation

Personalisation of travel document

The travel document Issuer must ensure that the Personalisation Agents acting on his behalf (i) establish the correct identity of the travel document holder and create the biographical data for the travel document, (ii) enrol the biometric reference data of the travel document holder, (iii) write a subset of these data on the physical Passport (optical



personalisation) and store them in the travel document (electronic personalisation) for the travel document holder as defined in [ICAO_9303], (iv) write the document details data, (v) write the initial TSF data, (vi) sign the Document Security Object defined in [ICAO_9303] (in the role of a DS).

5.2.5 Terminal operator: Terminal's receiving branch

OE.Terminal

Terminal operating

The terminal operators must operate their terminals as follows:

1) The related terminals (basic inspection systems, cf. above) are used by terminal operators and by travel document holders as defined in [ICAO_9303]. 2) The related terminals implement the terminal parts of the PACE protocol [ICAO_TR_SAC], of the Passive Authentication [ICAO_TR_SAC] (by verification of the signature of the Document Security Object) and use them in this order. The PACE terminal uses randomly and (almost) uniformly selected nonces, if required by the protocols (for generating ephemeral keys for Diffie-Hellmann). 3) The related terminals need not to use any own credentials. 4) The related terminals securely store the Country Signing Public Key and the Document Signer Public Key (in form of C_CSCA and C_DS) in order to enable and to perform Passive Authentication of the travel document (determination of the authenticity of data groups stored in the travel document, [ICAO_9303]) 5) The related terminals and their environment must ensure confidentiality and integrity of respective data handled by them (e.g. confidentiality of the PACE passwords, integrity of PKI certificates, etc.), where it is necessary for a secure operation of the TOE according to the [PP_PACE].

Application Note:

OE.Terminal completely covers and extends "OE.Exam_MRTD", "OE.Passive_Auth_Verif" and "OE.Prot_Logical_MRTD" from [PP_BAC].

5.2.6 Travel document holder Obligations

OE.Travel_Document_Holder

Travel document holder Obligations

The travel document holder may reveal, if necessary, his or her verification values of the PACE password to an authorized person or device who definitely act according to respective regulations and are trustworthy.

5.3 Security Objectives Rationale

5.3.1 Threats

T.Read_Sensitive_Data The OSP P.Sensitive_Data "Privacy of sensitive biometric reference data" is fulfilled and the threat T.Read_Sensitive_Data "Read the sensitive biometric reference data" is countered by the TOE-objective OT.Sens_Data_Conf "Confidentiality of sensitive biometric reference data" requiring that read access to EF.DG3 and EF.DG4 (containing the sensitive biometric reference data) is only granted to authorized inspection systems. Furthermore it is required that the transmission of these data ensures the data's confidentiality. The authorization bases on Document Verifier certificates issued by the issuing State or Organisation as required by OE.Authoriz_Sens_Data "Authorization for Use of Sensitive Biometric Reference Data".



The Document Verifier of the receiving State has to authorize Extended Inspection Systems by creating appropriate Inspection System certificates for access to the sensitive biometric reference data as demanded by OE.Ext_Insp_Systems "Authorization of Extended Inspection Systems".

This threat is also covered by OT.AC_SM_Level "Access control to sensitive biometric reference data according to SM level" that enhances this protection by allowing the issuing State or Organization to require the usage of a secure messaging with a minimum security level for accessing the sensitive biometric reference data. The strength of the secure messaging is tightly bound to the underlying block Cipher involved (DES, AES-128/192/256). This objective allows an issuing State or Organization to set a secure messaging level it considers as sufficient to ensure a long term confidentiality of the sensitive biometric data of its citizen when being read.

T.Counterfeit The threat T.Counterfeit "Counterfeit of travel document chip data" addresses the attack of unauthorized copy or reproduction of the genuine travel document's chip. This attack is thwarted by chip an identification and authenticity proof required by OT.Chip_Auth_Proof "Proof of the travel document's chip authenticity" using an authentication key pair to be generated by the issuing State or Organisation. 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_Travel_Document "Travel document Authentication Key". According to OE.Exam_Travel_Document "Examination of the physical part of the travel document" the General Inspection system has to perform the Chip Authentication Protocol Version 1 to verify the authenticity of the travel document's chip. OT.Chip_Auth_Proof_PACE_CAM ensures that the chip in addition to CA also supports the PACE-Chip Authentication Mapping (PACE-CAM) protocol, which supports the same security functionality as CA does. PACE-CAM enables much faster authentication of the of the chip than running PACE with general mapping followed by CA. This threat is also covered by OE.Auth_Key_Travel_Document "Travel document Authentication Key" using a authentication key pair to be generated by the issuing State or Organization.

T.Skimming The threat T.Skimming "Skimming travel document / Capturing Card-Terminal Communication" addresses accessing the User Data (stored on the TOE or transferred between the TOE and the terminal) using the TOE's contactless/contact interface. This threat is countered by the security objectives OT.Data_Integrity "Integrity of Data", OT.Data_Authenticity "Authenticity of Data" and OT.Data_Confidentiality "Confidentiality of Data" through the PACE authentication. The objective OE.Travel_Document_Holder "Travel document holder Obligations" ensures that a PACE session can only be established either by the travel document holder itself or by an authorised person or device, and, hence, cannot be captured by an attacker.

T.Eavesdropping The threat T.Eavesdropping "Eavesdropping on the communication between the TOE and the PACE terminal" addresses listening to the communication between the TOE and a rightful terminal in order to gain the User Data transferred there. This threat is countered by the security objective OT.Data_Confidentiality "Confidentiality of Data" through a trusted channel based on the PACE authentication.

T.Tracing The threat T.Tracing "Tracing travel document" addresses gathering TOE tracing data identifying it remotely by establishing or listening to a communication via the contactless/contact interface of the TOE, whereby the attacker does not a priori know the



correct values of the PACE password. This threat is directly countered by security objectives OT.Tracing "Tracing travel document" (no gathering TOE tracing data) and OE.Travel_Document_Holder "Travel document holder Obligations" (the attacker does not a priori know the correct values of the shared passwords).

T.Forgery The threat T.Forgery "Forgery of Data" addresses the fraudulent, complete or partial alteration of the User Data or/and TSF-data stored on the TOE or/and exchanged between the TOE and the terminal. The security objective OT.AC_Pers "Access Control for Personalisation of logical MRTD" requires the TOE to limit the write access for the travel document to the trustworthy Personalisation Agent (cf. OE.Personalisation). The TOE will protect the integrity and authenticity of the stored and exchanged User Data or/and TSF-data as aimed by the security objectives OT.Data_Integrity "Integrity of Data" and OT.Data_Authenticity "Authenticity of Data", respectively. The objectives OT.Prot_Phys-Tamper "Protection against Physical Tampering" and OT.Prot_Abuse-Func "Protection against Abuse of Functionality" contribute to protecting integrity of the User Data or/and TSF-data stored on the TOE. A terminal operator operating his terminals according to OE.Terminal "Terminal operating" and performing the Passive Authentication using the Document Security Object as aimed by OE.Passive_Auth_Sign "Authentication of travel document by Signature" will be able to effectively verify integrity and authenticity of the data received from the TOE.

Additionally to the security objectives from [PP_PACE] (see above) which counter this threat, the examination of the presented MRTD passport book according to OE.Exam_Travel_Document "Examination of the physical part of the travel document" shall ensure its authenticity by means of the physical security measures and detect any manipulation of the physical part of the travel document.

T.Abuse-Func The threat T.Abuse-Func "Abuse of Functionality" addresses attacks of misusing TOE's functionality to manipulate or to disclosure the stored User- or TSF-data as well as to disable or to bypass the soft-coded security functionality. The security objective OT.Prot_Abuse-Func "Protection against Abuse of Functionality" ensures that the usage of functions having not to be used in the operational phase is effectively prevented.

T.Information_Leakage The threat T.Information_Leakage is typical for integrated circuits like smart cards under direct attack with high attack potential. The protection of the TOE against this threat is obviously addressed by the directly related security objective OT.Prot_Inf_Leak

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

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

T.Configuration The threat T.Configuration "Tampering attempt of the TOE during preparation" addresses attacks in Pre-personalization and Personalization phases. The



attacker trying to access to unauthorized TOE functions, trying to access or to modify sensitive information exchanged between the TOE and the Personalization system. Protection of the TOE during these two phases is directly addressed by OT.Configuration "Protection of the TOE preparation".

T. Forgery_Supplemental_Data The threat T. Forgery_Supplemental_Data "Forgery of supplemental data stored in the TOE" addresses the fraudulent alteration of Updatable Data. The TOE protects the update of these data thanks to OT.Update_File "Modification of file in Operational Use Phase" that ensures inspection system are authenticated and data to be updated are sent through a secure channel ensuring integrity, authenticity and confidentiality.

T. BAC_breaking The threat T. BAC_breaking "BAC protocol is broken" addresses the attack aiming at breaking the BAC protocol. The protection of the TOE against this threat is addressed by security objective OT.BAC_Expiration "Automatic deactivation of BAC protocol" which is directly related to it. It prevents an attacker to perform offline dictionary attacks on transaction log, in order to preserve confidentiality of data and avoid citizen traceability.

5.3.2 Organisational Security Policies

P.Sensitive_Data The OSP P.Sensitive_Data "Privacy of sensitive biometric reference data" is fulfilled and the threat T.Read_Sensitive_Data "Read the sensitive biometric reference data" is countered by the TOE-objective OT.Sens_Data_Conf "Confidentiality of sensitive biometric reference data" requiring that read access to EF.DG3 and EF.DG4 (containing the sensitive biometric reference data) is only granted to authorized inspection systems. Furthermore it is required that the transmission of these data ensures the data's confidentiality. The authorization bases on Document Verifier certificates issued by the issuing State or Organisation as required by OE.Authoriz_Sens_Data "Authorization for Use of Sensitive Biometric Reference Data". The Document Verifier of the receiving State has to authorize Extended Inspection Systems by creating appropriate Inspection System certificates for access to the sensitive biometric reference data as demanded by OE.Ext_Insp_Systems "Authorization of Extended Inspection Systems".

This threat is also covered by OT.AC_SM_Level "Access control to sensitive biometric reference data according to SM level" that enhances this protection by allowing the issuing State or Organization to require the usage of a secure messaging with a minimum security level for accessing the sensitive biometric reference data. The strength of the secure messaging is tightly bound to the underlying block Cipher involved (DES, AES-128/192/256). This objective allows an issuing State or Organization to set a secure messaging level it considers as sufficient to ensure a long term confidentiality of the sensitive biometric data of its citizen when being read

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





MRTD" limits the management of TSF data and the management of TSF to the Personalisation Agent.

P.Pre-Operational The OSP P.Pre-Operational "Pre-operational handling of the travel document" is enforced by the following security objectives: OT.Identification "Identification of the TOE" is affine to the OSP's property 'traceability before the operational phase'; OT.AC_Pers "Access Control for Personalisation of logical MRTD" and OE.Personalisation "Personalisation of travel document" together enforce the OSP's properties 'correctness of the User- and the TSF-data stored' and 'authorisation of Personalisation Agents'; OE.Legislative_Compliance "Issuing of the travel document" is affine to the OSP's property 'compliance with laws and regulations'.

P.Card_PKI The OSP P.Card_PKI "PKI for Passive Authentication (issuing branch)" is enforced by establishing the issuing PKI branch as aimed by the objectives OE.Passive_Auth_Sign "Authentication of travel document by Signature" (for the Document Security Object).

P.Trustworthy_PKI The OSP P.Trustworthy_PKI "Trustworthiness of PKI" is enforced by OE.Passive_Auth_Sign "Authentication of travel document by Signature" (for CSCA, issuing PKI branch).

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

P.Terminal The OSP P.Terminal "Abilities and trustworthiness of terminals" is obviously enforced by the objective OE.Terminal "Terminal operating", whereby the one-to-one mapping between the related properties is applicable.

The OSP P.Terminal "Abilities and trustworthiness of terminals" is countered by the security objective OE.Exam_Travel_Document "Examination of the physical part of the travel document" additionally to the security objectives from [PP_PACE] (see above). OE.Exam_Travel_Document "Examination of the physical part of the travel document" enforces the terminals to perform the terminal part of the PACE protocol.



5.3.3 Assumptions

A.Insp_Sys The examination of the travel document addressed by the assumption A.Insp_Sys "Inspection Systems for global interoperability" is covered by the security objectives for the TOE environment OE.Exam_Travel_Document "Examination of the physical part of the travel document" which requires the inspection system to examine physically the travel document, the Basic Inspection System to implement the Basic Access Control, and the Extended Inspection Systems to implement and to perform the Chip Authentication Protocol Version 1 to verify the Authenticity of the presented travel document's chip. The security objectives for the TOE environment OE.Prot_Logical_Travel_Document "Protection of data from the logical travel document" require the Inspection System to protect the logical travel document data during the transmission and the internal handling.

A.Auth_PKI The assumption A.Auth_PKI "PKI for Inspection Systems" is covered by the security objective for the TOE environment OE.Authoriz_Sens_Data "Authorization for Use of Sensitive Biometric Reference Data" requires the CVCA to limit the read access to sensitive biometrics by issuing Document Verifier certificates for authorized receiving States or Organisations only. The Document Verifier of the receiving State is required by OE.Ext_Insp_Systems "Authorization of Extended Inspection Systems" to authorize Extended Inspection Systems by creating Inspection System Certificates. Therefore, the receiving issuing State or Organisation has to establish the necessary public key infrastructure

A.Passive_Auth The assumption A.Passive_Auth "PKI for Passive Authentication" is directly covered by the security objective for the TOE environment OE.Passive_Auth_Sign "Authentication of travel document by Signature" from [PP_PACE] 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_Travel_Document "Examination of the physical part of the travel document".

5.3.4 SPD and Security Objectives

Threats	Security Objectives	Rationale
T.Read Sensitive Data	OT.Sens Data Conf , OE.Authoriz Sens Data , OE.Ext Insp Systems , OT.AC SM Level	Section 5.3.1
T.Counterfeit	OT.Chip Auth Proof , OE.Auth Key Travel Document , OE.Exam Travel Document , OT.Chip Auth Proof PACE CAM	Section 5.3.1
T.Skimming	OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OE.Travel Document Holder	Section 5.3.1
T.Eavesdropping	OT.Data Confidentiality	Section 5.3.1
T.Tracing	OT.Tracing , OE.Travel Document Holder	Section 5.3.1
T.Forgery	OT.AC Pers , OT.Data Authenticity , OT.Data Integrity , OT.Prot Abuse-Func ,	Section 5.3.1



	OT.Prot Phys-Tamper , OE.Personalisation , OE.Passive Auth Sign , OE.Terminal , OE.Exam Travel Document	
T.Abuse-Func	OT.Prot Abuse-Func	Section 5.3.1
T.Information Leakage	OT.Prot Inf Leak	Section 5.3.1
T.Phys-Tamper	OT.Prot Phys-Tamper	Section 5.3.1
T.Malfunction	OT.Prot Malfunction	Section 5.3.1
T.Configuration	OT.Configuration	Section 5.3.1
T.Forgery Supplemental Data	OT.Update File	Section 5.3.1
T. BAC breaking	OT.BAC Expiration	Section 5.3.1

Table 10 Threats and Security Objectives - Coverage

Security Objectives	Threats
OT.Sens Data Conf	T.Read Sensitive Data
OT.Chip Auth Proof	T.Counterfeit
OT.Data Integrity	T.Skimming , T.Forgery
OT.Data Authenticity	T.Skimming , T.Forgery
OT.Data Confidentiality	T.Skimming , T.Eavesdropping
OT.Tracing	T.Tracing
OT.Prot Abuse-Func	T.Forgery , T.Abuse-Func
OT.Prot Inf Leak	T.Information Leakage
OT.Prot Phys-Tamper	T.Forgery , T.Phys-Tamper
OT.Prot Malfunction	T.Malfunction
OT.Identification	
OT.AC Pers	T.Forgery
OT.Configuration	T.Configuration
OT.Update File	T.Forgery Supplemental Data
OT.BAC Expiration	T. BAC breaking
OT.AC SM Level	T.Read Sensitive Data
OT.Chip Auth Proof PACE CAM	T.Counterfeit
OE.Auth Key Travel Document	T.Counterfeit
OE.Authoriz Sens Data	T.Read Sensitive Data
OE.Exam Travel Document	T.Counterfeit , T.Forgery
OE.Prot Logical Travel Document	
OE.Ext Insp Systems	T.Read Sensitive Data





OE.Legislative Compliance	
OE.Passive Auth Sign	T.Forgery
OE.Personalisation	T.Forgery
OE.Terminal	T.Forgery
OE.Travel Document Holder	T.Skimming , T.Tracing

Table 11 Security Objectives and Threats - Coverage

Organisational Security Policies	Security Objectives	Rationale
P.Sensitive Data	OT.Sens Data Conf , OE.Authoriz Sens Data , OE.Ext Insp Systems , OT.AC SM Level	Section 5.3.2
P.Personalisation	OT.AC Pers , OT.Identification , OE.Personalisation	Section 5.3.2
P.Pre-Operational	OT.Identification , OT.AC Pers , OE.Personalisation , OE.Legislative Compliance	Section 5.3.2
P.Card PKI	OE.Passive Auth Sign	Section 5.3.2
P.Trustworthy PKI	OE.Passive Auth Sign	Section 5.3.2
P.Manufact	OT.Identification	Section 5.3.2
P.Terminal	OE.Terminal , OE.Exam Travel Document	Section 5.3.2

Table 12 OSPs and Security Objectives - Coverage

Security Objectives	Organisational Security Policies
OT.Sens Data Conf	P.Sensitive Data
OT.Chip Auth Proof	
OT.Data Integrity	
OT.Data Authenticity	
OT.Data Confidentiality	
OT.Tracing	
OT.Prot Abuse-Func	
OT.Prot Inf Leak	
OT.Prot Phys-Tamper	
OT.Prot Malfunction	
OT.Identification	P.Personalisation , P.Pre-Operational , P.Manufact
OT.AC Pers	P.Personalisation , P.Pre-Operational
OT.Configuration	
OT.Update File	





OT.BAC Expiration	
OT.AC SM Level	P.Sensitive Data
OT.Chip Auth Proof PACE CAM	
OE.Auth Key Travel Document	
OE.Authoriz Sens Data	P.Sensitive Data
OE.Exam Travel Document	P.Terminal
OE.Prot Logical Travel Document	
OE.Ext Insp Systems	P.Sensitive Data
OE.Legislative Compliance	P.Pre-Operational
OE.Passive Auth Sign	P.Card PKI , P.Trustworthy PKI
OE.Personalisation	P.Personalisation , P.Pre-Operational
OE.Terminal	P.Terminal
OE.Travel Document Holder	

Table 13 Security Objectives and OSPs - Coverage

Assumptions	Security Objectives for the Operational Environment	Rationale
A.Insp Sys	OE.Exam Travel Document , OE.Prot Logical Travel Document	Section 5.3.3
A.Auth PKI	OE.Authoriz Sens Data , OE.Ext Insp Systems	Section 5.3.3
A.Passive Auth	OE.Passive Auth Sign , OE.Exam Travel Document	Section 5.3.3

Table 14 Assumptions and Security Objectives for the Operational Environment - Coverage

Security Objectives for the Operational Environment	Assumptions
OE.Auth Key Travel Document	
OE.Authoriz Sens Data	A.Auth PKI
OE.Exam Travel Document	A.Insp Sys , A.Passive Auth
OE.Prot Logical Travel Document	A.Insp Sys
OE.Ext Insp Systems	A.Auth PKI
OE.Legislative Compliance	
OE.Passive Auth Sign	A.Passive Auth
OE.Personalisation	
OE.Terminal	
OE.Travel Document Holder	

Table 15 Security Objectives for the Operational Environment and Assumptions - Coverage



6 Extended Requirements

6.1 Extended Families

6.1.1 Extended Family FPT_EMS - TOE Emanation

6.1.1.1 Description

The additional family FPT_EMS (TOE Emanation) of the Class FPT (Protection of the TSF) is defined here to describe the IT security functional requirements of the TOE. The TOE shall prevent attacks against the SCD and other secret data where the attack is based on external observable physical phenomena of the TOE. Examples of such attacks are evaluation of TOE's electromagnetic radiation, simple power analysis (SPA), differential power analysis (DPA), timing attacks, radio emanation etc. This family describes the functional requirements for the limitation of intelligible emanations. The family FPT_EMS belongs to the Class FPT because it is the class for TSF protection. Other families within the Class FPT do not cover the TOE emanation.

6.1.1.2 Extended Components

Extended Component FPT_EMS.1

Description

This family defines requirements to mitigate intelligible emanations.

FPT_EMS.1 TOE Emanation has two constituents:

- FPT_EMS.1.1 Limit of Emissions requires to not emit intelligible emissions enabling access to TSF data or user data.
- FPT_EMS.1.2 Interface Emanation requires to not emit interface emanation enabling access to TSF data or user data.

Definition

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].

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].

Dependencies: No dependencies.

6.1.2 Extended Family FIA_API - Authentication Proof of Identity

6.1.2.1 Description

To describe the IT security functional requirements of the TOE a sensitive family (FIA_API) of the Class FIA (Identification and authentication) is defined here. This family describes the functional requirements for the proof of the claimed identity for the authentication verification by an external entity where the other families of the class FIA address the verification of the identity of an external entity.

Application note 10: The other families of the Class FIA describe only the authentication verification of users' identity performed by the TOE and do not describe the functionality of the user to prove their identity. The following paragraph defines the family FIA_API in the style of the Common Criteria part 2 (cf. [3], chapter 'Explicitly stated IT security requirements (APE_SRE)') from a TOE point of view.

6.1.2.2 Extended Components

Extended Component FIA_API.1

Description

The following actions could be considered for the management functions in FMT: Management of authentication information used to prove the claimed identity.

Definition

FIA_API.1 Authentication Proof of Identity

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

Dependencies: No dependencies.

6.1.3 Extended Family FMT_LIM - Limited capabilities

6.1.3.1 Description

The family FMT_LIM describes the functional requirements for the test features of the TOE. The new functional requirements were defined in the class FMT because this class addresses the management of functions of the TSF. The examples of the technical mechanism used in the TOE show that no other class is appropriate to address the specific issues of preventing abuse of functions by limiting the capabilities of the functions and by limiting their availability.



6.1.3.2 Extended Components

Extended Component FMT LIM.1

Description

Definition

FMT_LIM.1 Limited capabilities

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

Dependencies: No dependencies.

Extended Component FMT LIM.2

Description

Definition

FMT_LIM.2 Limited capabilities

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: No dependencies.

6.1.4 Extended Family FAU_SAS - Audit data storage

6.1.4.1 Description

To describe the security functional requirements of the TOE, the family FAU_SAS of the class FAU (Security audit) is defined here. This family describes the functional requirements for the storage of audit data. It has a more general approach than FAU_GEN, because it does not necessarily require the data to be generated by the TOE itself and because it does not give specific details of the content of the audit records. The family 'Audit data storage (FAU_SAS)' is specified as follows:

6.1.4.2 Extended Components

Extended Component FAU SAS.1

Description

Requires the TOE to provide the possibility to store audit data.



*Definition***FAU_SAS.1 Audit storage**

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

Dependencies: No dependencies.

6.1.5 Extended Family FCS_RND - Generation of random numbers**6.1.5.1 Description**

This family defines quality requirements for the generation of random numbers intended to be used for cryptographic purposes.

6.1.5.2 Extended Components**Extended Component FCS_RND.1***Description*

Generation of random numbers requires that random numbers meet a defined quality metric.

*Definition***FCS_RND.1 Quality metric for random numbers**

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

Dependencies: No dependencies.

7 Security Requirements

7.1 Security Functional Requirements

This section describes the requirements imposed on the TOE in order to achieve the security objectives laid down in the previous chapter.

7.1.1 Class FCS Cryptographic Support

FCS_CKM.1/DH_PACE Cryptographic key generation

FCS_CKM.1.1/DH_PACE The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm **ECDH compliant to [TR_03111]** and specified cryptographic key sizes **192 to 512 bit** that meet the following: **[ICAO_TR_SAC]**.

FCS_CKM.1/CA Cryptographic key generation

FCS_CKM.1.1/CA The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm **see table below** and specified cryptographic key sizes **see table below** that meet the following: **see table below**:

Key Generation Algorithm	Key Sizes	Standard
based on ECDH compliant to [ISO_11770]	192 to 512 bit	[TR_03111]
based on DH	1024, 1536 and 2048	[TR_03110] and PKCS#3

FCS_CKM.1/CAM Cryptographic key generation

FCS_CKM.1.1/CAM The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm **based on ECDH compliant to [ISO_11770]** and specified cryptographic key sizes **192 to 521 bit** that meet the following: **[TR_03110]**.

FCS_CKM.1/CA_DATA_GEN Cryptographic key generation

FCS_CKM.1.1/CA_DATA_GEN The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm **see table below** and specified cryptographic key sizes **see table below** that meet the following: **see table below**

Algorithm	Key Size	Standard
Chip Authentication Data Generation using DH keys compliant to PKCS#3	1024 to 2048 bits in steps of 512 bits	PKCS#3
Chip authentication data generation using ECDH keys compliant to [ISO_15946]	192 to 512 bits	[TR_03111]

FCS_CKM.1/GP Cryptographic key generation

FCS_CKM.1.1/GP The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm **see table below** and specified cryptographic key sizes **see table below** that meet the following: **see table below:**

Key Generation Algorithm	Key Sizes	Standard
Triple-DES in CBC mode	112 bit	[GPC_SPE_034]
AES in CBC mode	128, 192 and 256	[GPC_SPE_014]

FCS_CKM.4 Cryptographic key destruction

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

FCS_COP.1/PACE_ENC Cryptographic operation

FCS_COP.1.1/PACE_ENC The TSF shall perform **refer to table below** in accordance with a specified cryptographic algorithm **refer to table below** and cryptographic key sizes **refer to table below** that meet the following: **refer to table below**

Cryptographic Operations	Algorithms	Key sizes	Norms
secure messaging-encryption and decryption	AES in CBC mode	128, 192 and 256 bits	[ICAO_TR_SAC]
secure messaging-encryption and decryption	TDES in CBC mode	112 bits	[ICAO_TR_SAC]

FCS_COP.1/PACE_MAC Cryptographic operation

FCS_COP.1.1/PACE_MAC The TSF shall perform **refer table below** in accordance with a specified cryptographic algorithm **refer table below** and cryptographic key sizes **refer table below** that meet the following: **refer table below**

Cryptographic Operations	Algorithms	Key sizes	Norms
secure messaging - message authentication code	AES CMAC	128, 192 and 256 bits	[ICAO_TR_SAC]
secure messaging - message authentication code	Retail MAC	112 bits	[ICAO_TR_SAC]

FCS_COP.1/CA_ENC Cryptographic operation

FCS_COP.1.1/CA_ENC The TSF shall perform **refer to table below** in accordance with a specified cryptographic algorithm **refer to table below** and cryptographic key sizes **refer to table below** that meet the following: **refer to table below**

Cryptographic Operations	Algorithms	Key sizes	Norms
secure messaging-encryption and decryption	AES in CBC mode	128, 192 and 256 bits	[TR-03110]
secure messaging-encryption and decryption	TDES in CBC mode	112 bits	[TR-03110]

FCS_COP.1/SIG_VER Cryptographic operation

FCS_COP.1.1/SIG_VER The TSF shall perform **see table below** in accordance with a specified cryptographic algorithm **see table below** and cryptographic key sizes **see table below** that meet the following: **see table below**

Cryptographic Operation	Algorithm	Key Sizes
digital signature verification	ECDSA with SHA-1, SHA-224 and SHA-256 as defined in [FIPS_186_3]	192 to 512
digital signature verification	RSA PKCS#1 v1.5 with SHA-1, SHA-256 and SHA-512	1024, 1536, 2048
digital signature verification	RSA PKCS#1-PSS with SHA-1, SHA-256 and SHA-512	1024, 1536, 2048

FCS_COP.1/CA_MAC Cryptographic operation

FCS_COP.1.1/CA_MAC The TSF shall perform **refer table below** in accordance with a specified cryptographic algorithm **refer table below** and cryptographic key sizes **refer table below** that meet the following: **refer table below**

Cryptographic Operations	Algorithms	Key sizes	Norms
secure messaging - message authentication code	AES CMAC	128, 192 and 256 bits	[TR-03110]
secure messaging - message authentication code	Retail MAC	112 bits	[TR-03110]

FCS_COP.1/CAM Cryptographic operation

FCS_COP.1.1/CAM The TSF shall perform **the PACE-CAM protocol** in accordance with a specified cryptographic algorithm **PACE-CAM** and cryptographic key sizes **192 to 521 bits** that meet the following: **[ICAO_9303]**.

FCS_COP.1/GP_ENC Cryptographic operation

FCS_COP.1.1/GP_ENC The TSF shall perform **see table below** in accordance with a specified cryptographic algorithm **see table below** and cryptographic key sizes **see table below** that meet the following: **see table below:**

Cryptographic Operation	Algorithm	Key Sizes	Standard
secure messaging (GP) – encryption and decryption	Triple-DES in CBC mode	112 bit	[FIPS_46_3]
secure messaging (GP) – encryption and decryption	AES in CBC mode	128, 192 and 256 bits	[NIST_800_38A]

FCS_COP.1/GP_MAC Cryptographic operation

FCS_COP.1.1/GP_MAC The TSF shall perform **see table below** in accordance with a specified cryptographic algorithm **see table below** and cryptographic key sizes **see table below** that meet the following: **see table below:**

Cryptographic Operation	Algorithm	Key Sizes	Standard
secure messaging – message authentication code	Retail MAC	112 bit	[ISO_9797_1]
secure messaging – message authentication code	AES CMAC	128, 198 and 256 bits	[NIST_800_38B]

FCS_COP.1/GP_AUTH Cryptographic operation

FCS_COP.1.1/GP_AUTH The TSF shall perform **see table below** in accordance with a specified cryptographic algorithm **see table below** and cryptographic key sizes **see table below** that meet the following: **see table below**:

Cryptographic Operation	Algorithm	Key Sizes	Standard
symmetric authentication – message authentication code	Full 3DES MAC	112 bit	[ISO_9797_1]
symmetric authentication – message authentication code	AES CMAC	128, 198 and 256 bits	[NIST_800_38B]

Application Note:

The Authentication Mechanisms based on Triple-DES and AES is the authentication process performed in phases 5 and 6

FCS_COP.1/GP_KEY_DEC Cryptographic operation

FCS_COP.1.1/GP_KEY_DEC The TSF shall perform **see table below** in accordance with a specified cryptographic algorithm **see table below** and cryptographic key sizes **see table below** that meet the following: **see table below**:

Cryptographic Operation	Algorithm	Key Sizes	Standard
key decryption	Triple-DES in ECB mode	112 bit	[FIPS_46_3]
key decryption	AES in CBC mode	128, 192 and 256 bits	[FIPS_197]

FCS_RND.1 Quality metric for random numbers

FCS_RND.1.1 The TSF shall provide a mechanism to generate random numbers that meet **the average Shannon entropy per internal random bit exceeds 0.999.**

7.1.2 Class FIA Identification and Authentication
FIA_UID.1/PACE Timing of identification

FIA_UID.1.1/PACE The TSF shall allow

- o **To establish a communication channel,**
- o **Carrying out the PACE protocol according to [ICAO_TR_SAC],**
- o **To read the Initialization Data if it is not disabled by TSF according to FMT_MTD.1/INI_DIS**



- o To carry out the Chip Authentication Mapping (PACE-CAM) according to [ICAO_9303]
- o To carry out the Chip Authentication Protocol v.1 according to [TR_03110]
- o To carry out the Terminal Authentication Protocol according to [TR_03110]

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

FIA_UID.1.2/PACE 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/PACE Timing of authentication

FIA_UAU.1.1/PACE The TSF shall allow

- o to establish the communication channel,
- o carrying out the PACE Protocol according to [ICAO_TR_SAC]
- o to read the Initialization Data if it is not disable by TSF according to FMT_MTD.1/INI_DIS,
- o to identify themselves by selection of the authentication key
- o to carry out the Chip Authentication Protocol v.1 according to [TR_03110]
- o To carry out the Terminal Authentication Protocol according to [TR_03110]
- o To carry out the authentication of the Manufacturer and Personalization Agent

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

FIA_UAU.1.2/PACE 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/PACE Single-use authentication mechanisms

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

- o PACE Protocol according to [ICAO_TR_SAC],
- o Authentication Mechanisms based on Triple-DES and AES
- o Terminal Authentication Protocol v.1 according to [TR_03110].

Application Note:

The authentication mechanisms based on Triple-DES and AES is the authentication process performed in phases 5 and 6





FIA_UAU.5/PACE Multiple authentication mechanisms

FIA_UAU.5.1/PACE The TSF shall provide

- o **PACE Protocol according to [ICAO_TR_SAC] and PACE-CAM Protocol according to [ICAO_9303],**
- o **Passive Authentication according to [ICAO_9303],**
- o **Secure messaging in MAC-ENC mode according to [ICAO_TR_SAC]**
- o **Symmetric Authentication Mechanism based on Triple-DES and AES**
- o **Terminal Authentication Protocol v.1 according to [TR_03110]**

to support user authentication.

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

- o **Having successfully run the PACE protocol the TOE accepts only received commands with correct message authentication code sent by means of secure messaging with the key agreed with the terminal by means of the PACE protocol.**
- o **The TOE accepts the authentication attempt as Personalisation Agent by the Authentication Mechanism with Personalization Agent Key(s).**
- o **After run of the Chip Authentication Protocol Version 1 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 v1.**
- o **The TOE accepts the authentication attempt by means of the Terminal Authentication Protocol v.1 only if the terminal uses the public key presented during the Chip Authentication Mechanism v.1 or the terminal uses the public key presented during PACE-CAM and the secure messaging established during PACE.**
- o **The TOE accepts the authentication attempt as Personalisation Agent by the Authentication Mechanism with Personalization Agent Key(s).**

FIA_UAU.6/PACE Re-authenticating

FIA_UAU.6.1/PACE The TSF shall re-authenticate the user under the conditions **each command sent to the TOE after successful run of the PACE protocol shall be verified as being sent by the PACE terminal.**

FIA_UAU.6/EAC Re-authenticating

FIA_UAU.6.1/EAC The TSF shall re-authenticate the user under the conditions **each command sent to the TOE after successful run of the Chip Authentication Protocol Version 1 shall be verified as being sent by the Inspection System.**



FIA_UAU.6/MP Re-authenticating

FIA_UAU.6.1/MP The TSF shall re-authenticate the user under the conditions **each command sent to the TOE after successful authentication of the terminal with the Symmetric Authentication Mechanism shall be verified as being sent by the authenticated terminal.**

FIA_AFL.1/PACE Authentication failure handling

FIA_AFL.1.1/PACE The TSF shall detect when **10** unsuccessful authentication attempts occur related to **authentication attempts using the PACE password as shared password.**

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

Application Note:

The PACE password being referred here are MRZ or CAN.

FIA_AFL.1/MP Authentication failure handling

FIA_AFL.1.1/MP The TSF shall detect when **1** unsuccessful authentication attempts occur related to **authentication of the Manufacturer and the Personalization Agent.**

FIA_AFL.1.2/MP When the defined number of unsuccessful authentication attempts has been **met**, the TSF shall **slow down exponentially the next authentication.**

FIA_API.1/CA Authentication Proof of Identity

FIA_API.1.1/CA The TSF shall provide a **Chip Authentication Protocol Version 1 according to [TR_03110]** to prove the identity of the **TOE.**

FIA_API.1/CAM Authentication Proof of Identity

FIA_API.1.1/CAM The TSF shall provide a **PACE-CAM according to [ICAO_9303]** to prove the identity of the **TOE.**

7.1.3 Class FDP User Data Protection



FDP_ACC.1/TRM Subset access control

FDP_ACC.1.1/TRM The TSF shall enforce the **Access Control SFP** on **terminals gaining access to user data and data stored in EF.SOD of the logical travel document.**

FDP_ACF.1/TRM Security attribute based access control

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

1. Subjects:

- a. Terminal,**
- b. BIS-PACE,**
- c. Extended Inspection System**

2. Objects:

- a. data in EF.DG1, EF.DG2 and EF.DG5 to EF.DG16,EF.SOD and EF.COM of the logical travel document,**
- b. data in EF.DG3 of the logical travel document,**
- c. data in EF.DG4 of the logical travel document,**
- d. all TOE intrinsic secret cryptographic keys stored in the travel document**

3. Security attributes:

- a. PACE Authentication**
- b. Terminal Authentication v.1**
- c. Authorisation of the Terminal.**

FDP_ACF.1.2/TRM The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: **a BIS-PACE is allowed to read data objects from FDP_ACF.1/TRM according to [ICAO_TR_SAC] after a successful PACE authentication as required by FIA_UAU.1/PACE.**

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

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

- o **Any terminal being not authenticated as PACE authenticated BIS-PACE is not allowed to read, to write, to modify, to use any User Data stored on the travel document.**
- o **Terminals not using secure messaging are not allowed to read, to write, to modify, to use any data stored on the travel document.**
- o **Any terminal being not successfully authenticated as Extended Inspection System with the Read access to DG 3 (Fingerprint) granted by the relative certificate holder authorization encoding is not allowed to read the data objects 2b) of FDP_ACF.1.1/TRM.**





- Any terminal being not successfully authenticated as Extended Inspection System with the Read access to DG 4 (Iris) granted by the relative certificate holder authorization encoding is not allowed to read the data objects 2c) of FDP_ACF.1.1/TRM.
- Nobody is allowed to read the data objects 2d) of FDP_ACF.1.1/TRM.
- Terminals authenticated as CVCA or as DV are not allowed to read data in the EF.DG3 and EF.DG4.
- Moreover, the Extended Inspection System shall communicate with at least the minimum secure messaging level identified at the creation of the DG3 and DG4, to be able to read these DGs.

FDP_ACC.1/UPD_FILE Subset access control

FDP_ACC.1.1/UPD_FILE The TSF shall enforce the **UPD_FILE Access Control SFP** on terminals gaining write, read and modification access to data in the file(s) other than EF.COM, EF.SOD, and EF.DG1 to EF.DG16 of the logical MRTD.

FDP_ACF.1/UPD_FILE Security attribute based access control

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

- **Subjects:**
 - **Personalization Agent,**
 - **Extended Inspection System**
 - **Terminal,**
- **Objects:**
 - **data in the file(s)EF.COM, EF.SOD, and EF.DG1 to EF.DG16 of the logical MRTD**
- **Security attributes**
 - **authentication status of terminals,**

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

- **the Personalization Agent is allowed to write, read and modify the data in the file(s) other than EF.COM, EF.SOD, and EF.DG1 to EF.DG16 of the logical MRTD,**
- **the successfully authenticated Extended Inspection System following FMT_MTD.1.1/UPD_FILE is allowed to modify the data in the file(s) other than EF.COM, EF.SOD, and EF.DG1 to EF.DG16 of the logical MRTD.**



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

FDP_ACF.1.4/UPD_FILE The TSF shall explicitly deny access of subjects to objects based on the following additional rules: **Any Terminal is not allowed to modify the data in the file(s) EF.COM, EF.SOD, and EF.DG1 to EF.DG16 of the logical MRTD.**

FDP_RIP.1 Subset residual information protection

FDP_RIP.1.1 The TSF shall ensure that any previous information content of a resource is made unavailable upon the **deallocation of the resource from** the following objects:

- o **Session Keys (immediately after closing related communication session),**
- o **the ephemeral private key ephem-SK picc -PACE (by having generated a DH shared secret K)**
- o **none.**

FDP_UCT.1/TRM Basic data exchange confidentiality

FDP_UCT.1.1/TRM The TSF shall enforce the **Access Control SFP to receive and transmit** user data in a manner protected from unauthorised disclosure.

FDP_UIT.1/TRM Data exchange integrity

FDP_UIT.1.1/TRM 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.

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

7.1.4 Class FTP Trusted Path/Channels



FTP_ITC.1/PACE Inter-TSF trusted channel

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

FTP_ITC.1.2/PACE The TSF shall permit **another trusted IT product** to initiate communication via the trusted channel.

FTP_ITC.1.3/PACE [Editorially Refined] The TSF shall **enforce** communication via the trusted channel for **any data exchange between the TOE and the Terminal**.

FTP_ITC.1/MP Inter-TSF trusted channel

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

FTP_ITC.1.2/MP The TSF shall permit **another trusted IT product** to initiate communication via the trusted channel.

FTP_ITC.1.3/MP The TSF shall initiate communication via the trusted channel for **loading sensitive data (Pre-Perso_K, Perso_K, PACE_PWD, CA_SK) shall be encrypted**.

7.1.5 Class FAU Security Audit

FAU_SAS.1 Audit storage

FAU_SAS.1.1 The TSF shall provide **the Manufacturer** with the capability to store **the Initialisation and Pre-Personalisation Data** in the audit records.

7.1.6 Class FMT Security Management

FMT_MOF.1/BAC_EXP Management of security functions behaviour

FMT_MOF.1.1/BAC_EXP The TSF shall restrict the ability to **enable** the functions

- o **deactivation of BAC protocol**

to **Country Verifying Certification Authority and Domestic Document Verifier once the current date in the TOE has reached or passed the value set by FMT_MTD.1/BAC_EXP**.



*Application Note:*

The BAC is automatically deactivated by the TOE once the authenticated subject (CVCA or Domestic Document Verifier) has updated the current date of the TOE with a date that reaches or passes the reference date configured by FMT_MTD.1/BAC_EXP

FMT_MOF.1/GP Management of security functions behaviour

FMT_MOF.1.1/GP The TSF shall restrict the ability to **enable** the functions

- o **transmission of user data in a manner protected from unauthorized disclosure,**
 - o **reception of user data in a manner protected from unauthorized disclosure,**
 - o **transmission of user data in a manner protected from modification, deletion, insertion and replay errors,**
 - o **reception of user data in a manner protected from modification, deletion, insertion and replay errors,**
- to **the manufacturer and personalization agent.**

FMT_SMF.1 Specification of Management Functions

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

- o **Initialization,**
- o **Pre-personalisation,**
- o **Personalisation,**
- o **Configuration,**
- o **Chip Authentication Protocol,**
- o **Protection of incoming user data,**
- o **Protection of outgoing user data,**
- o **Basic Access Control expiration.**

FMT_SMR.1/PACE Security roles

FMT_SMR.1.1/PACE The TSF shall maintain the roles

- o **Manufacturer,**
- o **Personalization Agent,**
- o **Terminal,**
- o **PACE authenticated BIS-PACE**
- o **Country Verifying Certificate Authority,**
- o **Document Verifier,**
- o **Domestic Extended Inspection System**
- o **Foreign Extended Inspection System.**





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

Application Note:

This SFR also applies to the refinement of the role Manufacturer.

FMT_LIM.1 Limited capabilities

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

Deploying test features after TOE delivery do not allow

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

FMT_LIM.2 Limited capabilities

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

Deploying test features after TOE delivery do not allow

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

FMT_MTD.1/INI_ENA Management of TSF data

FMT_MTD.1.1/INI_ENA The TSF shall restrict the ability to **write** the **Initialisation Data and the Pre-personalisation Data to the Manufacturer.**

Application Note:

Please refer to F.ACW for details of the data written by the manufacturer.



FMT_MTD.1/INI_DIS Management of TSF data

FMT_MTD.1.1/INI_DIS The TSF shall restrict the ability to **read out** the **Initialisation Data** and the **Pre-personalisation Data** to **the Personalisation Agent**.

FMT_MTD.1/PA Management of TSF data

FMT_MTD.1.1/PA The TSF shall restrict the ability to **write** the **document Security Object (SO D)** to **the Personalization Agent**.

FMT_MTD.1/CVCA_INI Management of TSF data

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

- **initial Country Verifying Certification Authority Public Key,**
- **initial Country Verifying Certification Authority Certificate,**
- **Initial Current Date**
- **none**

to **the Personalization Agent**.

FMT_MTD.1/CVCA_UPD Management of TSF data

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

- **Country Verifying Certification Authority Public Key,**
- **Country Verifying Certification Authority Certificate**

to **Country Verifying Certification Authority**.

FMT_MTD.1/DATE Management of TSF data

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

- **Country Verifying Certification Authority**
- **Document Verifier**
- **Domestic Extended Inspection System.**

FMT_MTD.1/CAPK Management of TSF data

FMT_MTD.1.1/CAPK The TSF shall restrict the ability to **load or create** the **Chip Authentication private key** to **the personalization agent**.

FMT_MTD.1/KEY_READ Management of TSF data

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

- o **PACE passwords,**
- o **Manufacturer Keys**
- o **Pre-personalization Agent Keys,**
- o **Personalisation Agent Keys,**
- o **Chip Authentication Private Key**

to **none**.

FMT_MTD.1/PACE_PWD Management of TSF data

FMT_MTD.1.1/PACE_PWD The TSF shall restrict the ability to **load** the **PACE Password** to **Personalization Agent**.

FMT_MTD.1/LCS_PERS Management of TSF data

FMT_MTD.1.1/LCS_PERS The TSF shall restrict the ability to **switch** the **LCS** from **phase 6 to phase 7** to **the Personalization Agent**.

FMT_MTD.1/BAC_EXP Management of TSF data

FMT_MTD.1.1/BAC_EXP The TSF shall restrict the ability to **set** the **BAC expiry date** to **Personalization Agent**.

Application Note:

By default, BAC expiration feature is not activated

FMT_MTD.1/UPD_FILE Management of TSF data

FMT_MTD.1.1/UPD_FILE The TSF shall restrict the ability to **set** the **identifiers of files that can be modified in phase 7**(different from **EF.COM, EF.SOD, EF.DG1 to EF.DG16**) to **the Personalization Agent**.

FMT_MTD.1/SM_LVL Management of TSF data

FMT_MTD.1.1/SM_LVL The TSF shall restrict the ability to **set** the **minimum Secure Messaging level required to access DG3 and DG4** to **Personalization Agent**.

Application Note:

Possible secure messaging levels are: DES, AES 128, AES 192 or AES 256





FMT_MTD.3 Secure TSF data

FMT_MTD.3.1 [Editorially Refined] The TSF shall ensure that only secure values of the certificate chain are accepted for **TSF data of the Terminal Authentication Protocol v.1 and the Access Control.**

Refinement:

The certificate chain is valid if and only if

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

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

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

7.1.7 Class FPT Protection of the Security Functions

FPT_EMS.1 TOE Emanation

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

- o **Chip Authentication Session Keys,**
- o **PACE session keys (PACE-K mac, PACE-K enc),**
- o **The ephemeral private key ephem SK picc -PACE,**
- o **The ephemeral private key SK Map,PICC -PACE-CAM,**
- o **Personalization Agent Key(s),**
- o **Chip Authentication Private Key.**

FPT_EMS.1.2 The TSF shall ensure **users** are unable to use the following interface **smart card circuit contacts** to gain access to

- o **Chip Authentication Session Keys,**
- o **PACE session keys (PACE-K mac, PACE-K enc),**
- o **The ephemeral private key ephem SK picc -PACE,**
- o **Personalization Agent Key(s),**
- o **Chip Authentication Private Key.**





FPT_FLS.1 Failure with preservation of secure state

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

- o **Exposure to operating conditions causing a TOE malfunction,**
- o **Failure detected by TSF according to FPT_TST.1,**
- o **none.**

FPT_PHP.3 Resistance to physical attack

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

FPT_TST.1 TSF testing

FPT_TST.1.1 The TSF shall run a suite of self tests **at the conditions**

- o **At reset** to demonstrate the correct operation of **the TSF.**

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

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

7.2 Security Requirements Rationale

7.2.1 Objectives

7.2.1.1 Security Objectives for the TOE

OT.Sens_Data_Conf The security objective OT.Sense_Data_Conf “Confidentiality of sensitive biometric reference data” is enforced by the Access Control SFP defined in FDP_ACC.1/TRM and FDP_ACF.1/TRM allowing the data of EF.DG3 and EF.DG4 only to be read by successfully authenticated Extended Inspection System being authorized by a valid certificate according FCS_COP.1/SIG_VER. The SFRs FIA_UID.1/PACE and FIA_UAU.1/PACE require the identification and authentication of the inspection systems. The SFR FIA_UAU.5/PACE requires the successful Chip Authentication (CA) v.1 before any authentication attempt as Extended Inspection System. During the protected communication following the CA v.1 the reuse of authentication data is prevented by FIA_UAU.4/PACE. The SFR FIA_UAU.6/EAC and FDP_UCT.1/TRM requires the confidentiality protection of the transmitted data after Chip Authentication v.1 by means of secure messaging implemented by the cryptographic functions according to FCS_RND.1 (for the generation of the terminal authentication challenge), FCS_CKM.1/CA (for the





generation of shared secret and for the derivation of the new session keys), FCS_CKM.1/CA_DATA_GEN for generation of Chip Authentication Data in personalization phase, and FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC for the ENC_MAC_Mode secure messaging. The session keys are destroyed according to FCS_CKM.4 after use. The SFR FMT_MTD.1/CAPK and FMT_MTD.1/KEY_READ requires that the Chip Authentication Key cannot be written unauthorized or read afterwards. FIA_UAU.6/MP requires that the sensitive data is sent via Secure Messaging during personalization phase. To allow a verification of the certificate chain as in FMT_MTD.3 the CVCA's public key and certificate as well as the current date are written or update by authorized identified role as of FMT_MTD.1/CVCA_INI, FMT_MTD.1/CVCA_UPD and FMT_MTD.1/DATE. FMT_MOF.1/GP ensures all data is transmitted and received via secure messaging to ensure confidentiality

OT.Chip_Auth_Proof The security objective OT.Chip_Auth_Proof "Proof of travel document's chip authenticity" is ensured by the Chip Authentication Protocol v.1 provided by FIA_API.1/CA proving the identity of the TOE. The Chip Authentication Protocol v.1 defined by FCS_CKM.1/CA is performed using a TOE internally stored confidential private key as required by FMT_MTD.1/CAPK and FMT_MTD.1/KEY_READ. The Chip Authentication Data is generated by using FCS_CKM.1/CA_DATA_GEN. The Chip Authentication Protocol v.1 [TR_03110] requires additional TSF according to FCS_CKM.1/CA (for the derivation of the session keys), FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC (for the ENC_MAC_Mode secure messaging).The SFRs FMT_SMF.1 and FMT_SMR.1/PACE support the functions and roles related.

OT.Data_Integrity The security objective OT.Data_Integrity "Integrity of personal data" requires the TOE to protect the integrity of the logical travel document stored on the travel document's chip against physical manipulation and unauthorized writing. Physical manipulation is addressed by FPT_PHP.3. Logical manipulation of stored user data is addressed by (FDP_ACC.1/TRM, FDP_ACF.1/TRM): only the Personalisation Agent is allowed to write the data in EF.DG1 to EF.DG16 of the logical travel document (FDP_ACF.1.2/TRM, rule 1) and terminals are not allowed to modify any of the data in EF.DG1 to EF.DG16 of the logical travel document (cf. FDP_ACF.1.4/TRM). FMT_MTD.1/PA requires that SOD containing signature over the User Data stored on the TOE and used for the Passive Authentication is allowed to be written by the Personalisation Agent only and, hence, is to be considered as trustworthy. The Personalisation Agent must identify and authenticate themselves according to FIA_UID.1/PACE and FIA_UAU.1/PACE before accessing these data. FIA_UAU.4/PACE, FIA_UAU.5/PACE and FCS_CKM.4 represent some required specific properties of the protocols used. The SFR FMT_SMR.1/PACE lists the roles and the SFR FMT_SMF.1 lists the TSF management functions.

Unauthorised modifying of the exchanged data is addressed, in the first line, by FTP_ITC.1/PACE using FCS_COP.1/PACE_MAC. For PACE secured data exchange, a prerequisite for establishing this trusted channel is a successful PACE Authentication (FIA_UID.1/PACE, FIA_UAU.1/PACE) using FCS_CKM.1/DH_PACE and possessing the special properties FIA_UAU.5/PACE, FIA_UAU.6/PACE resp. FIA_UAU.6/EAC. The trusted channel is established using PACE, Chip Authentication v.1, and Terminal Authentication v.1. FDP_RIP.1 requires erasing the values of session keys (here: for KMAC).

The TOE supports the inspection system detect any modification of the transmitted logical travel document data after Chip Authentication v.1. The SFR FIA_UAU.6/EAC and FDP_UIT.1/TRM requires the integrity protection of the transmitted data after Chip Authentication v.1 by means of secure messaging implemented by the cryptographic functions according to FCS_CKM.1/CA and FCS_CKM.1/CAM(for the generation of shared





secret and for the derivation of the new session keys), and FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC for the ENC_MAC_Mode secure messaging. The session keys are destroyed according to FCS_CKM.4 after use.

The SFR FMT_MTD.1/CAPK and FMT_MTD.1/KEY_READ requires that the Chip Authentication Key cannot be written unauthorized or read afterwards. The SFR FCS_RND.1 represents a general support for cryptographic operations needed.

The SFRs FDP_ACC.1/UPD_FILE and FDP_ACF.1/UPD_FILE ensure that no terminal is allowed to modify the user data.

FIA_UAU.6/MP and FMT_MOF.1/GP makes sure that the data is transmitted via secure messaging to maintain integrity.

OT.Data_Authenticity The security objective OT.Data_Authenticity aims ensuring authenticity of the User- and TSF data (after the PACE Authentication) by enabling its verification at the terminal-side and by an active verification by the TOE itself. This objective is mainly achieved by FTP_ITC.1/PACE using FCS_COP.1/PACE_MAC. A prerequisite for establishing this trusted channel is a successful PACE or Chip and Terminal Authentication v.1 (FIA_UID.1/PACE, FIA_UAU.1/PACE) using FCS_CKM.1/DH_PACE resp. FCS_CKM.1/CA or FCS_CKM.1/CAM and possessing the special properties FIA_UAU.5/PACE, FIA_UAU.6/PACE resp. FIA_UAU.6/EAC. FIA_UAU.6/MP ensures the data that is reaching the TOE is coming from the personalization agent by maintaining secure messaging for all commands. FDP_RIP.1 requires erasing the values of session keys (here: for KMAC). FIA_UAU.4/PACE, FIA_UAU.5/PACE and FCS_CKM.4 represent some required specific properties of the protocols used. The SFR FMT_MTD.1/KEY_READ restricts the access to the PACE passwords and the Chip Authentication Private Key. FMT_MTD.1/PA requires that SOD containing signature over the User Data stored on the TOE and used for the Passive Authentication is allowed to be written by the Personalisation Agent only and, hence, is to be considered as trustworthy. The SFR FCS_RND.1 represents a general support for cryptographic operations needed. The SFRs FMT_SMF.1 and FMT_SMR.1/PACE support the functions and roles related.



OT.Data_Confidentiality The security objective OT.Data_Confidentiality aims that the TOE always ensures confidentiality of the User- and TSF-data stored and, after the PACE Authentication resp. Chip Authentication, of these data exchanged. This objective for the data stored is mainly achieved by (FDP_ACC.1/TRM, FDP_ACF.1/TRM). FIA_UAU.4/PACE, FIA_UAU.5/PACE and FCS_CKM.4 represent some required specific properties of the protocols used. This objective for the data exchanged is mainly achieved by FDP_UCT.1/TRM, FDP_UIT.1/TRM and FTP_ITC.1/PACE using FCS_COP.1/PACE_ENC resp. FCS_COP.1/CA_ENC. A prerequisite for establishing this trusted channel is a successful PACE or Chip and Terminal Authentication v.1 (FIA_UID.1/PACE, FIA_UAU.1/PACE) using FCS_CKM.1/DH_PACE resp. FCS_CKM.1/CA or FCS_CKM.1/CAM and possessing the special properties FIA_UAU.5/PACE, FIA_UAU.6/PACE resp. FIA_UAU.6/EAC and FIA_UAU.6/MP for Manufacture and Personalization Agent authentication. FDP_RIP.1 requires erasing the values of session keys (here: for Kenc). The SFR FMT_MTD.1/KEY_READ restricts the access to the PACE passwords and the Chip Authentication Private Key. FMT_MTD.1/PA requires that SOD containing signature over the User Data stored on the TOE and used for the Passive Authentication is allowed to be written by the Personalisation Agent only and, hence, is to be considered trustworthy. The SFR FCS_RND.1 represents the general support for cryptographic operations needed. The SFRs FMT_SMF.1 and FMT_SMR.1/PACE support the functions and roles related.

OT.Tracing The security objective OT.Tracing aims that the TOE prevents gathering TOE tracing data by means of unambiguous identifying the travel document remotely through establishing or listening to a communication via the contactless interface of the TOE without a priori knowledge of the correct values of shared passwords (CAN, MRZ). This objective is achieved as follows: (i) while establishing PACE communication with CAN or MRZ (non-blocking authorisation data) – by FIA_AFL.1/PACE; (ii) for listening to PACE communication (is of importance for the current PP, since SOD is card-individual) – FTP_ITC.1/PACE.

OT.Prot_Abuse-Func The security objective OT.Prot_Abuse-Func “Protection against Abuse of Functionality” is ensured by the SFR 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 travel document’s chip against disclosure

- o 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 the SFR FPT_EMS.1,
- o by forcing a malfunction of the TOE which is addressed by the SFR FPT_FLS.1 and FPT_TST.1, and/or
- o by a physical manipulation of the TOE which is addressed by the SFR FPT_PHP.3.

OT.Prot_Phys-Tamper The security objective OT.Prot_Phys-Tamper “Protection against Physical Tampering” is covered by the SFR FPT_PHP.3.

OT.Prot_Malfunction The security objective OT.Prot_Malfunction “Protection against Malfunctions” is covered by (i) the SFR 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) the SFR FPT_FLS.1 which requires a secure state in case of detected failure or operating conditions possibly causing a malfunction.

OT.Identification The security objective OT.Identification “Identification of the TOE” addresses the storage of Initialisation and Pre-Personalisation Data in its non-volatile memory, whereby they also include the IC Identification Data uniquely identifying the TOE’s chip. This will be ensured by TSF according to SFR FAU_SAS.1. The SFR FMT_MTD.1/INI_ENA allows only the Manufacturer to write Initialisation and Pre-personalisation Data (including the Personalisation Agent key). The SFR FMT_MTD.1/INI_DIS requires the Personalisation Agent to disable access to Initialisation and Pre-personalisation Data in the life cycle phase ‘operational use’. The SFRs FMT_SMF.1 and FMT_SMR.1/PACE support the functions and roles related.

OT.AC_Pers The security objective OT.AC_Pers “Access Control for Personalisation of logical travel document” addresses the access control of the writing the logical travel document. The justification for the SFRs FAU_SAS.1, FMT_MTD.1/INI_ENA and FMT_MTD.1/INI_DIS arises from the justification for OT.Identification above with respect to the Pre-personalisation Data. The write access to the logical travel document data are defined by the SFR FIA_UID.1/PACE, FIA_UAU.1/PACE, FDP_ACC.1/TRM and FDP_ACF.1/TRM in the same way: only the successfully authenticated Personalisation Agent is allowed to write the data of the groups EF.DG1 to EF.DG16 of the logical travel document only once. FMT_MTD.1/PA covers the related property of OT.AC_Pers (writing SOD and, in generally, personalisation data). The SFR FMT_SMR.1/PACE lists the roles (including Personalisation Agent) and the SFR FMT_SMF.1 lists the TSF management functions (including Personalisation). The SFRs FMT_MTD.1/KEY_READ and FPT_EMS.1 restrict the access to the Personalisation Agent Keys and the Chip Authentication Private Key.

The authentication of the terminal as Personalisation Agent shall be performed by TSF according to SFR FIA_UAU.4/PACE and FIA_UAU.5/PACE. If the Personalisation Terminal want to authenticate itself to the TOE by means of the Terminal Authentication Protocol v.1 (after Chip Authentication v.1) with the Personalisation Agent Keys the TOE will use TSF according to the FCS_RND.1 (for the generation of the challenge), FCS_CKM.1/CA (for the derivation of the new session keys after Chip Authentication v.1), FCS_CKM.1/CA_DATA_GEN for generation of CA Data in phase 6, and FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC (for the ENC_MAC_Mode secure messaging), FCS_COP.1/SIG_VER (as part of the Terminal Authentication Protocol v.1) and FIA_UAU.6/EAC (for the re-authentication). If the Personalisation Terminal wants to authenticate itself to the TOE by means of the Authentication Mechanism with Personalisation Agent Key the TOE will use TSF according to the FCS_RND.1 (for the generation of the challenge) and FCS_COP.1/CA_ENC (to verify the authentication attempt). The session keys are destroyed according to FCS_CKM.4 after use.

The Personalisation Agent can load the PACE password according to FMT_MTD.1/PACE_PWD.

FMT_MTD.1/LCS_PERS ensures only personalization agent can transfer the TOE from life cycle phase 6 to phase 7.

FIA_UAU.6/MP ensures all commands in personalization phase are sent via secure messaging. FIA_AFL.1/MP helps block the Authentication in Phase 6 if too many failed authentication attempts occur to prevent attacks.

FDP_ACC.1/UPD_FILE and FDP_ACF.1/UPD_FILE restrict write access to files to personalization agent.



OT.Configuration The security objective OT.Configuration “Protection of the TOE preparation” addresses management of the Data Configuration, Pre-personalization Agent keys, Personalization Agent keys and the Life Cycle State of the TOE.

The authentication of the terminal as Manufacturer is performed by TSF according to SFR FIA_UAU.4 and FIA_UAU.5/MP. The Manufacturer can be authenticated by using the symmetric authentication mechanism (FCS_COP.1/GP_AUTH) with the Pre-personalization key. FIA_UAU.6/MP describes the re-authentication. In case of failed authentication attempts FIA_AFL.1/MP enforces additional waiting time prolonging the necessary amount of time for facilitating a brute force attack. The SFR FTP_ITC.1/MP allows the Manufacturer to communicate with the OS.

Once step 4 is done, the MRTD packaging responsible is allowed to set the Pre-personalization Agent keys according to the SFR FCS_COP.1/GP_KEY_DEC. The read access to the Pre-personalization keys is prevented by SFRs FPT_EMS.1, FPT_FLS.1 and FPT_PHP.3 the confidentiality of these keys.

In step 5, the authentication of the terminal as Manufacturer shall be performed by TSF according to SFR FIA_UAU.4 and FIA_UAU.5/MP. The Manufacturer shall be authenticated by using the symmetric authentication mechanism (FCS_COP.1/GP_AUTH).

In case of failed authentication attempts FIA_AFL.1/MP enforces additional waiting time prolonging the necessary amount of time for facilitating a brute force attack

The SFR FIA_UAU.6/MP describes the re-authentication and FDP_UCT.1/MP the protection of the transmitted data by means of secure messaging implemented by the cryptographic functions according to FCS_CKM.1/GP, FCS_RND.1 (for key generation), and FCS_COP.1/GP_ENC as well as FCS_COP.1/GP_MAC for the ENC_MAC_Mode. The SFR FCS_CKM.4 enforces the destruction of Secure Messaging session keys.

The Manufacturer and the Personalization Agent can select the protection mode of user data following FMT_MOF.1.1/GP.

The SFR FCS_CKM.4, FPT_EMS.1, FPT_FLS.1 and FPT_PHP.3 the confidentiality of Personalization Agent keys.

OT.Update_File The security objective OT.Update_File “Modification of file in Operational Use Phase” addresses the modification of Updatable Data as defined in FDP_ACC.1/UPD_FILE. The SFR FDP_ACF.1/UPD_FILE clarifies what can be done by which subject: after a correct authentication the Personalization Agent is allowed to write, read and modify these Updatable Data during Pre-Personalisation and Personalisation phases. Any Terminal is not allowed to modify them during Operational phase. Only a successfully authenticated Extended Inspection System is allowed to modify Updatable Data, only if with the name corresponding to the one (or beginning of the one) set following FMT_MTD.1/UPD_FILE by the Personalization Agent during Pre-Personalisation and Personalisation phases.

OT.BAC_Expiration The security objective OT.BAC_Expiration “Automatic deactivation of BAC protocol” is ensured by the SFR FMT_SMF.1 and detailed in FMT_MOF.1/BAC_EXP regarding mechanism activation and FMT_MTD.1/BAC_EXP regarding mechanism configuration.

OT.AC_SM_Level The security objective OT.AC_SM_Level “Access control to sensitive biometric reference data according to SM level” is covered by FMT_MTD.1/SM_LVL.





OT.Chip_Auth_Proof_PACE_CAM OT.Chip_Auth_Proof_PACE_CAM aims to ensure the authenticity of the electronic document's chip by the PACE-CAM protocol. This is supported by FCS_CKM.1/CAM for cryptographic key-generation, and FIA_API.1/CAM and FCS_COP.1/CAM for the implementation itself, as well as FIA_UID.1/PACE and FIA_UAU.5/PACE, the latter supporting the PACE protocol.

7.2.2 Rationale tables of Security Objectives and SFRs

Security Objectives	Security Functional Requirements	Rationale
OT.Sens Data Conf	FCS_CKM.1/CA , FCS_CKM.4 , FCS_COP.1/CA_ENC , FCS_COP.1/SIG_VER , FCS_COP.1/CA_MAC , FCS_RND.1 , FIA_UID.1/PACE , FIA_UAU.1/PACE , FIA_UAU.4/PACE , FIA_UAU.5/PACE , FIA_UAU.6/EAC , FIA_UAU.6/MP , FDP_ACC.1/TRM , FDP_ACF.1/TRM , FDP_UCT.1/TRM , FMT_MOF.1/GP , FMT_MTD.1/CVCA_INI , FMT_MTD.1/CVCA_UPD , FMT_MTD.1/DATE , FMT_MTD.1/CAPK , FMT_MTD.1/KEY_READ , FMT_MTD.3 , FCS_CKM.1/CA_DATA_GEN	Section 7.3.1
OT.Chip Auth Proof	FCS_CKM.1/CA , FCS_COP.1/CA_ENC , FCS_COP.1/CA_MAC , FIA_API.1/CA , FMT_SMF.1 , FMT_SMR.1/PACE , FMT_MTD.1/KEY_READ , FMT_MTD.1/CAPK , FCS_CKM.1/CA_DATA_GEN	Section 7.3.1
OT.Data Integrity	FCS_CKM.1/DH_PACE , FCS_COP.1/PACE_MAC , FIA_UAU.1/PACE , FIA_UAU.5/PACE , FIA_UAU.6/EAC , FIA_UID.1/PACE , FIA_UAU.4/PACE , FIA_UAU.6/PACE , FDP_ACF.1/TRM , FDP_ACC.1/TRM , FDP_UIT.1/TRM , FDP_ITC.1/PACE , FMT_MTD.1/PA , FMT_MTD.1/CAPK , FMT_MTD.1/KEY_READ , FCS_COP.1/CA_MAC , FCS_CKM.1/CA , FCS_CKM.4 , FCS_COP.1/CA_ENC , FDP_RIP.1 , FMT_SMF.1 , FMT_SMR.1/PACE , FPT_PHP.3 , FIA_UAU.6/MP , FDP_ACC.1/UPD_FILE , FDP_ACF.1/UPD_FILE , FCS_RND.1 , FMT_MOF.1/GP , FCS_CKM.1/CAM	Section 7.3.1
OT.Data Authenticity	FCS_CKM.1/DH_PACE , FCS_COP.1/PACE_MAC , FIA_UAU.1/PACE , FIA_UAU.5/PACE , FIA_UAU.6/EAC , FIA_UID.1/PACE , FIA_UAU.4/PACE , FIA_UAU.6/PACE ,	Section 7.3.1





	FTP_ITC.1/PACE , FMT_MTD.1/PA , FMT_MTD.1/KEY_READ , FCS_CKM.1/CA , FCS_CKM.4 , FDP_RIP.1 , FMT_SMF.1 , FMT_SMR.1/PACE , FIA_UAU.6/MP , FCS_RND.1 , FCS_CKM.1/CAM	
OT.Data Confidentiality	FCS_CKM.1/DH_PACE , FCS_COP.1/PACE_ENC , FIA_UAU.1/PACE , FIA_UAU.5/PACE , FIA_UAU.6/EAC , FIA_UID.1/PACE , FIA_UAU.4/PACE , FIA_UAU.6/PACE , FDP_ACF.1/TRM , FDP_ACC.1/TRM , FDP_UCT.1/TRM , FDP_UIT.1/TRM , FTP_ITC.1/PACE , FMT_MTD.1/PA , FMT_MTD.1/KEY_READ , FCS_CKM.1/CA , FCS_CKM.4 , FCS_COP.1/CA_ENC , FDP_RIP.1 , FMT_SMF.1 , FMT_SMR.1/PACE , FIA_UAU.6/MP , FCS_RND.1 , FCS_CKM.1/CAM	Section 7.3.1
OT.Tracing	FTP_ITC.1/PACE , FIA_AFL.1/PACE	Section 7.3.1
OT.Prot Abuse-Func	FMT_LIM.1 , FMT_LIM.2	Section 7.3.1
OT.Prot Inf Leak	FPT_FLS.1 , FPT_PHP.3 , FPT_TST.1 , FPT_EMS.1	Section 7.3.1
OT.Prot Phys-Tamper	FPT_PHP.3	Section 7.3.1
OT.Prot Malfunction	FPT_FLS.1 , FPT_TST.1	Section 7.3.1
OT.Identification	FMT_MTD.1/INI_ENA , FMT_MTD.1/INI_DIS , FAU_SAS.1 , FMT_SMF.1 , FMT_SMR.1/PACE	Section 7.3.1
OT.AC Pers	FMT_MTD.1/PA , FMT_MTD.1/KEY_READ , FMT_MTD.1/INI_ENA , FMT_MTD.1/INI_DIS , FAU_SAS.1 , FIA_UAU.5/PACE , FMT_SMF.1 , FMT_SMR.1/PACE , FIA_UAU.6/MP , FIA_AFL.1/MP , FDP_ACC.1/UPD_FILE , FDP_ACF.1/UPD_FILE , FMT_MTD.1/LCS_PERS , FCS_CKM.1/CA , FCS_CKM.4 , FCS_COP.1/CA_ENC , FCS_COP.1/SIG_VER , FCS_RND.1 , FIA_UID.1/PACE , FIA_UAU.1/PACE , FIA_UAU.4/PACE , FIA_UAU.6/EAC , FDP_ACC.1/TRM , FDP_ACF.1/TRM , FMT_MTD.1/PACE_PWD , FPT_EMS.1 , FCS_CKM.1/CA_DATA_GEN , FCS_COP.1/CA_MAC	Section 7.3.1
OT.Configuration	FCS_CKM.1/GP , FCS_COP.1/GP_ENC , FCS_COP.1/GP_MAC , FCS_COP.1/GP_AUTH , FCS_COP.1/GP_KEY_DEC	Section 7.3.1



	FTP_ITC.1/MP , FIA_AFL.1/MP , FIA_UAU.6/MP , FCS_CKM.4 , FCS_RND.1 , FPT_EMS.1 , FPT_FLS.1 , FPT_PHP.3	
OT.Update File	FDP_ACC.1/UPD_FILE , FDP_ACF.1/UPD_FILE , FMT_MTD.1/UPD_FILE	Section 7.3.1
OT.BAC Expiration	FMT_MOF.1/BAC_EXP , FMT_SMF.1 , FMT_MTD.1/BAC_EXP	Section 7.3.1
OT.AC SM Level	FMT_MTD.1/SM_LVL	Section 7.3.1
OT.Chip Auth Proof PACE CAM	FCS_COP.1/CAM , FIA_UAU.5/PACE , FIA_API.1/CAM , FIA_UID.1/PACE , FCS_CKM.1/CAM	Section 7.3.1

Table 16 Security Objectives and SFRs - Coverage

Security Functional Requirements	Security Objectives
FCS_CKM.1/DH_PACE	OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality
FCS_CKM.1/CA	OT.Sens Data Conf , OT.Chip Auth Proof , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers
FCS_CKM.1/CAM	OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.Chip Auth Proof PACE CAM
FCS_CKM.1/CA_DATA_GEN	OT.Sens Data Conf , OT.Chip Auth Proof , OT.AC Pers
FCS_CKM.1/GP	OT.Configuration
FCS_CKM.4	OT.Sens Data Conf , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers , OT.Configuration
FCS_COP.1/PACE_ENC	OT.Data Confidentiality
FCS_COP.1/PACE_MAC	OT.Data Integrity , OT.Data Authenticity
FCS_COP.1/CA_ENC	OT.Sens Data Conf , OT.Chip Auth Proof , OT.Data Integrity , OT.Data Confidentiality , OT.AC Pers
FCS_COP.1/SIG_VER	OT.Sens Data Conf , OT.AC Pers
FCS_COP.1/CA_MAC	OT.Sens Data Conf , OT.Chip Auth Proof , OT.Data Integrity , OT.AC Pers
FCS_COP.1/CAM	OT.Chip Auth Proof PACE CAM
FCS_COP.1/GP_ENC	OT.Configuration
FCS_COP.1/GP_MAC	OT.Configuration





FCS COP.1/GP AUTH	OT.Configuration
FCS COP.1/GP KEY DEC	OT.Configuration
FCS RND.1	OT.Sens Data Conf , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers , OT.Configuration
FIA UID.1/PACE	OT.Sens Data Conf , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers , OT.Chip Auth Proof PACE CAM
FIA UAU.1/PACE	OT.Sens Data Conf , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers
FIA UAU.4/PACE	OT.Sens Data Conf , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers
FIA UAU.5/PACE	OT.Sens Data Conf , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers , OT.Chip Auth Proof PACE CAM
FIA UAU.6/PACE	OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality
FIA UAU.6/EAC	OT.Sens Data Conf , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers
FIA UAU.6/MP	OT.Sens Data Conf , OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.AC Pers , OT.Configuration
FIA AFL.1/PACE	OT.Tracing
FIA AFL.1/MP	OT.AC Pers , OT.Configuration
FIA API.1/CA	OT.Chip Auth Proof
FIA API.1/CAM	OT.Chip Auth Proof PACE CAM
FDP ACC.1/TRM	OT.Sens Data Conf , OT.Data Integrity , OT.Data Confidentiality , OT.AC Pers
FDP ACF.1/TRM	OT.Sens Data Conf , OT.Data Integrity , OT.Data Confidentiality , OT.AC Pers
FDP ACC.1/UPD FILE	OT.Data Integrity , OT.AC Pers , OT.Update File
FDP ACF.1/UPD FILE	OT.Data Integrity , OT.AC Pers , OT.Update File
FDP RIP.1	OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality
FDP UCT.1/TRM	OT.Sens Data Conf , OT.Data Confidentiality
FDP UIT.1/TRM	OT.Data Integrity , OT.Data Confidentiality
FTP ITC.1/PACE	OT.Data Integrity , OT.Data Authenticity , OT.Data Confidentiality , OT.Tracing





FTP ITC.1/MP	OT.Configuration
FAU SAS.1	OT.Identification, OT.AC Pers
FMT MOF.1/BAC EXP	OT.BAC Expiration
FMT MOF.1/GP	OT.Sens Data Conf, OT.Data Integrity
FMT SMF.1	OT.Chip Auth Proof, OT.Data Integrity, OT.Data Authenticity, OT.Data Confidentiality, OT.Identification, OT.AC Pers, OT.BAC Expiration
FMT SMR.1/PACE	OT.Chip Auth Proof, OT.Data Integrity, OT.Data Authenticity, OT.Data Confidentiality, OT.Identification, OT.AC Pers
FMT LIM.1	OT.Prot Abuse-Func
FMT LIM.2	OT.Prot Abuse-Func
FMT MTD.1/INI ENA	OT.Identification, OT.AC Pers
FMT MTD.1/INI DIS	OT.Identification, OT.AC Pers
FMT MTD.1/PA	OT.Data Integrity, OT.Data Authenticity, OT.Data Confidentiality, OT.AC Pers
FMT MTD.1/CVCA INI	OT.Sens Data Conf
FMT MTD.1/CVCA UPD	OT.Sens Data Conf
FMT MTD.1/DATE	OT.Sens Data Conf
FMT MTD.1/CAPK	OT.Sens Data Conf, OT.Chip Auth Proof, OT.Data Integrity
FMT MTD.1/KEY READ	OT.Sens Data Conf, OT.Chip Auth Proof, OT.Data Integrity, OT.Data Authenticity, OT.Data Confidentiality, OT.AC Pers
FMT MTD.1/PACE PWD	OT.AC Pers
FMT MTD.1/LCS PERS	OT.AC Pers
FMT MTD.1/BAC EXP	OT.BAC Expiration
FMT MTD.1/UPD FILE	OT.Update File
FMT MTD.1/SM_LVL	OT.AC SM Level
FMT MTD.3	OT.Sens Data Conf
FPT EMS.1	OT.Prot Inf Leak, OT.AC Pers, OT.Configuration
FPT FLS.1	OT.Prot Inf Leak, OT.Prot Malfunction, OT.Configuration
FPT PHP.3	OT.Data Integrity, OT.Prot Inf Leak, OT.Prot Phys-Tamper, OT.Configuration
FPT TST.1	OT.Prot Inf Leak, OT.Prot Malfunction

Table 17 SFRs and Security Objectives



7.2.3 Dependencies

7.2.3.1 SFRs Dependencies

Requirements	CC Dependencies	Satisfied Dependencies
FCS_CKM.1/DH_PACE	(FCS_CKM.2 or FCS_COP.1) and (FCS_CKM.4)	FCS_CKM.4 , FCS_COP.1/PACE_ENC , FCS_COP.1/PACE_MAC
FCS_CKM.1/CA	(FCS_CKM.2 or FCS_COP.1) and (FCS_CKM.4)	FCS_CKM.4 , FCS_COP.1/CA_ENC , FCS_COP.1/CA_MAC
FCS_CKM.1/CAM	(FCS_CKM.2 or FCS_COP.1) and (FCS_CKM.4)	FCS_CKM.4 , FCS_COP.1/CAM
FCS_CKM.1/CA_DATA_GEN	(FCS_CKM.2 or FCS_COP.1) and (FCS_CKM.4)	FCS_CKM.4 , FCS_COP.1/SIG_VER
FCS_CKM.1/GP	(FCS_CKM.2 or FCS_COP.1) and (FCS_CKM.4)	FCS_CKM.4 , FCS_COP.1/GP_ENC , FCS_COP.1/GP_MAC
FCS_CKM.4	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2)	FCS_CKM.1/DH_PACE , FCS_CKM.1/CA , FCS_CKM.1/CA_DATA_GEN , FCS_CKM.1/GP
FCS_COP.1/PACE_ENC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/DH_PACE , FCS_CKM.4
FCS_COP.1/PACE_MAC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/DH_PACE , FCS_CKM.4
FCS_COP.1/CA_ENC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/CA , FCS_CKM.4
FCS_COP.1/SIG_VER	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/CA , FCS_CKM.4
FCS_COP.1/CA_MAC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/CA , FCS_CKM.4
FCS_COP.1/CAM	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/CAM , FCS_CKM.4
FCS_COP.1/GP_ENC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/GP , FCS_CKM.4
FCS_COP.1/GP_MAC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/GP , FCS_CKM.4
FCS_COP.1/GP_AUTH	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/GP , FCS_CKM.4
FCS_COP.1/GP_KEY_DEC	(FCS_CKM.1 or FDP_ITC.1 or FDP_ITC.2) and (FCS_CKM.4)	FCS_CKM.1/GP , FCS_CKM.4
FCS_RND.1	No Dependencies	
FIA_UID.1/PACE	No Dependencies	
FIA_UAU.1/PACE	(FIA_UID.1)	FIA_UID.1/PACE
FIA_UAU.4/PACE	No Dependencies	
FIA_UAU.5/PACE	No Dependencies	
FIA_UAU.6/PACE	No Dependencies	
FIA_UAU.6/EAC	No Dependencies	
FIA_UAU.6/MP	No Dependencies	
FIA_AFL.1/PACE	(FIA_UAU.1)	FIA_UAU.1/PACE
FIA_AFL.1/MP	(FIA_UAU.1)	FIA_UAU.1/PACE
FIA_API.1/CA	No Dependencies	
FIA_API.1/CAM	No Dependencies	
FDP_ACC.1/TRM	(FDP_ACF.1)	FDP_ACF.1/TRM





FDP_ACF.1/TRM	(FDP_ACC.1) and (FMT_MSA.3)	FDP_ACC.1/TRM
FDP_ACC.1/UPD_FILE	(FDP_ACF.1)	FDP_ACF.1/UPD_FILE
FDP_ACF.1/UPD_FILE	(FDP_ACC.1) and (FMT_MSA.3)	FDP_ACC.1/UPD_FILE
FDP_RIP.1	No Dependencies	
FDP_UCT.1/TRM	(FDP_ACC.1 or FDP_IFC.1) and (FTP_ITC.1 or FTP_TRP.1)	FDP_ACC.1/TRM , FTP_ITC.1/PACE
FDP_UIT.1/TRM	(FDP_ACC.1 or FDP_IFC.1) and (FTP_ITC.1 or FTP_TRP.1)	FDP_ACC.1/TRM , FTP_ITC.1/PACE
FTP_ITC.1/PACE	No Dependencies	
FTP_ITC.1/MP	No Dependencies	
FAU_SAS.1	No Dependencies	
FMT_MOF.1/BAC_EXP	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MOF.1/GP	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_SMF.1	No Dependencies	
FMT_SMR.1/PACE	(FIA_UID.1)	FIA_UID.1/PACE
FMT_LIM.1	No Dependencies	
FMT_LIM.2	No Dependencies	
FMT_MTD.1/INI_ENA	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/INI_DIS	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/PA	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/CVCA_INI	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/CVCA_UPD	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/DATE	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/CAPK	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/KEY_READ	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/PACE_PWD	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/LCS_PERS	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/BAC_EXP	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/UPD_FILE	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.1/SM_LVL	(FMT_SMF.1) and (FMT_SMR.1)	FMT_SMF.1 , FMT_SMR.1/PACE
FMT_MTD.3	(FMT_MTD.1)	FMT_MTD.1/CVCA_INI , FMT_MTD.1/CVCA_UPD
FPT_EMS.1	No Dependencies	



FPT_FLS.1	No Dependencies	
FPT_PHP.3	No Dependencies	
FPT_TST.1	No Dependencies	

Table 18 SFRs Dependencies

Rationale for the exclusion of Dependencies

The dependency FMT_MSA.3 of FDP_ACF.1/TRM is discarded. The access control TSF according to FDP_ACF.1/TRM uses security attributes that have been defined during personalization, and that are fixed over the whole life time of the TOE. No management of these security attributes (i.e. SFR FMT_MSA.1 and FMT_MSA.3) is necessary.

The dependency FMT_MSA.3 of FDP_ACF.1/UPD_FILE is discarded. The access control TSF according to FDP_ACF.1/UPD_FILE uses security attributes which are defined during the personalisation 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.

7.2.3.2 SARs Dependencies

Requirements	CC Dependencies	Satisfied Dependencies
ADV_ARC.1	(ADV_FSP.1) and (ADV_TDS.1)	ADV_FSP.5, ADV_TDS.4
ADV_FSP.5	(ADV_IMP.1) and (ADV_TDS.1)	ADV_IMP.1, ADV_TDS.4
ADV_IMP.1	(ADV_TDS.3) and (ALC_TAT.1)	ADV_TDS.4, ALC_TAT.2
ADV_TDS.4	(ADV_FSP.5)	ADV_FSP.5
ADV_INT.2	(ADV_IMP.1) and (ADV_TDS.3) and (ALC_TAT.1)	ADV_IMP.1, ADV_TDS.4, ALC_TAT.2
AGD_OPE.1	(ADV_FSP.1)	ADV_FSP.5
AGD_PRE.1	No Dependencies	
ALC_CMC.4	(ALC_CMS.1) and (ALC_DVS.1) and (ALC_LCD.1)	ALC_CMS.5, ALC_DVS.2, ALC_LCD.1
ALC_CMS.5	No Dependencies	
ALC_DEL.1	No Dependencies	
ALC_DVS.2	No Dependencies	
ALC_LCD.1	No Dependencies	
ALC_TAT.2	(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.5, ASE_INT.1, ASE_REQ.2
ATE_COV.2	(ADV_FSP.2) and (ATE_FUN.1)	ADV_FSP.5, ATE_FUN.1
ATE_DPT.3	(ADV_ARC.1) and (ADV_TDS.4) and (ATE_FUN.1)	ADV_ARC.1, ADV_TDS.4, 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.5, AGD_OPE.1, AGD_PRE.1, ATE_COV.2, ATE_FUN.1
AVA_VAN.5	(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.5, ADV_IMP.1, ADV_TDS.4, AGD_OPE.1, AGD_PRE.1, ATE_DPT.3

Table 19 SARs Dependencies

7.2.4 Rationale for the Security Assurance Requirements

The EAL5 was chosen to permit a developer to gain maximum assurance from security engineering based upon rigorous commercial development practices supported by moderate application of specialist security engineering techniques.

EAL5 is therefore applicable in those circumstances where developers or users require a high level of independently assured security in a planned development and require a rigorous development approach without incurring unreasonable costs attributable to specialist security engineering techniques.

7.2.4.1 AVA_VAN.5 Advanced methodical vulnerability analysis

The selection of the component AVA_VAN.5 provides a higher assurance of the security by vulnerability analysis to assess the resistance to penetration attacks performed by an attacker possessing a high attack potential. This vulnerability analysis is necessary to fulfill the security objectives OT.Chip_Auth_Proof.

The component AVA_VAN.5 has the following dependencies:

- ADV_ARC.1 "Security architecture description"
- ADV_FSP.4 "Security-enforcing functional specification"
- ADV_TDS.3 "Basic modular design"
- ADV_IMP.1 "Implementation representation of the TSF"
- AGD_OPE.1 "Operational user guidance"
- AGD_PRE.1 "Preparative procedures"
- ATE_DPT.1 "Testing: basic design"

All of these are met or exceeded in the EAL5 assurance package

7.2.4.2 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 EAL5 has no dependencies to other security requirements.

8 TOE Summary Specification

8.1 TOE Summary Specification

The TOE provides the following Security Functions (TSF):

TSF	Acronym	Step 5	Step 6	Step 7
Access Control in Reading	F.ACR	Yes	Yes	Yes
Access Control in Writing	F.ACW	Yes	Yes	Yes
Clear Residual Information	F.CLR_INFO	Yes	Yes	Yes
Cryptographic Support	F.CRYPTO	Yes	Yes	Yes
Extended Access Control	F.EAC	No	No	Yes
PACE	F.PACE	No	No	Yes
MRTD Personalisation	F.PERS	No	Yes	No
Physical Protection	F.PHY	Yes	Yes	Yes
MRTD Pre-Personalisation	F.PREP	Yes	No	No
Safe State Management	F.SS	Yes	Yes	Yes
Secure Messaging	F.SM	Yes	Yes	Yes
Self Test	F.STST	No	No	Yes

F.ACR - 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:

- o Manufacturer Keys,
- o Pre-personalization Agent keys,
- o Personalization Agent keys,
- o CA private key,
- o PACE passwords

It controls access to the Initialization and Pre-Personalization data by allowing read access without authentication prior to delivery. After delivery, only the personalization agent after authentication has read access to it.

Regarding the file structure:

In the Operational Use phase:

- o The terminal can read user data, the Document Security Object, (EF.COM, EF.SOD, EF.DG1 to EF.DG16) only after PACE or EAC authentication and through a valid secure channel.

In the Production and preparation stage:

The Manufacturer can read the Initialization Data in Stage 2 "Production". The pre-personalization agent and the Personalization Agent can read only the random identifier in



Stage 3 "Preparation" stored in the TOE. Other data-elements can only be read after they are authenticated by the TOE (using their authentication keys).

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

F.ACW - Access Control in Writing

This function controls access to write functions (in NVM) 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.

Regarding the file structure:

In the Operational Use phase:

It is not possible to create any files (system or data files). Furthermore, it is not possible to update any files (system or data files), except for the current date, the CVCA public key and the CVCA certificate which can be updated if the access conditions is verified by the subjects defined in FMT_MTD.1/CVCA_UPD and FMT_MTD.1/DATE.

In the Production and preparation stage:

The Manufacturer can write all the Initialization and data for the Pre-personalization. The Personalization Agent can write through a valid secure channel all the data, PACE passwords, Chip Authentication Private Key and Country Verifying Certification Authority Public Key after it is authenticated by the TOE (using its authentication keys).

The Pre-Personalization Agent can write through a valid secure channel data to be used by the personalization agent (after it is authenticated by the TOE using its authentication keys). The Pre-personalization agent is only active after delivery. The key that is written in the TOE for authentication purposes during manufacturing is meant for the pre-personalization agent. The Pre-personalization agent (which is seen as a sub-role of the Personalization agent) will refresh this key.

F.CLR_INFO - Clear Residual Information

This security function ensures clearing of sensitive information

- o Authentication state is securely cleared in case an error is detected or a new authentication is attempted
- o Authentication data related to GP authentication, PACE authentication and EAC is securely cleared to prevent reuse
- o Session keys is securely erased in case an error is detected or the secure communication session is closed
- o ephemer-SK picc -PACE is securely erased

F.CRYPTO - Cryptographic Support

This Security Function provides the following cryptographic features:

- o Key Generation based on ECDH with key sizes 192 to 521 bits.
- o Key generation based on DH with key sizes 1024, 1536 and 2048.
- o Key generation for Triple-DES in CBC mode for 112 bits.
- o Key generation for AES in CBC mode with key sizes 128, 192 and 256 bits.
- o Secure messaging (encryption and decryption) using:
 - Triple DES in CBC mode (key size 112 bits).
 - AES in CBC mode (key sizes 128,192,256 bits).
- o Secure messaging (message authentication code) using:





- Retail MAC with key size 112 bits.
- AES CMAC with key sizes 128,192 and 256 bits.
- o GP Secure Messaging (encryption and decryption) using:
 - Triple-DES in CBC mode with key size 112 bits as defined in [FIPS_46_3].
 - AES with key sizes 128, 192 and 256 bits as defined in [NIST_800_38A].
- o Digital signature verification using:
 - ECDSA with SHA-1, SHA-224 and SHA-256 with key sizes 192 to 512 bits.
 - RSA PKCS#1v1.5 with SHA-1, SHA-256 and SHA-512 with key sizes 1024, 1536, 2048
 - RSA PKCS#1-PSS with SHA-1, SHA-256 and SHA-512 with key sizes 1024, 1536, 2048
- o GP Secure Messaging (message authentication code) using:
 - Retail MAC with key size 112 bits as defined in [ISO_9797_1].
 - AES CMAC with key sizes 128, 192 and 256 bits as defined in [NIST_800_38B].
- o Random number generation that meets the requirement the average Shannon entropy per internal random bit exceeds 0.999.
- o Symmetric Authentication - encryption and decryption using:
 - Full 3DES MAC with key size 112 bits as defined in [ISO_9797_1].
 - AES CMAC with key sizes 128, 192 and 256 bits as defined in [NIST_800_38B].
- o Key decryption using:
 - Triple-DES in ECB mode with key size 112 bits as defined in [FIPS_46_3].
 - AES in CBC mode with key sizes 128, 192 and 256 bits as defined in [FIPS_197].
- o Chip Authentication Data Generation using DH, with key sizes 1024 to 2048 bits in steps of 512 bits.
- o Chip Authentication Data Generation using ECDH, with key sizes 192 to 512 bits.
- o PACE-CAM as defined in [ICAO_9303] with key sizes 192 to 521 bits.

F.EAC - Extended Access Control

This TSF provides the Extended Access Control, authentication and session keys generation to be used by F.SM, as described in [TR_03110]. It also provides the following management functions:

- o Maintain the roles: Document Verifier, CVCA, Domestic EIS, Foreign EIS
- o Limit the ability to update the CVCA Public key and CVCA Certificate to the Country Verifying Certification Authority
- o Limit the ability to update the date to CVCA, Document Verifier and Domestic Extended Inspection System.

F.PACE - Authentication using PACE

This TSF provides the Password Authenticated Connection Establishment Authentication (all mappings) and session keys generation to be used by F.SM, as described in [ICAO_9303].

In case the number of consecutive failed authentication attempts crosses the administrator defined number defined in FIA_AFL.1/PACE the TSF will slow down further authentication attempts.



**F.PERS - MRTD Personalization**

This security functionality ensures that the TOE, when delivered to the Personalization Agent, provides and requires authentication for data exchange. This authentication is based on a Triple DES and AES authentication mechanism. This security function is also responsible for management operations during personalization phase. This function allows to:

- o Manage symmetric authentication using Personalization Agent keys,
- o Configuration of the TOE
- o Compute session keys to be used by F.SM,
- o Load user data,
- o Configure SM level for biometrical data access,
- o Load Chip Authentication keys in encrypted form,
- o Chip Authentication Key Generation,
- o Load of key data PACE in encrypted form,
- o Configure BAC deactivation mechanism,
- o Set TOE life cycle to Operational Use phase,
- o set the files that are allowed to be modified in phase 7,
- o Write the Document Security Object (SO d),
- o Write the initial CVCA Public Key, CVCA Certificate and Current Date.

In case the number of consecutive failed authentication attempts crosses 1 the TSF will slow down further authentication attempts.

F.PHY - Physical Protection

This Security Function protects the TOE against physical attacks, so that the integrity and confidentiality of the TOE is ensured, including keys, user data, configuration data and TOE life cycle. It detects physical tampering, responds automatically, and also controls the emanations sent out by the TOE.

This Security Function also limits any physical emanations from the TOE so as to prevent any information leakage via these emanations that might reveal or provide access to sensitive data.

Furthermore, it prevents deploying test features after TOE delivery.

F.PREP - MRTD Pre-personalization

This security functionality ensures that the TOE, when delivered to the Manufacturer, provides and requires an authentication mechanism for data exchange. This authentication is based on Triple DES and AES symmetric authentication mechanism. This function allows to:

- o Manage symmetric authentication using Pre-personalization Agent keys,
- o Compute session keys to be used by F.SM,
- o Initialization of the TOE,
- o Load Personalization Agent keys in encrypted form,
- o Store the Initialization and Pre-Personalization data in audit records.

In case the number of consecutive failed authentication attempts crosses 1 the TSF will slow down further authentication attempts.



F.SM - Secure Messaging

This security functionality ensures the confidentiality, authenticity and integrity of the communication between the TOE and the interface device. In the operational phase, after a successful Authentication Procedure (i.e. PACE or CA), a secure channel is established. This security functionality also provides a Secure Messaging (SCP02 and SCP03) for the transmission of user data in Pre-personalization and Personalization phases. The protocols can be configured to protect the exchanges integrity and/or confidentiality. If an error occurs in the secure messaging layer or if the session is closed, the session keys are destroyed. This ensures protection against replay attacks as session keys are never reused.

F.SS - Safe State Management

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

- o a tearing occurs (during a copy of data in NVM).
- o an error due to self test as defined in FPT_TST.1.
- o any physical tampering is detected.

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

F.STST - Self Test

This security function implements self test features through platform functionalities at reset as defined in FPT_TST.1 to ensure the integrity of the TSF and TSF data.

8.2 SFRs and TSS

8.2.1 SFRs and TSS - Rationale

Class FDP User Data Protection

FDP_ACC.1/TRM is met by F.ACW - Access Control in Writing and F.ACR - Access Control in Reading that control read and write access to the data based on the current authentication state using authentication mechanism provided by F.PACE - Authentication using PACE

FDP_ACF.1/TRM is met by F.ACW - Access Control in Writing and F.ACR - Access Control in Reading that control read and write access to the data based on the current authentication state using authentication mechanism provided by F.PACE - Authentication using PACE

Class FTP Trusted Path/Channels

FTP_ITC.1/MP is met by F.SM - Secure Messaging that establishes a secure channel for communication for loading of keys as defined in F.PERS - MRTD Personalization and F.PREP - MRTD Pre-personalization.

8.2.2 Association tables of SFRs and TSS





Security Functional Requirements	TOE Summary Specification
FCS_CKM.1/DH_PACE	F.PACE - Authentication using PACE, F.CRYPTO - Cryptographic Support
FCS_CKM.1/CA	F.EAC - Extended Access Control, F.CRYPTO - Cryptographic Support, F.PACE - Authentication using PACE
FCS_CKM.1/CAM	F.CRYPTO - Cryptographic Support
FCS_CKM.1/CA_DATA_GEN	F.PERS - MRTD Personalization, F.CRYPTO - Cryptographic Support
FCS_CKM.1/GP	F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization, F.CRYPTO - Cryptographic Support
FCS_CKM.4	F.SM - Secure Messaging, F.CLR_INFO - Clear Residual Information
FCS_COP.1/PACE_ENC	F.SM - Secure Messaging, F.CRYPTO - Cryptographic Support
FCS_COP.1/PACE_MAC	F.SM - Secure Messaging, F.CRYPTO - Cryptographic Support
FCS_COP.1/CA_ENC	F.SM - Secure Messaging, F.CRYPTO - Cryptographic Support
FCS_COP.1/SIG_VER	F.EAC - Extended Access Control, F.CRYPTO - Cryptographic Support
FCS_COP.1/CA_MAC	F.SM - Secure Messaging, F.CRYPTO - Cryptographic Support
FCS_COP.1/CAM	F.CRYPTO - Cryptographic Support, F.PACE - Authentication using PACE
FCS_COP.1/GP_ENC	F.SM - Secure Messaging, F.CRYPTO - Cryptographic Support
FCS_COP.1/GP_MAC	F.SM - Secure Messaging, F.CRYPTO - Cryptographic Support
FCS_COP.1/GP_AUTH	F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization, F.CRYPTO - Cryptographic Support
FCS_COP.1/GP_KEY_DEC	F.PERS - MRTD Personalization, F.CRYPTO - Cryptographic Support, F.SM - Secure Messaging
FCS_RND.1	F.CRYPTO - Cryptographic Support
FIA_UID.1/PACE	F.EAC - Extended Access Control, F.PACE - Authentication using PACE, F.SM - Secure Messaging, F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization, F.ACR - Access Control in Reading
FIA_UAU.1/PACE	F.ACR - Access Control in Reading, F.SM - Secure Messaging, F.EAC - Extended Access Control, F.PACE - Authentication using PACE, F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization





FIA_UAU.4/PACE	F.CLR_INFO - Clear Residual Information
FIA_UAU.5/PACE	F.EAC - Extended Access Control, F.PACE - Authentication using PACE, F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization
FIA_UAU.6/PACE	F.SM - Secure Messaging
FIA_UAU.6/EAC	F.SM - Secure Messaging
FIA_UAU.6/MP	F.SM - Secure Messaging
FIA_AFL.1/PACE	F.PACE - Authentication using PACE
FIA_AFL.1/MP	F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization
FIA_API.1/CA	F.EAC - Extended Access Control
FIA_API.1/CAM	F.PACE - Authentication using PACE
FDP_ACC.1/TRM	F.ACR - Access Control in Reading, F.ACW - Access Control in Writing, F.PACE - Authentication using PACE
FDP_ACF.1/TRM	F.ACR - Access Control in Reading, F.ACW - Access Control in Writing, F.PACE - Authentication using PACE
FDP_ACC.1/UPD_FILE	F.ACR - Access Control in Reading, F.ACW - Access Control in Writing, F.PERS - MRTD Personalization, F.EAC - Extended Access Control
FDP_ACF.1/UPD_FILE	F.ACR - Access Control in Reading, F.ACW - Access Control in Writing, F.PERS - MRTD Personalization
FDP_RIP.1	F.CLR_INFO - Clear Residual Information
FDP_UCT.1/TRM	F.SM - Secure Messaging
FDP_UIT.1/TRM	F.SM - Secure Messaging
FTP_ITC.1/PACE	F.SM - Secure Messaging, F.PACE - Authentication using PACE
FTP_ITC.1/MP	F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization, F.SM - Secure Messaging
FAU_SAS.1	F.PREP - MRTD Pre-personalization
FMT_MOF.1/BAC_EXP	F.PERS - MRTD Personalization
FMT_MOF.1/GP	F.SM - Secure Messaging
FMT_SMF.1	F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization, F.EAC - Extended Access Control, F.SM - Secure Messaging
FMT_SMR.1/PACE	F.PACE - Authentication using PACE, F.PERS - MRTD Personalization, F.PREP - MRTD Pre-personalization, F.EAC - Extended Access Control
FMT_LIM.1	F.PHY - Physical Protection
FMT_LIM.2	F.PHY - Physical Protection





FMT_MTD.1/INI_ENA	F.ACW - Access Control in Writing
FMT_MTD.1/INI_DIS	F.ACR - Access Control in Reading
FMT_MTD.1/PA	F.PERS - MRTD Personalization
FMT_MTD.1/CVCA_INI	F.ACW - Access Control in Writing, F.PERS - MRTD Personalization
FMT_MTD.1/CVCA_UPD	F.EAC - Extended Access Control, F.ACW - Access Control in Writing
FMT_MTD.1/DATE	F.EAC - Extended Access Control, F.ACW - Access Control in Writing
FMT_MTD.1/CAPK	F.PERS - MRTD Personalization
FMT_MTD.1/KEY_READ	F.ACR - Access Control in Reading
FMT_MTD.1/PACE_PWD	F.PERS - MRTD Personalization
FMT_MTD.1/LCS_PERS	F.PERS - MRTD Personalization
FMT_MTD.1/BAC_EXP	F.PERS - MRTD Personalization
FMT_MTD.1/UPD_FILE	F.ACW - Access Control in Writing, F.PERS - MRTD Personalization
FMT_MTD.1/SM_LVL	F.PERS - MRTD Personalization
FMT_MTD.3	F.EAC - Extended Access Control
FPT_EMS.1	F.PHY - Physical Protection
FPT_FLS.1	F.SS - Safe State Management
FPT_PHP.3	F.PHY - Physical Protection, F.SS - Safe State Management
FPT_TST.1	F.STST - Self Test

Table 20 SFRs and TSS - Coverage

TOE Summary Specification	Security Functional Requirements
F.ACR - Access Control in Reading	FIA_UID.1/PACE, FIA_UAU.1/PACE, FDP_ACC.1/TRM, FDP_ACF.1/TRM, FDP_ACC.1/UPD_FILE, FDP_ACF.1/UPD_FILE, FMT_MTD.1/INI_DIS, FMT_MTD.1/KEY_READ
F.ACW - Access Control in Writing	FDP_ACC.1/TRM, FDP_ACF.1/TRM, FDP_ACC.1/UPD_FILE, FDP_ACF.1/UPD_FILE, FMT_MTD.1/INI_ENA, FMT_MTD.1/CVCA_INI, FMT_MTD.1/CVCA_UPD, FMT_MTD.1/DATE, FMT_MTD.1/UPD_FILE
F.CLR_INFO - Clear Residual Information	FCS_CKM.4, FIA_UAU.4/PACE, FDP_RIP.1
F.CRYPTO - Cryptographic Support	FCS_CKM.1/DH_PACE, FCS_CKM.1/CA, FCS_CKM.1/CAM, FCS_CKM.1/CA_DATA_GEN, FCS_CKM.1/GP, FCS_COP.1/PACE_ENC, FCS_COP.1/PACE_MAC, FCS_COP.1/CA_ENC, FCS_COP.1/SIG_VER, FCS_COP.1/CA_MAC, FCS_COP.1/CAM, FCS_COP.1/GP_ENC, FCS_COP.1/GP_MAC, FCS_COP.1/GP_AUTH, FCS_COP.1/GP_KEY_DEC,





	FCS_RND.1
F.EAC - Extended Access Control	FCS_CKM.1/CA , FCS_COP.1/SIG_VER , FIA_UID.1/PACE , FIA_UAU.1/PACE , FIA_UAU.5/PACE , FIA_API.1/CA , FDP_ACC.1/UPD_FILE , FMT_SMF.1 , FMT_SMR.1/PACE , FMT_MTD.1/CVCA_UPD , FMT_MTD.1/DATE , FMT_MTD.3
F.PACE - Authentication using PACE	FCS_CKM.1/DH_PACE , FCS_CKM.1/CA , FCS_COP.1/CAM , FIA_UID.1/PACE , FIA_UAU.1/PACE , FIA_UAU.5/PACE , FIA_AFL.1/PACE , FIA_API.1/CAM , FDP_ACC.1/TRM , FDP_ACF.1/TRM , FTP_ITC.1/PACE , FMT_SMR.1/PACE
F.PERS - MRTD Personalization	FCS_CKM.1/CA_DATA_GEN , FCS_CKM.1/GP , FCS_COP.1/GP_AUTH , FCS_COP.1/GP_KEY_DEC , FIA_UID.1/PACE , FIA_UAU.1/PACE , FIA_UAU.5/PACE , FIA_AFL.1/MP , FDP_ACC.1/UPD_FILE , FDP_ACF.1/UPD_FILE , FTP_ITC.1/MP , FMT_MOF.1/BAC_EXP , FMT_SMF.1 , FMT_SMR.1/PACE , FMT_MTD.1/PA , FMT_MTD.1/CVCA_INI , FMT_MTD.1/CAPK , FMT_MTD.1/PACE_PWD , FMT_MTD.1/LCS_PERS , FMT_MTD.1/BAC_EXP , FMT_MTD.1/UPD_FILE , FMT_MTD.1/SM_LVL
F.PHY - Physical Protection	FMT_LIM.1 , FMT_LIM.2 , FPT_EMS.1 , FPT_PHP.3
F.PREP - MRTD Pre-personalization	FCS_CKM.1/GP , FCS_COP.1/GP_AUTH , FIA_UID.1/PACE , FIA_UAU.1/PACE , FIA_UAU.5/PACE , FIA_AFL.1/MP , FTP_ITC.1/MP , FAU_SAS.1 , FMT_SMF.1 , FMT_SMR.1/PACE
F.SM - Secure Messaging	FCS_CKM.4 , FCS_COP.1/PACE_ENC , FCS_COP.1/PACE_MAC , FCS_COP.1/CA_ENC , FCS_COP.1/CA_MAC , FCS_COP.1/GP_ENC , FCS_COP.1/GP_MAC , FCS_COP.1/GP_KEY_DEC , FIA_UID.1/PACE , FIA_UAU.1/PACE , FIA_UAU.6/PACE , FIA_UAU.6/EAC , FIA_UAU.6/MP , FDP_UCT.1/TRM , FDP_UIT.1/TRM , FTP_ITC.1/PACE , FTP_ITC.1/MP , FMT_MOF.1/GP , FMT_SMF.1
F.SS - Safe State Management	FPT_FLS.1 , FPT_PHP.3
F.STST - Self Test	FPT_TST.1

Table 21 TSS and SFRs - Coverage



9 GLOSSARY AND ACRONYMS

9.1 Glossary

Term	Definition
Accurate Terminal Certificate	A Terminal Certificate is accurate, if the issuing Document Verifier is trusted by the travel document's chip to produce Terminal Certificates with the correct certificate effective date, see [TR_03110].
Advanced Inspection Procedure (with PACE)	A specific order of authentication steps between a travel document and a terminal as required by [ICAO_TR_SAC], namely (i) PACE, (ii) Chip Authentication v.1, (iii) Passive Authentication with SOD and (iv) Terminal Authentication v.1. AIP can generally be used by EIS-AIP-PACE.
Agreement	This term is used in the current PP in order to reflect an appropriate relationship between the parties involved, but not as a legal notion.
Active Authentication	Security mechanism defined in [ICAO_9303] option by which means the travel document's chip proves and the inspection system verifies the identity and authenticity of the travel document's chip as part of a genuine travel document issued by a known State of Organisation.
Application note	Optional informative part of the PP containing sensitive supporting information that is considered relevant or useful for the construction, evaluation, or use of the TOE.
Audit records	Write-only-once non-volatile memory area of the travel document's chip to store the Initialization Data and Pre-personalisation Data.
Authenticity	Ability to confirm the travel document and its data elements on the travel document's chip were created by the issuing State or Organisation
Basic Access Control (BAC)	Security mechanism defined in [ICAO_9303] by which means the travel document'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 with PACE protocol (BIS-PACE)	A technical system being used by an inspecting authority and operated by a governmental organisation (i.e. an Official Domestic or Foreign Document Verifier) and verifying the travel document presenter as the travel document holder (for ePassport: by comparing the real biometric data (face) of the travel document presenter with the stored biometric data (DG2) of the travel document holder). The Basic Inspection System with PACE is a PACE Terminal additionally supporting/applying the Passive Authentication protocol and is authorised by the travel document Issuer through the Document Verifier of receiving state to read a subset of data stored on the travel document.
Basic Inspection System (BIS)	An inspection system which implements the terminals part of the Basic Access Control Mechanism and authenticates itself to the travel document's chip using the Document Basic Access Keys derived from the printed MRZ data for reading the logical travel document.
Biographical data (biodata)	The personalised details of the travel document holder of the document appearing as text in the visual and machine readable zones on the biographical data page of a travel document. [ICAO_9303]
Biometric reference data	Data stored for biometric authentication of the travel document holder in the travel document's chip as (i) digital portrait and (ii) optional biometric reference data.
Card Access Number (CAN)	Password derived from a short number printed on the front side of the data-page.
Certificate chain	A sequence defining a hierarchy certificates. The Inspection System Certificate is the lowest level, Document Verifier Certificate in between, and Country Verifying Certification Authority Certificates are on the highest level. A certificate of a lower level is signed with the private key corresponding to the public key in the certificate of the next higher level.
Counterfeit	An unauthorized copy or reproduction of a genuine security document made by whatever means. [ICAO_9303]
Country Signing Certificate (CCSCA)	Certificate of the Country Signing Certification Authority Public Key (KPuSCSA) issued by Country Signing Certification Authority stored in the inspection system.





Term	Definition
Country Signing Certification Authority (CSCA)	<p>An organisation enforcing the policy of the travel document Issuer with respect to confirming correctness of user and TSF data stored in the travel document. The CSCA represents the country specific root of the PKI for the travel documents and creates the Document Signer Certificates within this PKI.</p> <p>The CSCA also issues the self-signed CSCA Certificate (CCSCA) having to be distributed by strictly secure diplomatic means, see. [ICAO_9303], 5.5.1. The Country Signing Certification Authority issuing certificates for Document Signers (cf. [ICAO_9303]) and the domestic CVCA may be integrated into a single entity, e.g. a Country Certification Authority. However, even in this case, separate key pairs must be used for different roles, see [TR_03110].</p>
Country Verifying Certification Authority (CVCA)	<p>An organisation enforcing the privacy policy of the travel document Issuer with respect to protection of user data stored in the travel document (at a trial of a terminal to get an access to these data). The CVCA represents the country specific root of the PKI for the terminals using it and creates the Document Verifier Certificates within this PKI. Updates of the public key of the CVCA are distributed in form of CVCA Link-Certificates, see [TR_03110].</p> <p>Since the Standard Inspection Procedure does not imply any certificate-based terminal authentication, the current TOE cannot recognise a CVCS as a subject; hence, it merely represents an organizational entity within this PP. The Country Signing Certification Authority (CSCA) issuing certificates for Document Signers (cf. [ICAO_9303]) and the domestic CVCA may be integrated into a single entity, e.g. a Country Certification Authority. However, even in this case, separate key pairs must be used for different roles, see [TR_03110].</p>
Current date	The maximum of the effective dates of valid CVCA, DV and domestic Inspection System certificates known to the TOE. It is used the validate card verifiable certificates.
CV Certificate	Card Verifiable Certificate according to [TR_03110].
CVCA link Certificate	Certificate of the new public key of the Country Verifying Certification Authority signed with the old public key of the Country Verifying Certification Authority where the certificate effective date for the new key is before the certificate expiration date of the certificate for the old key.
Document Basic Access Key Derivation Algorithm	The [ICAO_9303] describes the Document Basic Access Key Derivation Algorithm on how terminals may derive the Document Basic Access Keys from the second line of the printed MRZ data.
PACE passwords	Passwords used as input for PACE. This may either be the CAN or the SHA-1-value of the concatenation of Serial Number, Date of Birth and Date of Expiry as read from the MRZ, see [ICAO_TR_SAC]
Document Details Data	Data printed on and electronically stored in the travel document representing the document details like document type, issuing state, document number, date of issue, date of expiry, issuing authority. The document details data are less-sensitive data.
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 travel document's chip. It may carry the Document Signer Certificate (CDS). [ICAO_9303]
Document Signer (DS)	<p>An organisation enforcing the policy of the CSCA and signing the Document Security Object stored on the travel document for passive authentication.</p> <p>A Document Signer is authorised by the national CSCA issuing the Document Signer Certificate (CDS), see [TR_03110] and [ICAO_9303].</p> <p>This role is usually delegated to a Personalisation Agent.</p>
Document Verifier (DV)	<p>An organisation enforcing the policies of the CVCA and of a Service Provider (here: of a governmental organisation / inspection authority) and managing terminals belonging together (e.g. terminals operated by a State's border police), by – inter alia – issuing Terminal Certificates. A Document Verifier is therefore a Certification Authority, authorised by at least the national CVCA to issue certificates for national terminals, see [TR_03110].</p> <p>Since the Standard Inspection Procedure does not imply any certificate-based terminal authentication, the current TOE cannot recognise a DV as a subject; hence, it merely represents an organisational entity within this PP. There can be Domestic and Foreign DV: A domestic DV is acting under the policy of the domestic CVCA being run by the travel document Issuer; a foreign DV is acting under a policy of the respective foreign CVCA (in this case there shall be an appropriate agreement between the travel document Issuer und a foreign CVCA ensuring enforcing the travel document Issuer's privacy policy).55 56</p>
Eavesdropper	A threat agent with high attack potential reading the communication between the travel document's chip and the inspection system to gain the data on the travel document's chip.





Term	Definition
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. [ICAO_9303]
Travel document (electronic)	The contact based or contactless smart card integrated into the plastic or paper, optical readable cover and providing the following application: ePassport.
ePassport application	A part of the TOE containing the non-executable, related user data (incl. biometric) as well as the data needed for authentication (incl. MRZ); this application is intended to be used by authorities, amongst other as a machine readable travel document (MRTD). See [TR_03110].
Extended Access Control	Security mechanism identified in [ICAO_9303] by which means the travel document'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.
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 Organisation 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. [ICAO_9303]
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. [ICAO_9303]
IC Dedicated Software	Software developed and injected into the chip hardware by the IC manufacturer. Such software might support special functionality of the IC hardware and be used, amongst other, for implementing delivery procedures between different players. The usage of parts of the IC Dedicated Software might be restricted to certain life phases.
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 Embedded Software	Software embedded in an IC and not being designed by the IC developer. The IC Embedded Software is designed in the design life phase and embedded into the IC in the manufacturing life phase of the TOE.
IC Identification Data	The IC manufacturer writes a unique IC identifier to the chip to control the IC as travel document material during the IC manufacturing and the delivery process to the travel document manufacturer.
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. [ICAO_9303]
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. [ICAO_9303]
Initialisation	Process of writing Initialisation Data (see below) to the TOE (cf. sec. 1.2, TOE life-cycle, Phase 2, Step 3).
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 travel document's material (IC identification data).
Inspection	The act of a State examining an travel document presented to it by a traveller (the travel document holder) and verifying its authenticity. [ICAO_9303]





Term	Definition
Inspection System (IS)	A technical system used by the border control officer of the receiving State (i) examining an travel document presented by the traveller and verifying its authenticity and (ii) verifying the traveller as travel document holder.
Integrated Circuit (IC)	Electronic component(s) designed to perform processing and/or memory functions. The travel document's chip is an integrated circuit.
Integrity	Ability to confirm the travel document and its data elements on the travel document's chip have not been altered from that created by the issuing State or Organisation
Issuing Organisation	Organisation authorized to issue an official travel document (e.g. the United Nations Organization, issuer of the Laissez-passer). [ICAO_9303]
Issuing State	The Country issuing the travel document. [ICAO_9303]
Logical Data Structure (LDS)	The collection of groupings of Data Elements stored in the optional capacity expansion technology [ICAO_9303]. The capacity expansion technology used is the travel document's chip.
Logical travel document	<p>Data of the travel document holder stored according to the Logical Data Structure [ICAO_9303] as specified by ICAO on the contact based/contactless integrated circuit. It presents contact based/contactless readable data including (but not limited to)</p> <ol style="list-style-type: none"> 1.personal data of the travel document 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
Machine Readable Travel Document (MRTD)	Official document issued by a State or Organisation 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. [ICAO_9303]
Machine Readable Zone (MRZ)	<p>Fixed dimensional area located on the front of the travel document or MRP Data Page or, in the case of the TD1, the back of the travel document, containing mandatory and optional data for machine reading using OCR methods. [ICAO_9303]</p> <p>The MRZ-Password is a restricted-revealable secret that is derived from the machine readable zone and may be used for PACE.</p>
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. [ICAO_9303]
Manufacturer	Generic term for the IC Manufacturer producing integrated circuit and the travel document Manufacturer completing the IC to the travel document. The Manufacturer is the default user of the TOE during the manufacturing life phase. The TOE itself does not distinguish between the IC Manufacturer and travel document Manufacturer using this role Manufacturer.





Term	Definition
Metadata of a CV Certificate	<p>Data within the certificate body (excepting Public Key) as described in [TR_03110].</p> <p>The metadata of a CV certificate comprise the following elements:</p> <ul style="list-style-type: none"> - Certificate Profile Identifier, - Certificate Authority Reference, - Certificate Holder Reference, - Certificate Holder Authorisation Template, - Certificate Effective Date, - Certificate Expiration Date.
ePassport application	<p>Non-executable data defining the functionality of the operating system on the IC as the travel document's chip. It includes</p> <ul style="list-style-type: none"> •the file structure implementing the LDS [ICAO_9303], •the definition of the User Data, but does not include the User Data itself (i.e. content of EF.DG1 to EF.DG13, EF.DG16, EF.COM and EF.SOD) and •the TSF Data including the definition the authentication data but except the authentication data itself.
Optional biometric reference data	<p>Data stored for biometric authentication of the travel document holder in the travel document'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 fingerprint and not to use iris images as optional biometric reference data.</p>
Passive authentication	<p>(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.</p>
PACE Password	<p>A password needed for PACE authentication, e.g. CAN or MRZ.</p>
Personalization	<p>The process by which the Personalisation Data are stored in and unambiguously, inseparably associated with the travel document. This may also include the optional biometric data collected during the "Enrolment" (cf. sec. 1.2, TOE life-cycle, Phase 3, Step 6).</p>
Personalization Agent	<p>An organisation acting on behalf of the travel document Issuer to personalise the travel document for the travel document holder by some or all of the following activities:</p> <ul style="list-style-type: none"> (i) establishing the identity of the travel document holder for the biographic data in the travel document, (ii) enrolling the biometric reference data of the travel document holder, (iii) writing a subset of these data on the physical travel document (optical personalisation) and storing them in the travel document (electronic personalisation) for the travel document holder as defined in [TR_03110], (iv) writing the document details data, (v) writing the initial TSF data, (vi) signing the Document Security Object defined in [ICAO_9303] (in the role of DS). <p>Please note that the role 'Personalisation Agent' may be distributed among several institutions according to the operational policy of the travel document Issuer. Generating signature key pair(s) is not in the scope of the tasks of this role.</p>





Term	Definition
Personalisation Data	<p>A set of data incl.</p> <p>(i) individual-related data (biographic and biometric data) of the travel document holder,</p> <p>(ii) dedicated document details data and</p> <p>(iii) dedicated initial TSF data (incl. the Document Security Object).</p> <p>Personalisation data are gathered and then written into the non-volatile memory of the TOE by the Personalisation Agent in the life-cycle phase card issuing.</p>
Personalization Agent Authentication Information	TSF data used for authentication proof and verification of the Personalisation Agent.
Personalization Agent Key	Cryptographic authentication key used (i) by the Personalisation Agent to prove his identity and to get access to the logical travel document and (ii) by the travel document's chip to verify the authentication attempt of a terminal as Personalisation Agent according to the SFR FIA_UAU.4/PACE, FIA_UAU.5/PACE and FIA_UAU.6/EAC.
Physical travel document	<p>Travel document in form of paper, plastic and chip using secure printing to present data including (but not limited to)</p> <ol style="list-style-type: none"> 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 (see below) to the TOE including the creation of the travel document Application (cf. sec. 1.2, TOE life-cycle, Phase 2, Step 5)
Pre-personalization Data	Any data that is injected into the non-volatile memory of the TOE by the travel document Manufacturer (Phase 2) for traceability of non-personalised travel document's and/or to secure shipment within or between life cycle phases 2 and 3. It contains (but is not limited to) the Personalisation Agent Key Pair.
Pre-personalized travel document's chip	travel document's chip equipped with a unique identifier.
Receiving State	The Country to which the traveller is applying for entry. [ICAO_9303]
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.
RF-terminal	A device being able to establish communication with an RF-chip according to ISO/IEC 14443.
secondary image	A repeat image of the holder's portrait reproduced elsewhere in the document by whatever means. [ICAO_9303]
Secure messaging in encrypted/combined mode	Secure messaging using encryption and message authentication code according to ISO/IEC 7816-4
Service Provider	An official organisation (inspection authority) providing inspection service which can be used by the travel document holder. Service Provider uses terminals (BIS-PACE) managed by a DV.
Skimming	Imitation of the inspection system to read the logical travel document or parts of it via the contactless communication channel of the TOE without knowledge of the printed MRZ data.
Standard Procedure Inspection	A specific order of authentication steps between an travel document and a terminal as required by [ICAO_TR_SAC], namely (i) PACE or BAC and (ii) Passive Authentication with SOD. SIP can generally be used by BIS-PACE and BIS-BAC.





Term	Definition
Terminal	<p>A terminal is any technical system communicating with the TOE either through the contact based or contactless interface. A technical system verifying correspondence between the password stored in the travel document and the related value presented to the terminal by the travel document presenter.</p> <p>In this PP the role 'Terminal' corresponds to any terminal being authenticated by the TOE.</p> <p>Terminal may implement the terminal's part of the PACE protocol and thus authenticate itself to the travel document using a shared password (CAN or MRZ).</p>
Terminal Authorization	Intersection of the Certificate Holder Authorizations defined by the Inspection System Certificate, the Document Verifier Certificate and Country Verifying Certification Authority which shall be all valid for the Current Date.
Terminal Authorisation Level	Intersection of the Certificate Holder Authorisations defined by the Terminal Certificate, the Document Verifier Certificate and Country Verifying Certification Authority which shall be all valid for the Current Date.
TOE tracing data	Technical information about the current and previous locations of the travel document gathered by inconspicuous (for the travel document holder) recognising the travel document.
Travel document	Official document issued by a state or organisation 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; see [ICAO_9303] (there "Machine readable travel document").
Travel Document Holder	The rightful holder of the travel document for whom the issuing State or Organisation personalised the travel document.
Travel document's Chip	A contact based/contactless integrated circuit chip complying with ISO/IEC 14443 and programmed according to the Logical Data Structure as specified by ICAO, [ICAO_9303], sec III.
Travel document's Chip Embedded Software	Software embedded in a travel document's chip and not being developed by the IC Designer. The travel document's chip Embedded Software is designed in Phase 1 and embedded into the travel document's chip in Phase 2 of the TOE life-cycle.
Traveler	Person presenting the travel document to the inspection system and claiming the identity of the travel document holder.
TSF data	Data created by and for the TOE that might affect the operation of the TOE (CC part 1 [CC_1]).
Unpersonalised travel document	The travel document that contains the travel document chip holding only Initialization Data and Pre-personalisation Data as delivered to the Personalisation Agent from the Manufacturer.
User data	<p>All data (being not authentication data)</p> <p>(i) stored in the context of the ePassport application of the travel document as defined in [TR_03110] and</p> <p>(ii) being allowed to be read out solely by an authenticated terminal acting as Basic Inspection System with PACE .</p> <p>CC give the following generic definitions for user data: Data created by and for the user that does not affect the operation of the TSF ([CC_1]). Information stored in TOE resources that can be operated upon by users in accordance with the SFRs and upon which the TSF places no special meaning ([CC_2]).</p>
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. [ICAO_9303]
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.





9.2 Acronyms

Acronym	Term
<i>BIS</i>	Basic Inspection System
<i>BIS-PACE</i>	Basic Inspection System with PACE
<i>CA</i>	Chip Authentication
<i>CAN</i>	Card Access Number
<i>CC</i>	Common Criteria
<i>EAC</i>	Extended Access Control
<i>CPS</i>	Common Personalization System
<i>EF</i>	Elementary File
<i>ICCSN</i>	Integrated Circuit Card Serial Number.
<i>MF</i>	Master File
<i>MRZ</i>	Machine readable zone
<i>n.a.</i>	Not applicable
<i>OSP</i>	Organisational security policy
<i>PACE</i>	Password Authenticated Connection Establishment
<i>PCD</i>	Proximity Coupling Device
<i>PICC</i>	Proximity Integrated Circuit Chip
<i>PP</i>	Protection Profile
<i>PT</i>	Personalisation Terminal
<i>RF</i>	Radio Frequency
<i>SAR</i>	Security assurance requirements
<i>SFR</i>	Security functional requirement
<i>SIP</i>	Standard Inspection Procedure
<i>TA</i>	Terminal Authentication
<i>TOE</i>	Target of Evaluation
<i>TSF</i>	TOE Security Functions
<i>TSP</i>	TOE Security Policy (defined by the current document)





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