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SOMA-ck022 Travel Document

SECURITY TARGET LITE

Reference	TS-IT_25027
Classification	PUBLIC
Document Version	1.1 - June 12, 2025

Common Criteria version 3.1 revision 5

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Abbreviations and notations

Numerical values

Numbers are printed in decimal, hexadecimal or binary notation.
Hexadecimal values are indicated with a ‘h’ suffix as in XXh, where X is a hexadecimal digit from 0 to F.
Decimal values have no suffix.

Example: the decimal value 179 may be noted as the hexadecimal value B3h.

Denoted text

The text added to provide details on how the TOE implementation fulfils some security requirements is written in *italics* and is preceded by the numbered tag “Application Note”.

Key words

The words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY” and “OPTIONAL” are to be interpreted as described in RFC2119 [R21].

Definitions

As the TOE only supports LDS1 application, the terms “ICAO application” and “LDS1 eMRTD Application” are to be considered as equivalent.

As the TOE supports PPs BSI-CC-PP-0055 [R3], BSI-CC-PP-0056-V2-2012 [R4] and BSI-CC-PP-0068-V2-2011-MA-01 [R5], the terms “MRTD”, “Passport book” and “Travel Document” are to be considered as equivalent.

1 Introduction

1.1 Overview

This document is the sanitized version of the document Security Target for SOMA-ck022 Travel Document [R13].

This Security Target (ST) document defines the security objectives and requirements, as well as the scope of the Common Criteria evaluation of SOMA-ck022 Travel Document.

The Target Of Evaluation (TOE) is the integrated circuit chip Infineon IFX_CCI_000039h with IC Dedicated Software and Crypto Library, the operating system SOMA-ck022 and ICAO application compliant with ICAO Doc 9303 8th ed. 2021 – LDS1 [R18] [R19] [R20].

The TOE adds security features to a document booklet or card, providing machine-assisted identity confirmation and machine-assisted verification of document security.

This ST addresses the following advanced security mechanisms featured by the ICAO application:

- Basic Access Control (BAC) security mechanism, featured by the ICAO application according to ICAO Doc 9303 8th ed. Part 11 [R19].
- Password Authenticated Connection Establishment (PACE) according to ICAO Doc 9303 8th ed. Part 11 [R19],
- Extended Access Control (EAC) v1, which includes Chip Authentication according to ICAO Doc 9303 8th ed. Part 11 [R19], and Terminal Authentication according to BSI TR-03110 [R6] [R7], and
- Active Authentication according to ICAO Doc 9303 8th ed. 2021 Part 11 [R19].

1.2 ST reference

Table 1-1 ST reference

Title	Security Target Lite for SOMA-ck022 Travel Document
Version	1.1
Authors	Giovanni LICCARDO; Roberta SODANO
Date	June 12, 2025
Reference	TS-IT_25027

Compliant to	BSI-CC-PP-0055 [R3] BSI-CC-PP-0056-V2-2012 [R4] BSI-CC-PP-0068-V2-2011-MA-01 [R5]
CC version	3.1 revision 5
Assurance Level	EAL4 augmented by ALC_DVS.2 for BAC EAL5 augmented by ALC_DVS.2 and AVA_VAN.5 for EAC/PACE

1.3 TOE reference

Table 1-2 TOE reference

TOE name	SOMA-ck022 Travel Document
TOE version	1.0
TOE developer	TOPPAN Security S.r.l.
TOE identifier	SOMA-ck022_1.0
TOE identification data	53h 4Fh 4Dh 41h 2Dh 63h 6Bh 30h 32h 32h 5Fh 31h 2Eh 30h
IC Security Target	IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh T11 Security Target Lite, Revision: v6.5, 20 August 2024 [R23]
IC Developer	Infineon
IC Manufacturer	Infineon
IC certification report	BSI-DSZ-CC-1107-V5-2024 [R1]

The TOE is delivered in the form of a chip on reel. It is identified by the following string, which constitutes the TOE identifier:

SOMA-ck022_1.0
(ASCII codes 53h 4Fh 4Dh 41h 2Dh 63h 6Bh 30h 32h 32h 5Fh 31h 2Eh 30h)

where:

- “SOMA-ck022” is the TOE name,
- “1” is the TOE major version number and
- “0” is the TOE minor version number

The ASCII encoding of the TOE identifier constitutes the TOE identification data, located in the persistent memory of the chip. Instructions for reading these data are provided by the guidance documentation [R14] [R15] [R16] [R17].

1.4 TOE overview

1.4.1 TOE definition

The Target Of Evaluation (TOE) is an electronic document representing a contactless smart card implementing ICAO Doc 9303 8th ed. 2021 – LDS1 [R18] [R19] [R20] and BSI TR-03110 [R6] [R7].

The SOMA-ck022 Travel Document is composed by:

- the circuitry of Infineon IFX_CCI_000039h chip with its firmware and user guidance (see Appendix A),
- the IC Dedicated Software and Crypto Library,
- the smart card operating system SOMA-ck022,
- the LDS1 eMRTD Application compliant with ICAO Doc 9303 [R18] [R19] [R20],
- the associated guidance documentation [R14] [R15] [R16] [R17].

The authentication methods supported by the TOE are:

- Basic Access Control (BAC), according to ICAO Doc 9303 8th edition Part 11 [R19]
- Password Authenticated Connection Establishment (PACE), according to ICAO Doc 9303 8th edition Part 11 [R19]
- Extended Access Control (EAC) v1, which includes Chip Authentication according to ICAO Doc 9303 8th ed. Part 11 [R19], and Terminal Authentication according to BSI TR-03110 [R6] [R7]
- Active Authentication, according to ICAO Doc 9303 8th ed. 2021 Part 11 [R19].

The TOE is configurable in BAC, EAC with BAC, PACE, BAC and PACE, EAC with BAC or PACE, EAC with PACE, with or without conditionally Active Authentication, as specified in the following table:

Table 1-3 TOE configuration for authentication method

	BAC	PACE	EAC	(AA)
cfg_1	X			(X)
cfg_2	X		X	(X)
cfg_3		X		(X)
cfg_4	X	X		(X)
cfg_5	X	X	X	(X)
cfg_6		X	X	(X)

The assurance level for the TOE is EAL4 augmented with ALC_DVS.2 in case BAC is chosen as authentication method.
The assurance level for the TOE is EAL5 augmented with ALC_DVS.2 and AVA_VAN.5 in case EAC/PACE is chosen as authentication method.

The TOE supports wireless communication through an antenna connected to the IC. Both the TOE and the antenna are embedded in a paper or plastic substrate that provides mechanical support and protection.
Once personalized with the data of the legitimate holder and with security data, the Travel Document can be inspected by authorized agents.

The TOE is meant for “global interoperability”. According to ICAO the term is understood as “*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*”.
The TOE is supplied with a file system that contains all the data used in the context of the ICAO application, as described in the Protection Profiles [R3] [R4] [R5].

1.4.2 TOE usage and security features for operational use

A State or Organization issues Travel Documents to be used by the holder. The traveller presents a Travel Document to the inspection system to prove his or her identity.

For the ICAO application, the document holder can control access to his user data by consciously presenting his document to organizations deputed to perform inspection[1].

[1] User authentication with PACE password, such as CAN or MRZ or shared secret, see [R19].

In the case of a secret PACE password, the document holder can exert further control over access to his data as in addition to his document, he must separately reveal the password in order to authorize inspection.
The document's chip is integrated into a physical (plastic or paper) substrate. The substrate is not part of the TOE. The tying-up of the document's chip to the plastic/paper document is achieved in accordance with physical and organizational security measures being within the scope of the current security target.

The Travel Document 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),
iii. data elements on the Travel Document's chip according to LDS1 for contactless machine reading.

The authentication of the traveller is based on:

- the possession of a valid Travel Document personalized with the claimed identity as given on the biographical data page, and
- optional biometrics using the reference data stored in the Travel Document.

The Issuing State or Organization ensures the authenticity of the data of genuine Travel Document. The receiving state trusts a genuine Travel Document of an Issuing State or Organization.

For this security target, the Travel Document is viewed as the unit of:

- the **physical part of the Travel Document** in form of paper and/or plastic and chip. It presents visual readable data including (but not limited to) personal data of the Travel Document holder:
  i. the biographical data on the biographical data page of the data surface,
  ii. the printed data in the Machine Readable Zone (MRZ),
  iii. the printed portrait;
- the **logical Travel Document** as data of the Travel Document holder stored according to:
  - the Logical Data Structure [R18] as specified by ICAO on the integrated circuit. It presents machine readable data including (but not limited to) personal data of the Travel Document holder:
    i. the digital Machine Readable Zone Data (digital MRZ data, EF.DG1),
    ii. the digitized portraits (EF.DG2),

iii. the biometric reference data of finger(s) (EF.DG3) or iris image(s) (EF.DG4) or both[2],

iv. the other data according to LDS1 (EF.DG5 to EF.DG16),

v. the Document Security Object (SO_D),

vi. security data objects required for product management

The Issuing State or Organization implements security features of the Travel Document to maintain the authenticity and integrity of the Travel Document and its data. The physical part of the Travel Document as the Travel Document's chip are uniquely identified by the Document Number.

The physical part of the Travel Document is protected by physical security measures (e.g. watermark, security printing), logical (e.g. authentication keys of the Travel Document's chip) and organizational security measures (e.g. control of materials, personalization procedure). These security measures can include the binding of the Travel Document's chip to the Travel Document.

The logical Travel Document delivered by the IC Manufacturer to the Initialization Agent is protected by a mechanism requiring the decryption of a cryptogram by means of AES-256 cryptography, until completion of the initialization process. After completion, the decryption of the cryptogram is no longer possible.

The logical Travel Document delivered by the Initialization Agent to the Pre-personalization Agent is protected by SCP03 mechanism based, until completion of the pre-personalization process.

The logical Travel Document delivered by the Pre-personalization Agent to the Personalization Agent is protected by SCP03 mechanism based, until completion of the personalization process.

The logical Travel Document 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 Travel Document's chip.

The ICAO defines the baseline required security methods Passive Authentication and the following optional advanced security methods:

- Basic Access Control to the logical Travel Document,

[2] These biometric reference data are optional according to [R18]. This ST assumes that the issuing State or Organization uses this option and protects these data by means of extended access control.

- Active Authentication of the Travel Document's chip,
- Extended Access Control to and the Data Encryption of sensitive biometrics as an optional security measure in the ICAO Doc 9303-11 [R19], and
- Password Authenticated Connection Establishment [R19].

The Passive Authentication mechanism is performed completely and independently of the TOE by the TOE environment.

This 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 and Basic Access Control Mechanism.

The Basic Access Control is a security feature which is supported by the TOE. The inspection system:

i. reads optically the MRTD,
ii. authenticates itself as inspection system by means of Document Basic Access Keys.

After successful authentication of the inspection system, the MRTD's chip provides read access to the logical MRTD by means of private communication (secure messaging) with this inspection system [R19], section 9.8.

The confidentiality by Password Authenticated Access Control (PACE) is a 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 (PACE PP)" [R5]. Note that [R5] considers high attack potential.
The TOE supports PACE with Generic Mapping (PACE-GM), with Integrated Mapping (PACE-IM), and with Chip Authentication Mapping (PACE-CAM).

For the PACE protocol according to [R19], the following steps shall be performed:

i. The Travel Document's chip encrypts a nonce with the shared password, derived from the PACE password (MRZ, CAN or secret password) and transmits the encrypted nonce together with the domain parameters to the terminal.
ii. The terminal recovers the nonce using the shared password. If this password is derived from MRZ or CAN, MRZ data or CAN data are physically read.
iii. The Travel Document's chip and terminal computer perform a Diffie-Hellman key agreement together with the ephemeral domain parameters to create a shared secret. Both parties derive the session keys K_{MAC} and K_{ENC} from the shared secret.

iv. Each party generates an authentication token, sends it to the other party and verifies the received token.

Additionally, for PACE-CAM only, the following steps shall be performed:

v. the Travel Document computes Chip Authentication Data, encrypts them, and sends them to the terminal;

vi. the terminal recovers Chip Authentication Data and verifies the authenticity of the chip.

After successful key negotiation, the terminal and the Travel Document's chip provide private communication (secure messaging) [R5] [R19].

This security target requires the TOE to implement the Extended Access Control as defined in [R6] [R7], and additionally the Active Authentication as defined in [R19].
The Extended Access Control consists of two parts: (i) the Chip Authentication and (ii) the Terminal Authentication Protocol version 1 (v.1).
The Chip Authentication may be performed as part of the PACE protocol (see steps v and vi above), or as a distinct protocol (Chip Authentication Protocol version 1). Both modes are detailed in section 4.4 of ICAO Doc 9303 Part 11 [R19].
The Chip Authentication (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 either PACE-CAM or Chip Authentication Protocol v.1 have 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 Organization through the issuing State, and (ii) an access control by the TOE to allow reading the sensitive biometric reference data only to successfully authenticated inspection systems. The issuing State or Organization authorizes the receiving State by means of certification the authentication public keys of Document Verifiers who create Inspection System Certificates.
The Active Authentication authenticates the Travel Document to the inspection system.

1.4.3 Non-TOE hardware/software/firmware required by the TOE

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 that the substrate holding the chip as well as the antenna (if any) and the card are needed to represent a complete Travel Document, nevertheless these parts are not essential for the secure operation of the TOE.

1.5 TOE life cycle

The TOE life cycle is comprised of four life cycle phases, i.e. *development*, *manufacturing*, *personalization*, and *operational use*. These phases can be split into seven steps as follows:

1. Phase 1: Development comprises:

   Step 1: the development of the integrated circuit and IC dedicated software by the IC Manufacturer, and

   Step 2: the development of the operating system software by the Embedded Software Developer;

2. Phase 2: Manufacturing comprises:

   Step 3: the fabrication of the integrated circuit by the IC Manufacturer,

   Step 4: the embedding of the chip in a substrate with an antenna.

   Step 5: the initialization of the Travel Document, and

   Step 6: the pre-personalization of the Travel Document;

3. Phase 3: Personalization comprises:

   Step 7: the personalization of the Travel Document for the holder;

4. Phase 4: Operational use comprises:

   Step 8: the inspection of the Travel Document.

Application Note 1 *The entire development phase, as well as step 3, “Manufacture of the IC”, of the manufacturing phase are the only phases covered by assurance under ALC, as during these phases the TOE is under construction in a protected environment.*

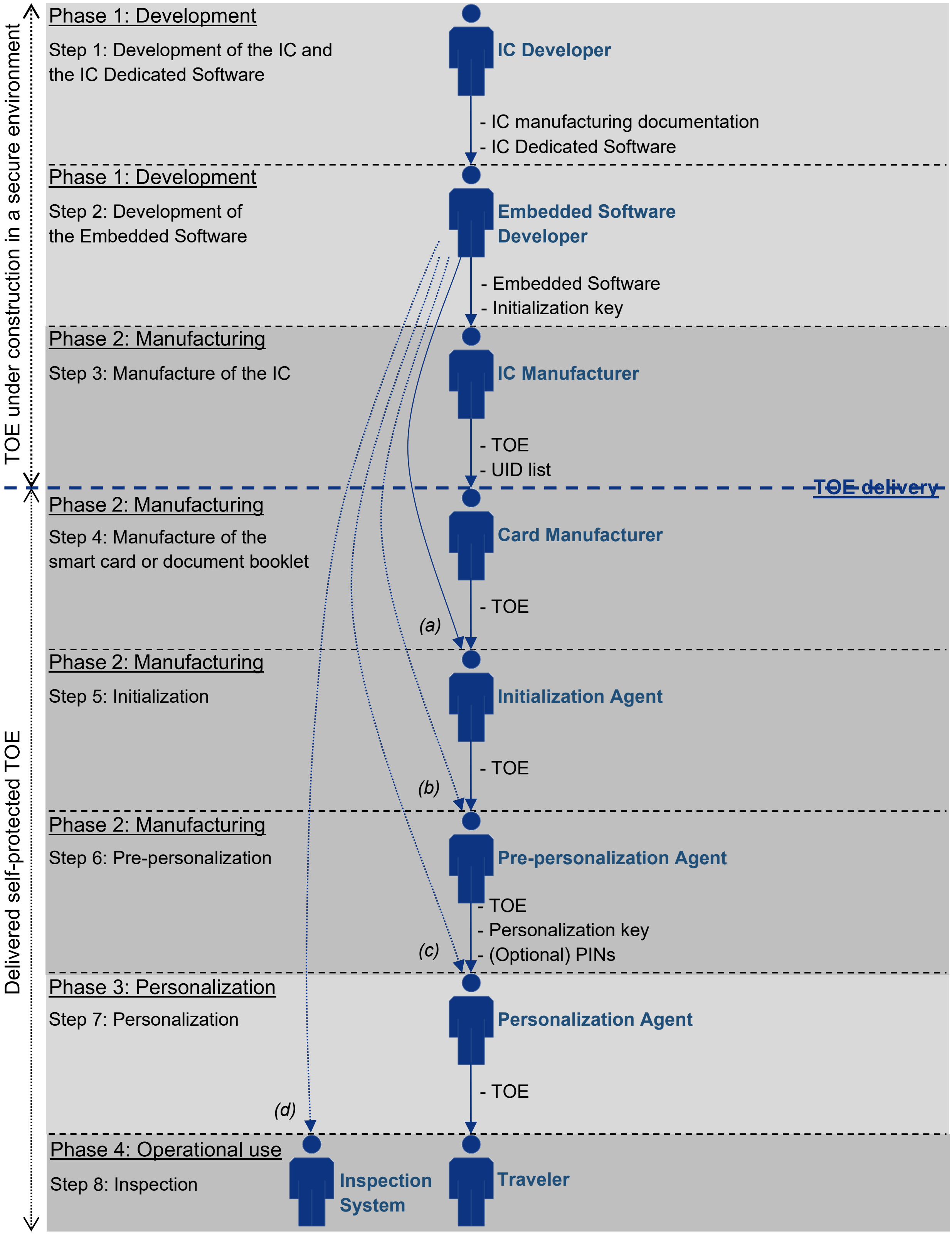
Figure 1-1 represents the life cycle of the TOE. Particularly, it identifies the actors involved in each step of the life cycle. Direct deliveries of items between actors are represented with continuous lines, while deliveries in which intermediate actors may be in charge of receiving the exchanged items and forwarding them to the subsequent actors are represented with dashed lines.
Deliveries of items occurring between non-consecutive actors are just marked with letters in order to preserve the clarity of the diagram. A legend for these deliveries, which identifies the exchanged items for each of them, is provided in Table 1-4.

Table 1-4 Legend for deliveries occurring between non-consecutive actors

Delivery	Delivered items
(a)	• Initialization cryptograms • Initialization guidance
(b)	• Pre-personalization key • Pre-personalization guidance • PINs[3]
(c)	• Personalization guidance
(d)	• Operational user guidance

[3] Only if it is requested by the Issuing State or Organization. The word “PINs” refers to PIN #1 and PIN #2. If created, PIN #1 is always present, while PIN #2 can be omitted.

Figure 1-1 Life cycle of the TOE



Detailed information about the operations available in each life cycle phase of the TOE is provided in the guidance documentation.
Table 1-5 describes the roles taking part in each phase of the life cycle of the TOE ICAO application. Some roles, printed in italics, collectively identify multiple agents.

Table 1-5 Roles involved in the life cycle of the TOE ICAO application

Phase	Role	Description
1	IC Developer	Infineon
1	Embedded Software Developer	TOPPAN Security S.r.l.
2	IC Manufacturer	Infineon
2	Card Manufacturer	The agent who is acting on behalf of the issuing state or organization to assemble the booklet or plastic card by embedding the TOE and antenna into the substrate.
2	Initialization Agent	The agent who is acting on behalf of the issuing state or organization to initialize the OS and load the pre-personalization key.
2	Pre-personalization Agent	The agent who is acting on behalf of the issuing state or organization to pre-personalize the Travel Document.
2	*Manufacturer*	Role that collectively identifies all the agents acting in phase 2, namely: • the IC Manufacturer, • the Card Manufacturer, • the Initialization Agent, • The Pre-Personalization Agent.
3	Personalization Agent	The agent who is acting on behalf of the issuing state or organization to personalize the Travel Document for the holder.
4	Travel Document Holder	The rightful owner of the Travel Document.

4	Inspection System	A technical system used by the control officer of the receiving state or organization (i) to examine a Travel Document presented by the holder and verify its authenticity and (ii) to verify the holder as Traveller.

Table 1-6 identifies, for each guidance document, the actors who are the intended recipients of that item.

Table 1-6 Identification of recipient actors for the guidance documentation of the TOE

Guidance document	Recipient actors
Initialization guidance	Card Manufacturer
	Initialization Agent
Pre-personalization guidance	Pre-personalization Agent
Personalization guidance	Personalization Agent
Operational user guidance	Inspection System

The phases and steps of the TOE life cycle are described in what follows. The names of the involved actors are emphasized using boldface.

1.5.1 Phase 1: Development

Step 1: Development of the IC and the IC Dedicated Software

The **IC Developer** develops the integrated circuit, the IC Dedicated Software, and the guidance documentation associated with these TOE components.

Finally, the following items are securely delivered to the **Embedded Software Developer** and the **IC Manufacturer**:

- the IC manufacturing documentation,
- the IC Dedicated Software.

Step 2: Development of the Embedded Software

The **Embedded Software Developer** uses the guidance documentation for the integrated circuit and for relevant parts of the IC Dedicated Software and develops the Embedded Software, as well as the guidance documentation.

Furthermore, the **Embedded Software Developer** generates the initialization key and the pre-personalization key and, if requested by the Issuing State or Organization, the PINs and makes use of the initialization key to encrypt the pre-personalization key and the PINs.

Finally:

- the Embedded Software and the initialization key are securely delivered to the **IC Manufacturer**;
- the cryptograms enciphered using the initialization key are securely delivered to the **Initialization Agent**
- the pre-personalization key and, optionally, the PINs are securely delivered to either the **Initialization Agent** or the **Pre-personalization Agent**.

As regards TOE guidance documentation, either all documents are securely delivered to the **Initialization Agent**, or each document is securely delivered to the recipient actors as identified in Table 1-6.

1.5.2 Phase 2: Manufacturing

Step 3: Manufacture of the IC

The **IC Manufacturer** produces the TOE integrated circuit, containing the IC Dedicated Software and the Embedded Software, and creates in the IC persistent memory the high-level objects relevant for the ICAO application.
Particularly, the initialization key is stored into the IC persistent memory.
Moreover, the **IC Manufacturer** generates the UID list, i.e. an archive of all chip serial number.

Finally, the TOE along with the UID list are securely delivered to the **Card Manufacturer**.

Application Note 2 *The point of delivery of the TOE coincides with the completion of step 3, i.e. with the delivery of the TOE, in the form of an IC not yet embedded, from the IC Manufacturer to the Card Manufacturer. That is to say, this is the event upon which the construction of the TOE in a secure environment ends, and the TOE begins to be self-protected.*

Step 4: Manufacture of the smart card or document booklet

The **Card Manufacturer** equips the IC with contactless interfaces and embeds the IC into a smart card or a document booklet.

Finally, the TOE is securely delivered to the **Initialization Agent**.

Step 5: Initialization

The **Initialization Agent** sends the encrypted product information and configuration data as well as the encrypted pre-personalization key, to the TOE, which deciphers the cryptograms using the initialization key, verifies the correctness of the resulting plaintexts, and stores the data into persistent memory.

Finally, the TOE is securely delivered to the **Pre-personalization Agent**, along with the pre-personalization key and, optionally, the PINs, if it was delivered to the **Initialization Agent** rather than directly to the **Pre-personalization Agent**.

As regards TOE guidance documentation, if the **Initialization Agent** also received the documents intended for the subsequent actors, then either all of these documents are securely delivered to the **Pre-personalization Agent**, or each document is securely delivered to the recipient actors as identified in Table 1-6.

Step 6: Pre-personalization

The **Pre-personalization Agent** generates the personalization key, then creates/modifies in the IC persistent memory the high-level objects relevant for the ICAO application.

Once the pre-personalization is finished, the TOE, the personalization key and, optionally, the PINs are securely delivered to the **Personalization Agent**.

As regards TOE guidance documentation, if the **Pre-personalization Agent** also received the documents intended for the subsequent actors, then either all of these documents are securely delivered to the **Personalization Agent**, or each document is securely delivered to the recipient actors as identified in Table 1-6.

1.5.3 Phase 3: Personalization

Step 7: Personalization

The personalization of the Travel Document, performed by the **Personalization Agent**, includes:

(i) the survey of the traveller biographical data,

(ii) the enrolment of the traveller biometric reference data (i.e. the digitized portraits and the optional biometric reference data),

(iii) the personalization of the visual readable data onto the physical part of the Travel Document,

(iv) the writing of the TOE user data and TSF data into the logical Travel Document, and

(v) configuration of the TSF if necessary.

Step (iv) includes, but is not limited to, the creation of:

(i) the digital MRZ data (EF.DG1),

(ii) the digitized portrait (EF.DG2), and

(iii) the Document Security Object.

The signing of the Document Security Object by the Document Signer [R18] [R20] finalizes the personalization of the genuine Travel Document for the document holder.

The personalized Travel Document (together with appropriate guidance for TOE use if necessary) is handed over to the **traveller** for operational use.

1.5.4 Phase 4: Operational use

Step 7: Inspection

The TOE is used as Travel Document's chip by the traveller and the inspection systems in the operational use phase. The user data can be read and used according to the security policy of the issuing state or organization, but can never be modified.

Application Note 3 *This ST considers phase 1 and parts of phase 2 (i.e. step 1 to step 3) as part of the evaluation, and therefore defines the TOE delivery according to CC after step 3. Since specific production steps of phase 2 are of minor security relevance (e.g. card manufacturing and antenna integration), these are not part of the CC evaluation under ALC. Note that the personalization process and its environment may depend on specific security needs of an issuing state or organization. All production, generation, and installation procedures, after TOE delivery up to the operational use (phase 4), have to be considered in the product evaluation process under AGD assurance class. Therefore, this security target outlines the split up of P.Manufact, P.Personalization and the related security objectives into aspects relevant before vs. after TOE delivery.*

1.6 TOE description

1.6.1 Physical scope of the TOE

The TOE is comprised of the following parts:

- dual-interface integrated circuit chip Infineon IFX_CCI_000039h equipped with IC Dedicated Software and Crypto Library (cf. Appendix A for more details);
- smart card operating system SOMA-ck022;
- the LDS1 eMRTD Application compliant with ICAO Doc 9303 and BSI TR-03110
- guidance documentation about the initialization of the TOE, the preparation and use of the ICAO application, composed by:
    - the Initialization Guidance [R14],
    - the Pre-Personalization Guidance [R15],
    - the Personalization Guidance [R16],
    - the Operational User Guidance [R17].

Table 1-6 identifies, for each guidance document, the actors involved in TOE life cycle who are the intended recipients of that document.

The Table 1-7 describes the format and delivery method of each TOE components:

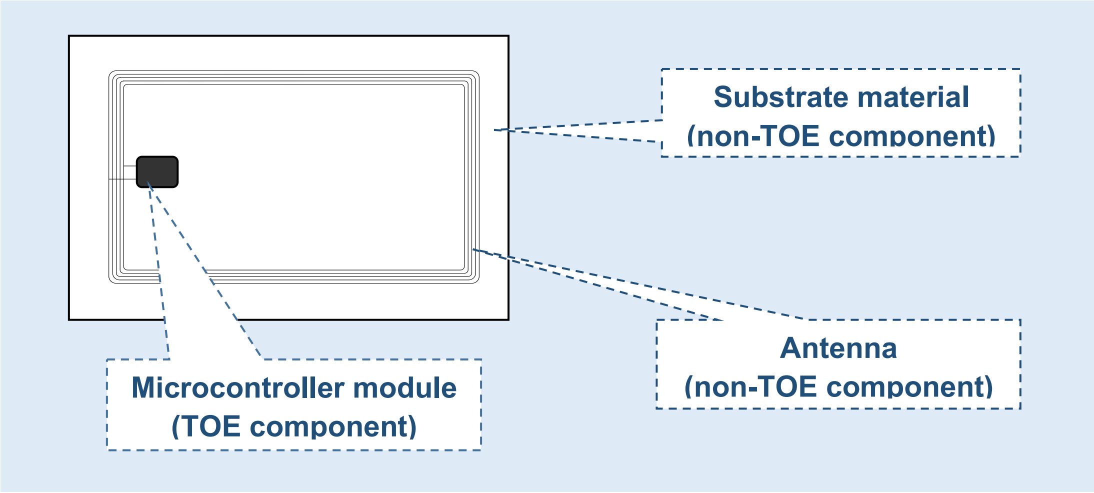
Table 1-7 TOE component delivery

Type	TOE component	Format	Delivery method
IC with Dedicated Software and Crypto Library	Infineon IFX_CCI_000039h	Module on chip	Secure courier
OS and ICAO Application	SOMA-ck022 Travel Document (TOE Identification data: `53h 4Fh 4Dh 41h 2Dh 63h 6Bh 30h 32h 32h 5Fh 31h 2Eh 30h`)	HEX file	Secure IC Manufacturer's Web portal
Document	Preparative and operational guidance	pdf/docx	Encrypted email message

1.6.2 Other non-TOE physical components

The antenna and the substrate are not part of the TOE.
Figure 1-2 shows the physical components, distinguishing between TOE components and non-TOE components.

Figure 1-2 Smart card physical components



1.6.3 Logical scope of the TOE

The SOMA-ck022 operating system manages all the resources of the integrated circuit that equips the Travel Document, providing secure access to data and functions.
In more detail, in each life cycle phase/step, access to data and functions is restricted by means of cryptographic mechanisms as follows:

- In step 5, Initialization, of phase 2, the Initialization Agent must prove his/her identity by means of an authentication mechanism based on AES with 256-bit keys.
- In step 6, Pre-personalization, of phase 2, the Pre-personalization Agent must prove his/her identity by means of an authentication mechanism based on SCP03 with AES with 128, 192, 256 bit keys.
- In phase 3, Personalization, the Personalization Agent must prove his/her identity by means of an authentication mechanism based on SCP03 with AES with 128, 192, 256 bit keys.
- In phase 4, Operational use, the user must prove his entitlement to access less sensitive data, i.e. DG1, DG2, and DG5 to DG16, by means of the the BAC or PACE mechanism compliant to ICAO Doc 9303-11 [R19]. Access to sensitive data, i.e. DG3 and DG4, is allowed after the genuineness of the IC has been proven by means of the Chip Authentication mechanism defined in [R19], and after the user has proven

his/her entitlement by means of the Terminal Authentication mechanism as defined in [R6].

After a successful authentication, the communication between the Travel Document and the terminal is protected by the Secure Messaging mechanism defined in section 6 of the ISO 7816-4 specification [R25].

The integrity of the data stored under the LDS can be checked by means of the Passive Authentication mechanism defined in [R19]. The Active Authentication mechanism defined in [R19] may be used as an alternative technique to ascertain the genuineness of the chip. However, access to sensitive data requires the use of the Chip Authentication mechanism. Passive Authentication, BAC, PACE, Active Authentication, Chip Authentication, and EAC mechanisms are described in more detail in the following subsections.

1.6.3.1 Passive Authentication

Passive Authentication consists of the following steps (cf. [R19]):

1. The inspection system reads the Document Security Object (SO_D), which contains the Document Signer Certificate (C_{DS}, cf. [R18]), from the IC.
2. The inspection system builds and validates a certification path from a Trust Anchor to the Document Signer Certificate used to sign the Document Security Object (SO_D) according to [R20].
3. The inspection system uses the verified Document Signer Public Key (KPu_{DS}) to verify the signature of the Document Security Object (SO_D).
4. The inspection system reads relevant data groups from the IC.
5. The inspection system ensures that the contents of the data groups are authentic and unchanged by hashing the contents and comparing the result with the corresponding hash value in the Document Security Object (SO_D).

1.6.3.2 Basic Access Control

Basic Access Control provides mutual authentication and session key establishment by means of a three-step challenge-response protocol according to [R28], Key Establishment Mechanism 6, using Triple DES [R32] as block cipher. A cryptographic checksum according to [R27], MAC Algorithm 3, is calculated over and appended to the ciphertexts. The modes of operation described in [R19] are used. Exchanged nonces must be 8 bytes long, exchanged keying material must be 16 bytes long.

1.6.3.3 Password Authenticated Connection Establishment

PACE is a password-authenticated Diffie-Hellman key agreement protocol that provides secure communication and password-based authentication of the Travel document's chip and the inspection system (i.e. the Travel document's chip and the inspection system share the same password).

PACE establishes secure messaging between a Travel document's chip and an inspection system based on possibly weak (short) passwords. The security context is established in the Master File. The protocol enables the Travel document's chip to verify that the inspection system is authorized to access stored data, and has the following features:

- Strong session keys are provided independently of the strength of the password.
- The entropy of the password used to authenticate the inspection system can be very low (e.g. 6 digits are sufficient in general).

PACE supports, as part of the protocol execution, different mappings of the generator of the cryptographic group contained in the selected domain parameters into an ephemeral one. The following mappings are supported by the TOE:

- *Generic Mapping*, based on a Diffie-Hellman key agreement;
- *Integrated Mapping*, based on a direct mapping of a nonce into an element of the cryptographic group;
- *Chip Authentication Mapping*, which extends the Generic Mapping and integrates Chip Authentication into the PACE protocol.

All the algorithm combinations (i.e. key agreement algorithms, mapping algorithms, block ciphers) and the standardized domain parameters specified in ICAO Doc 9303-11 [R19] are supported for PACE authentication.

1.6.3.4 Active Authentication

Active Authentication authenticates the IC by signing a challenge sent by the inspection system with a private key known only to the IC (cf. [R19]).

For this purpose, the IC contains its own Active Authentication key pair (KPr_{AA} and KPu_{AA}). A hash representation of Data Group 15 (public key info, KPu_{AA}) is stored in the Document Security Object (SO_D), and is therefore authenticated by the issuer's digital signature. The corresponding private key (KPr_{AA}) is stored in the IC secure memory.

By authenticating the Document Security Object (SO_D) and Data Group 15 by means of Passive Authentication (cf. section 1.6.3.1) in combination with Active Authentication, the inspection system verifies that the Document Security Object (SO_D) has been read from a genuine IC.

The ICAO application supports the following cryptographic specifications:

- RSA, compliant with [R26], Digital Signature Scheme 1, with hash algorithms SHA-224, SHA-256, SHA-384 and SHA-512[4] compliant with FIPS PUB 180-4 [R34] and keys at least of 2048 to a maximum of 4096[5] bits.
- ECDSA, plain signature format according to [R8]. Only prime curves with uncompressed points shall be used. A hash algorithm, whose output length is of the same length or shorter than the length of the ECDSA key in use, shall be used, with hash algorithm SHA-224, SHA-256, SHA-384 and SHA-512[4] compliant with FIPS PUB 180-4 [R34] and keys at least of 256 bits to a maximum of 521 bits[6].

1.6.3.5 Chip Authentication

Chip Authentication is an ephemeral-static Diffie-Hellman key agreement protocol that provides secure communication and unilateral authentication of the Travel Document chip (cf. [R19]).

The main differences with respect to Active Authentication are:

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

Details on Challenge Semantics are described in [R19].

The static Chip Authentication key pair(s) must be stored on the Travel Document chip. In more detail:

- The private key is stored securely in the Travel Document chip’s memory.
- The public key is stored in Data Group 14.

The protocol provides implicit authentication of both the Travel Document chip itself and the stored data by performing secure messaging with the new session keys.

[4] SHA-1 is supported but it is out of the scope of the evaluation.

[5] Key length less than 2048 are also supported but they are out of scope of the evaluation.

[6] The curves brainpoolP320r1, as well as those having field order shorter than 256 bits, are out of the scope of the evaluation.

The ICAO application supports Diffie-Hellman key agreement for Chip Authentication either on integer multiplicative groups (DH algorithm, cf. [R38]), with keys of 2048 bits[7], or on elliptic curve groups over prime fields (ECDH algorithm, cf. [R8]), with keys of 256, 384, 512 and 521 bits[8].

Chip Authentication may be performed either as a distinct protocol, or as part of the PACE protocol in case Chip Authentication Mapping is used. In the latter case, only ECDH may be used as key agreement algorithm.

1.6.3.6 Extended Access Control

According to [R19], Extended Access Control is a security mechanism by means of which the Travel Document chip authenticates the inspection systems authorized to read the optional biometric reference data and protects access to these data.

Following BSI TR-03110 [R6] [R7], the ICAO application enforces Extended Access Control through the support of Terminal Authentication v1, which is a challenge-response protocol that provides explicit unilateral authentication of the terminal.

This protocol enables the Travel Document's chip to verify that the terminal is entitled to access sensitive data. Terminal Authentication also authenticates the ephemeral public key chosen by the terminal to set up secure messaging through Chip Authentication (cf. section 1.6.3.5) or PACE with Chip Authentication Mapping (cf. section 1.6.3.3). In this way, the Travel Document chip binds the terminal's access rights to the secure messaging session established by the authenticated ephemeral public key of the terminal.

In more detail, the terminal sends to the Travel Document's chip a certificate chain that starts with a certificate verifiable with a trusted public key stored on the chip and ends with the terminal certificate. Then, the terminal signs a plaintext containing its ephemeral public key with the private key associated to its certificate and sends the resulting signature to the Travel Document's chip, which authenticates the terminal by verifying the certificates and the final signature. The read access rights to biometric data groups granted by the authentication are encoded in the certificates. Access to Data Group 3 alone, Data Group 4 alone, or both Data Group 3 and Data Group 4 may be granted.

The ICAO application supports Terminal Authentication with signature verification algorithms RSASSA-PSS (cf. [R37]) and ECDSA (cf. [R8]).

[7] Key length less than 2048 are also supported but they are out of scope of the evaluation.

[8] The curves brainpoolP320r1, as well as those having field order shorter than 256 bits, are out of the scope of the evaluation.

Hash algorithms SHA-256 and SHA-512 (cf. [R19]) and keys of 2048, 3072 or 4096 bits are supported in the RSA case, while hash algorithm SHA-224, SHA-256, SHA-384 and SHA-512 (cf. [R8]) and key 256, 384 or 512[9] bits are supported in the ECDSA case.

[9] The curves brainpoolP320r1, as well as those having field order shorter than 256 bits, are out of the scope of the evaluation.

2 Conformance claims

2.1 Common Criteria conformance claim

This security target claims conformance to:

- Common Criteria version 3.1 revision 5 [R9] [R10] [R11], as follows:
  - Part 2 (security functional requirements) extended,
  - Part 3 (security assurance requirements) conformant.

The software part of the TOE runs on the chip Infineon IFX_CCI_000039h. This integrated circuit is certified against Common Criteria at the assurance level EAL6+ (cf. Appendix A).

2.2 Package conformance claim

This security target claims conformance to:

- EAL4 assurance package augmented by ALC_DVS.2, as defined in CC part 3 [R11] when authentication method BAC is selected,
- EAL5 assurance package augmented by ALC_DVS.2 and AVA_VAN.5, as defined in CC part 3 [R11] when authentication method EAC/PACE is selected.

2.3 Protection Profile conformance claim

The PPs considered for the TOE are:

- BSI-CC-PP-0055, Common Criteria Protection Profile, Machine Readable Travel Document with „ICAO Application", Basic Access Control, version 1.10, March 2009. [R3],
- BSI-CC-PP-0056-V2-2012, Common Criteria Protection Profile, Machine Readable Travel Document with „ICAO Application", Extended Access Control with PACE (EAC PP), version 1.3.2, December 2012 [R4],
- BSI-CC-PP-0068-V2-2011-MA-01, Common Criteria Protection Profile, Machine Readable Travel Document using Standard Inspection Procedure with PACE (PACE PP), version 1.01, July 2014 [R5].

According to the authentication method used by the TOE for each session, this Security Target claims strict conformance to:

Table 2-1 Strict conformance to PP for each session authentication method

	BSI-CC-PP-0055	BSI-CC-PP-0056-V2-2012	BSI-CC-PP-0068-V2-2011-MA-01
BAC	X		
PACE			X
EAC with PACE		X	

2.4 Protection Profile conformance rationale

This ST claims strict conformance to the BAC PP [R3], PACE PP [R5] and EAC PP [R4]. The parts of the TOE listed in those Protection Profiles correspond to the ones listed in section 1.4.1 of this ST.

This ST adopts as a reference the ICAO Doc 9303 Eight Edition 2021. Due to this update, in this ST:

- any references to the ICAO Doc 9303 2006 specification in the BAC PP, EAC PP and PACE PP have been replaced with references to Doc 9303 2021,
- the terms “Supplemental Access Control” and “SAC” in the PACE PP have been replaced with the terms “Password Authenticated Connection Establishment” and “PACE”.

With respect to the PPs, the role “MRTD Manufacturer” has been split into the roles Card Manufacturer, Initialization Agent, and Pre-personalization Agent, acting in Phase 2 “Manufacturing” respectively in Step 4, Card Manufacturing, Step 5, Initialization, and Step 6, Pre-personalization. Note that the Card Manufacturer is a role performing only the physical preparation of the TOE.

In some parts of this ST the roles acting in Phase 2, i.e. the IC Manufacturer, the Card Manufacturer, the Initialization Agent, and the Pre-personalization Agent are collectively referred to as the Manufacturer.

In this ST, the TOE will be delivered from the IC Manufacturer to the Card Manufacturer after Step 3 “IC Manufacturing” of Phase 2, as a chip, in accordance with Application Note 5 of the PP [R3] and Application Note 4 of the EAC PP [R4]. At TOE delivery, there is no user data or machine readable data available.

Concerning Initialization Data, this ST distinguishes between IC Initialization Data written in Step 3 by the IC Manufacturer and TOE Initialization Data written in Step 5 by the Initialization Agent.

This ST adds some notes to warn that, according to [R39], the algorithm Triple-DES used for PACE and Chip Authentication, is classified as "legacy".

Table 2-2 describes the changes and additions made to the security problem definition and to the security objectives with respect to the PPs [R3] [R4] [R5]. These changes do not lower TOE security.

Table 2-2 Modified elements in the security problem definition and security objectives

Element	Definition	Operation
A.Insp_Sys	Inspection Systems for global interoperability	Refined to take into account the fact that if PACE-CAM is performed, there is no need to perform Chip Authentication v1.
T.Skimming	Skimming Travel Document /Capturing Card-Terminal Communication	Refined to remove the contact interface.
T.Forgery	Forgery of data	Refined to include the BAC authenticated terminal
T.Tracing	Tracing Travel Document	Refined to remove the contact interface.
P.Manufact	Manufacturing of the Travel Document's chip	Refined to specify the storage of Travel Document's Manufacturer keys.
P.Pre-operational	Pre-operational handling of the Travel Document	Refined to add the Initialization Agent and the Pre-personalization Agent among the subjects authorized by the Travel Document issuer.
OT.AC_Init	Access control for Initialization of Travel Document	Added to take into account access control in Step 5, Initialization.
OT.AC_Pre-pers	Access control for Pre-personalization of Travel Document	Added to take into account access control in Step 6, Pre-personalization.
OT.AC_Pers	Access control for Personalization of Travel Document	Refined by removing the word "only" to indicate the possibility that some objects can be created in Pre-personalization step also.
OT.Data_Integrity	Integrity of Data	Refined to include the BAC and SCP03 authenticated terminal

OT.Data_Authenticity	Authenticity of Data	Refined to include the SCP03 authenticated terminal
OT.Data_Confidentiality	Confidentiality of Data	Refined to include the BAC and SCP03 authenticated terminal
OT.Tracing	Tracing travel document	Refined to include the Initialization Key, Pre-personalization Key and Personalization key
OT.Chip_Auth_Proof	Proof of the Travel Document's chip authenticity	Refined to take into account the fact that chip authenticity may also be proved by means of PACE-CAM.
OT.Active_Auth_Proof	Proof of Travel Document‘s chip authenticity by Active Authentication	Added to cover the proof of IC authenticity for Basic Inspection Systems.
OE.Active_Auth_Key_Travel_Document	Travel Document Active Authentication key	Added to cover the generation, signature and storage of the Active Authentication key pair, as well as the support to the Inspection System. This addition does not contradict with any other objective nor mitigate a threat (or part of a threat) meant to be addressed by security objectives for the TOE in the PPs, nor fulfils an OSP (or part of an OSP) meant to be addressed by security objectives for the TOE in the PPs.
OE.Exam_Travel_Document	Examination of the physical part of the Travel Document	Refined to take into account the fact that chip authenticity may also be proved by means of PACE-CAM.
OE.Initialization	Initialization of Travel Document	Added to take into account responsibilities in Step 6, Initialization. This addition does not contradict with any other objective nor mitigate a threat (or part of a threat) meant to be addressed by security objectives for the TOE in the PPs, nor fulfils an OSP (or part of an OSP) meant to be addressed by security objectives for the TOE in the PPs.

OE.Pre-personalization	Pre-personalization of Travel Document	Added to take into account responsibilities in Step 6, Pre-personalization. This addition does not contradict with any other objective nor mitigate a threat (or part of a threat) meant to be addressed by security objectives for the TOE in the PPs, nor fulfils an OSP (or part of an OSP) meant to be addressed by security objectives for the TOE in the PPs.

The security functional requirements described in section 6 of this ST include those of the BAC PP [R3], the PACE PP [R5] and the EAC PP [R4].

Table 2-3 specifies the source (BAC PP, PACE PP or EAC PP) of security functional requirements.

In the below table, note the following points:

- The SFRs written in bold text cover the definition given in BAC and PACE PP and extend them for PACE and EAC. These extensions do not conflict with strict conformance to BAC and PACE PP.
- An iteration label has been added to the PP SFRs printed in underlined text, to distinguish them from the similar SFRs that have been added to this ST (see Table 2-4 below). The requirement definitions remain unchanged with respect to the PP.

Table 2-3 Source of security functional requirements

	Source		
	BAC PP [R3]	**PACE PP [R5]**	**EAC PP [R4]**
Security functional requirements	• FAU_SAS.1 • FCS_CKM.1/BAC • FCS_CKM.4 • FCS_COP.1/SHA • FCS_COP.1/ENC • FCS_COP.1/AUTH • FCS_COP.1/MAC • FCS_RND.1 • FIA_UID.1/BAC • FIA_UAU.1/BAC • FIA_UAU.4/BAC • FIA_UAU.5/BAC	• FCS_CKM.1/DH_PACE • **FCS_CKM.4** • FCS_COP.1/PACE_ENC • FCS_COP.1/PACE_MAC • **FCS_RND.1** • FIA_AFL.1/PACE • FIA_UID.1/PACE • FIA_UAU.1/PACE • FIA_UAU.4/PACE	• FCS_CKxM.1/CA • FCS_COP.1/CA_ENC • FCS_COP.1/SIG_VER • FCS_COP.1/CA_MAC • FIA_API.1 • **FIA_UID.1/PACE** • **FIA_UAU.1/PACE** • **FIA_UAU.4/PACE** • **FIA_UAU.5/PACE** • FIA_UAU.6/EAC • **FDP_ACC.1/TRM**

	• FIA_UAU.6/BAC • FIA_AFL.1/BAC • FDP_ACC.1 • FDP_ACF.1 • FDP_UCT.1 • FDP_UIT.1 • FMT_SMF.1 • FMT_SMR.1/BAC • FMT_LIM.1 • FMT_LIM.2 • FMT_MTD.1/INI_ENA • FMT_MTD.1/INI_DIS • FMT_MTD.1/KEY_WRITE • FMT_MTD.1/KEY_READ • FPT_EMSEC.1 • FPT_FLS.1 • FPT_TST.1 • FPT_PHP.3	• FIA_UAU.5/PACE • FIA_UAU.6/PACE • FDP_ACC.1/TRM • FDP_ACF.1/TRM • FDP_RIP.1 • **FDP_UCT.1/TRM** • **FDP_UIT.1/TRM** • FTP_ITC.1/PACE • **FAU_SAS.1** • **FMT_SMF.1** • FMT_SMR.1/PACE • FMT_LIM.1 • FMT_LIM.2 • **FMT_MTD.1/INI_ENA** • **FMT_MTD.1/INI_DIS** • FMT_MTD.1/KEY_READ • FMT_MTD.1/PA • FPT_EMS.1 • **FPT_FLS.1** • **FPT_TST.1** • **FPT_PHP.3**	• **FDP_ACF.1/TRM** • **FMT_SMR.1/PACE** • **FMT_LIM.1** • **FMT_LIM.2** • 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 • **FPT_EMS.1**

Iterations and changes to the SFRs, with respect to BAC PP, PACE PP and EAC PP, are listed in Table 2-4. These changes do not lower TOE security.

Table 2-4 Additions, iterations, and changes to SFRs

Security functional requirement	Operation
FCS_CKM.1/BAC	**Iteration** An iteration labelled "BAC" has been added to the original BAC PP SFR to specify the algorithm to which it refers
FCS_CKM.1/SCP	**Iteration** This iteration has been added to cover the generation of the session keys for the Pre-personalization Agent and for the Personalization Agent.
FCS_CKM.1/DH_PACE	**Change in dependency rationale** It has been found that some components fulfil dependency from FCS_COP.1. Therefore Justification 4 has been removed.

FCS_COP.1/ENC	**Change** Having FIPS 46-3 been withdrawn, NIST SP 800-67 and SP 800-38A have been referenced instead. See Application Note 45.
FCS_COP.1/AA_SIGN/RSA	**Iteration** This iteration has been added to cover the signature of Active Authentication data with RSA algorithm according to ICAO Doc 9303-11 [R19].
FCS_COP.1/AA_SIGN/ECDSA	**Iteration** This iteration has been added to cover the signature of Active Authentication data with ECDSA algorithm according to ICAO Doc 9303-11 [R19].
FIA_AFL.1/Init FIA_AFL.1/Pre-pers FIA_AFL.1/Pers	**Iteration** Iterations have been added to distinguish between authentication failure handling throughout pre-operational TOE life cycle
FIA_AFL.1/Init	**Refinement** This SFR has been refined with respect to the PP to indicate that the initialization key is blocked after 15 authentication attempts, regardless of the outcome of the authentication. This refinement makes the SFR more restrictive.
FIA_AFL.1/BAC	**Iteration** An iteration labelled “BAC” has been added to the original BAC PP SFR to specify the algorithm to which it refers
FIA_UID.1/BAC	**Iteration** An iteration labelled “BAC” has been added to the original BAC PP SFR to specify the algorithm to which it refers **Refinement** The reference to Active Authentication has been added.
FIA_UAU.1/BAC	**Iteration** An iteration labelled “BAC” has been added to the original BAC PP SFR to specify the algorithm to which it refers **Refinement** The reference to Active Authentication has been added.

FIA_UAU.4/BAC	**Iteration** An iteration labelled “BAC” has been added to the original BAC PP SFR to specify the algorithm to which it refers
FIA_UAU.5/BAC	**Iteration** An iteration labelled “BAC” has been added to the original BAC PP SFR to specify the algorithm to which it refers. **Refinement** A technical reference to the authentication mechanism with Personalization keys has been added. Moreover, the addition has been performed of the Initialization Agent and the Pre-personalization Agent among the users allowed to authenticate to the MRTD.
FIA_UAU.6/BAC	**Iteration** An iteration labelled “BAC” has been added to the original BAC PP SFR to specify the algorithm to which it refers
FIA_UAU.5.2/PACE	**Refinement** The specification concerning Terminal Authentication takes into account the fact that session keys established during PACE-CAM may also be used. An alternative condition has been added for the TOE to accept authentication attempts by means of Terminal Authentication.
FIA_UAU.6/EAC/CAV1 FIA_UAU.6/EAC/CAM	**Iteration** An iteration labelled 'EAC/CAM' has been added to take into account PACE-CAM as an additional condition. The iteration label 'CAV1' has been added to the original SFR from the PP to distinguish it from the other iteration.
FIA_API.1/CAV1 FIA_API.1/CAM	**Iteration** An iteration labelled 'CAM' has been added to take into account PACE-CAM as an additional mechanism that the TOE must provide. The iteration label 'CAV1' has been added to better distinguish it from the other iteration.
FIA_API.1/AA	**Iteration** This iteration has been added to cover the proof of identity by means of Active Authentication.
FDP_ACF.1/TRM	**Refinement** This SFR has been refined with respect to the PP EAC to include additional subjects, objects and rules related to BAC PP

FTP_ITC.1/SCP	**Iteration** This iteration has been added to require data to be exchanged through a secure channel in Pre-personalization and in Personalization.
FMT_SMR.1/BAC	**Iteration** An iteration labelled “BAC” has been added to the original BAC PP SFR to specify the algorithm to which it refers
FMT_MTD.1/AAPK	**Iteration** This iteration has been added to restrict the ability to cover the writing of the Active Authentication private key.
FMT_MTD.1/KEY_READ	**Refinement** This SFR has been refined to indicate that read access restriction applies also to the Basic Access Key, the Initialization key, the Pre-personalization key and the Active Authentication Private Key.
FCS_CKM.1/CA FCS_COP.1/SIG_VER FIA_UAU.6/EAC	**Change in SFRs Rationale** With respect to EAC PP [R4], the SFRs listed on the left are not mapped to the objective OT.AC_Pers since neither Chip Authentication nor Terminal Authentication are used for authentication of the Personalization Agent.

The applicability of SFR for each session authentication method is reported in the table below.
The “X” in brackets denotes that the SFRs are applicable only if Active Authentication is configured.

Table 2-5 SFR applicable for each session authentication method

SFR	BAC	PACE	EAC with PACE
FAU_SAS.1	X	X	X
FCS_CKM.1/BAC	X		
FCS_CKM.1/SCP	X	X	X
FCS_CKM.1/DH_PACE		X	X
FCS_CKM.1/CA			X
FCS_CKM.4	X	X	X
FCS_COP.1/SHA	X		
FCS_COP.1/ENC	X		
FCS_COP.1/AUTH	X	X	X
FCS_COP.1/MAC	X		

FCS_COP.1/AA_SIGN/RSA	(X)	(X)	(X)
FCS_COP.1/AA_SIGN/ECDSA	(X)	(X)	(X)
FCS_COP.1/PACE_ENC		X	X
FCS_COP.1/PACE_MAC		X	X
FCS_COP.1/CA_ENC			X
FCS_COP.1/CA_MAC			X
FCS_COP.1/SIG_VER			X
FCS_RND.1	X	X	X
FIA_AFL.1/Init	X	X	X
FIA_AFL.1/Pre-pers	X	X	X
FIA_AFL.1/Pers	X	X	X
FIA_AFL.1/BAC	X		
FIA_AFL.1/PACE		X	X
FIA_UID.1/BAC	X		
FIA_UID.1/PACE		X	X
FIA_UAU.1/BAC	X		
FIA_UAU.1/PACE		X	X
FIA_UAU.4/BAC	X		
FIA_UAU.4/PACE		X	X
FIA_UAU.5/BAC	X		
FIA_UAU.5/PACE		X	X
FIA_UAU.6/BAC	X		
FIA_UAU.6/PACE		X	X
FIA_UAU.6/EAC/CAV1			X
FIA_UAU.6/EAC/CAM			X
FIA_API.1/CAV1			X
FIA_API.1/CAM			X
FIA_API.1/AA	(X)	(X)	(X)
FDP_ACC.1/TRM	X	X	X
FDP_ACF.1/TRM	X	X	X
FDP_RIP.1		X	X
FDP_UCT.1/TRM	X	X	X
FDP_UIT.1/TRM	X	X	X

FTP_ITC.1/PACE		X	X
FTP_ITC.1/SCP	(X)	X	X
FMT_SMF.1	X	X	X
FMT_SMR.1/BAC	X		
FMT_SMR.1/PACE		X	X
FMT_LIM.1	X	X	X
FMT_LIM.2	X	X	X
FMT_MTD.1/INI_ENA	X	X	X
FMT_MTD.1/INI_DIS	X	X	X
FMT_MTD.1/CVCA_INI			X
FMT_MTD.1/CVCA_UPD			X
FMT_MTD.1/DATE			X
FMT_MTD.1/CAPK			X
FMT_MTD.1/KEY_WRITE	X		
FMT_MTD.1/KEY_READ	X	X	X
FMT_MTD.1/PA		X	X
FMT_MTD.1/AAPK	(X)	(X)	(X)
FMT_MTD.3			X
FPT_EMS.1	X	X	X
FPT_FLS.1	X	X	X
FPT_TST.1	X	X	X
FPT_PHP.3	X	X	X

3 Security problem definition

The security problem definition includes the assets, the subjects, the assumptions, the threats, and the organizational security policies of PPs.

Application Note 4 *With respect to the security problem definition contained in the PPs, this ST has some additions concerning Active Authentication.*

3.1 Introduction

3.1.1 Assets

Due to strict conformance to both BAC PP [R3], EAC PP [R4] and PACE PP [R5], this ST includes, as assets to be protected, all assets listed in section 3.1 of those PPs.

3.1.1.1 Assets to be protected according to BAC PP

All Assets listed in BAC PP are omitted as they are covered/extended by those defined in the sections below, as reported in the following table. These extensions do not conflict with strict conformance to BAC PP.

Table 3-1 Asset from BAC PP covered/extended by other PPs

Asset from BAC PP	covered/extended by
Logical MRTD Data	User data stored on the TOE (from PP PACE)
Authenticity of the MRTD chip	Genuineness of the TOE (from PP PACE)

3.1.1.2 Assets to be protected according to PACE PP

The primary assets to be protected by the TOE as long as they are in scope of the TOE are listed in Table 3-2 (please refer to the glossary in section 10.2 for the term definitions).

Table 3-2 Primary assets

Object No.	Asset	Definition	Generic security property to be maintained by the current security policy
		Travel document	
1	User data stored on the TOE	All data (being not authentication data) stored in the context of the ePassaport application of the Travel document as defined in [R19] and being allowed to read out solely by an authenticated terminal acting as Basic Inspection System with PACE (in the sense of [R19]). This asset covers “User Data on the MRTD’s chip”, “Logical MRTD Data” and “sensitive User Data” in [R3].	Confidentiality[10] Integrity Authenticity
2	User data transferred between the TOE and the terminal connected (i.e. an authority represented by Basic Inspection System with PACE)	All data (being not authentication data) being transferred in the context of the ePassaport application of the Travel document as defined in [R19] between the TOE and an authenticated terminal acting as Basic Inspection System with PACE (in the sense of [R19]). User data can be received and sent (exchange ⇔ {receive, send}).	Confidentiality[11] Integrity Authenticity
3	Travel Document tracing data	Technical information about the current and previous locations of the Travel Document gathered unnoticeable by the Travel Document holder recognising the TOE not knowing any PACE password. TOE tracing data can be provided/gathered.	Unavailability[12]

[10] Though not each data element stored on the TOE represents a secret, the specification [R19] anyway requires securing their confidentiality: only terminals authenticated according to [R19] can get access to the user data stored. They have to be operated according to P.Terminal.

[11] Though not each data element being transferred represents a secret, the specification [R19] anyway requires securing their confidentiality: the secure messaging in encrypt-then-authenticate mode is required for all messages according to [R19].

[12] Represents a prerequisite for anonymity of the Travel Document holder.

Application Note 5 *Please note that user data being referred to in the table above include, amongst other, individual-related (personal) data of the Travel Document holder which also include his sensitive (i.e. biometric) data. Hence, the general security policy defined by the current PP also secures these specific Travel Document holder's data as stated in the table above.*

All these primary assets represent User Data in the sense of CC.

The secondary assets also having to be protected by the TOE in order to achieve a sufficient protection of the primary assets are listed in Table 3-3.

Table 3-3 Secondary assets

Object No.	Asset	Definition	Property to be maintained by the current security policy
		Travel Document	
4	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.	Availability
5	Genuineness of the TOE	Property of the TOE to be authentic in order to provide claimed security functionality in a proper way.	Availability
6	TOE internal secret cryptographic keys	Permanently or temporarily stored secret cryptographic material used by the TOE in order to enforce its security functionality.	Confidentiality Integrity
7	TOE internal non-secret cryptographic material	Permanently or temporarily stored non-secret cryptographic (public) keys and other non-secret material (Document Security Object SO_D containing digital signature) used by the TOE in order to enforce its security functionality.	Integrity Authenticity
8	Travel Document communication establishment authorization data	Restricted-revealable[13] authorization information for a human user being used for verification of the authorization attempts as authorised user (PACE password). These	Confidentiality Integrity

[13] The Travel Document holder may reveal, if necessary, his or her verification values of CAN and MRZ to an authorised person or device who definitely act according to respective regulations and are trustworthy.

		data are stored in the TOE and are not to be sent to it.	

Application Note 6 *Since the Travel Document does not support any secret document holder authentication data and the latter may reveal, if necessary, his or her verification values of the PACE password to an authorised person or device, a successful PACE authentication of a terminal does not unambiguously mean that the Travel Document holder is using TOE.*

Application Note 7 *Travel Document communication establishment authorization data are represented by two different entities: (i) reference information being persistently stored in the TOE and (ii) verification information being provided as input for the TOE by a human user as an authorization attempt.*
The TOE shall secure the reference information as well as – together with the terminal connected[14] *- the verification information in the "TOE ⬄ terminal" channel, if it has to be transferred to the TOE. Please note that PACE passwords are not to be sent to the TOE.*

The secondary assets represent TSF and TSF-data in the sense of CC.

3.1.1.3 Assets to be protected according to EAC PP

Logical Travel Document sensitive User Data

Sensitive biometric reference data (EF.DG3, EF.DG4)

Application Note 8 *Due to interoperability reasons, the ICAO Doc 9303-11 [R19] 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 according to this ST, if it is accessed using BAC [R19]. Note that the BAC mechanism cannot resist attacks with high attack potential (cf. [R3]). If supported, it is therefore recommended to use PACE instead of BAC. If nevertheless BAC has to be used, it is recommended to perform either PACE-CAM or Chip Authentication v.1 before getting access to data (except DG14), as these mechanisms are resistant to potential attacks.*

A sensitive asset is the following more general one.

Authenticity of the Travel Document's chip

[14] The Travel Document holder may reveal, if necessary, his or her verification values of CAN and MRZ to an authorised person or device who definitely act according to respective regulations and are trustworthy.

The authenticity of the Travel Document's chip personalised by the issuing State or Organization for the Travel Document holder is used by the presenter to prove his possession of a genuine Travel Document.

3.1.2 Subjects

This security target considers the subjects defined in the BAC PP, PACE PP and in the EAC PP.

3.1.2.1 Subjects according to BAC PP

The subjects considered in accordance with the BAC PP are:

The **Basic Inspection System** (BIS):

(i) contains a terminal for the contactless communication with the MRTD's chip,

(ii) implements the terminals part of the Basic Access Control Mechanism, and

(iii) gets the authorization to read the logical MRTD under the Basic Access Control by optically reading the MRZ or other parts of the passport book providing this information.

The **General Inspection System** (GIS) is a Basic Inspection System which implements additionally the Chip Authentication Mechanism.

All other Subjects listed in BAC PP are omitted as they are covered/extended by those defined in the sections below, as reported in the following table. These extensions do not conflict with strict conformance to BAC PP.

Table 3-4 Subject from BAC PP covered/extended by other PPs

Subject from BAC PP	covered/extended by
Manufacturer	Manufacturer (from PP PACE)
Personalization Agent	Personalization Agent (from PP PACE)
Terminal	Terminal (from PP PACE)
Inspection System (IS)	Inspection System (from PP EAC)
Extended Inspection System (EIS)	Extended Inspection System (EIS) (from PP EAC)
MRTD Holder	Travel Document holder (from PP PACE)

Traveler	Travel Document presenter (traveller) (from PP PACE)
Attacker	Attacker (from PP PACE)

3.1.2.2 Subjects according to PACE PP

The subjects considered in accordance with the PACE PP are listed in Table 3-5.

Table 3-5 Subjects and external entities according to PACE PP

External Entity No.	Subject No.	Role	Definition
1	1	Travel Document holder	A person for whom the Travel Document Issuer has personalised the Travel Document[15]. This entity is commensurate with Travel Document Holder in [R3]. Please note that a Travel Document holder can also be an attacker (see below external entity No.9).
2	-	Travel Document presenter (traveller)	A person presenting the Travel Document to a terminal[16] and claiming the identity of the Travel Document holder. This external entity is commensurate with “Traveller” in [R3]. Please note that a Travel Document presenter can also be an attacker (see below external entity No.9).
3	2	Terminal	A terminal is any technical system communicating with the TOE through the contact or contactless interfaces. The role “Terminal” is the default role for any terminal being recognised by the TOE as not being PACE authenticated (“Terminal” is used by the Travel Document presenter). This entity is commensurate with “Terminal” in [R3].
4	3	Basic Inspection System with	A technical system being used by an inspection authority[17] and verifying the Travel Document presenter as the Travel Document holder (for Travel

[15] That is, this person is uniquely associated with a concrete Travel Document
[16] In the sense of [R19]
[17] Concretely, by a control officer

		PACE (BIS-PACE)	Document: 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.
5	-	Document Signer (DS)	An organization 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 CSCA issuing the Document Signer Certificate (C_{DS}), see [R20]. This role is usually delegated to a Personalization Agent.
6	-	Country Signing Certification Authority (CSCA)	An organization enforcing the policy of the Travel Document Issuer with respect to confirming correctness of user and TSF data stored in 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 (C_{CSCA}) having to be distributed by strictly secure diplomatic means, see [R20].
7	4	Personalization Agent	An organization acting on behalf of the Travel Document Issuer to personalise the Travel Document for its holder by some or all of the following activities (i) establishing the identity of the Travel Document holder, (ii) enrolling the biometric reference data of the Travel Document holder, (iii) writing a subset of these data on the physical Travel Document (optical personalization) and storing them in the Travel Document (electronic personalization) for the Travel Document holder as defined in [R19], (iv) writing the document details data, (v) writing the initial TSF data, (vi) signing the Document Security Object defined in [R18] (in the role of DS). Please note that the role "Personalization Agent" may be distributed among several institutions according to the operational policy of the Travel Document Issuer. This entity is commensurate with "Personalization Agent" in [R18].

8	5	Manufacturer	Generic term collectively identifying the IC Manufacturer, the Card Manufacturer, the Initialization Agent and the Pre-personalization Agent. The Manufacturer is the default user of the TOE during the manufacturing life cycle phase. This entity is commensurate with “Manufacturer” in [R3].
9	-	Attacker	A threat agent (a person or a process acting on his behalf) trying to undermine the security policy defined by the current PP, especially to change properties of the assets having to be maintained. The attacker is assumed to possess an at most high attack potential. Please note that the attacker might “capture” any subject role recognised by the TOE. This external entity is commensurate to “Attacker” in [R3].

3.1.2.3 Subjects according to EAC PP

In addition to the subjects defined by the PACE PP, this ST considers the following subjects defined by the EAC PP:

- **Country Verifying Certification Authority:** The Country Verifying Certification Authority (CVCA) enforces the privacy policy of the issuing State or Organization with respect to the protection of sensitive biometric reference data stored in the 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**: 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 Organizations in the form of the Document Verifier Certificates.

- **Terminal**: A terminal is any technical system communicating with the TOE through the contact or contactless interfaces.

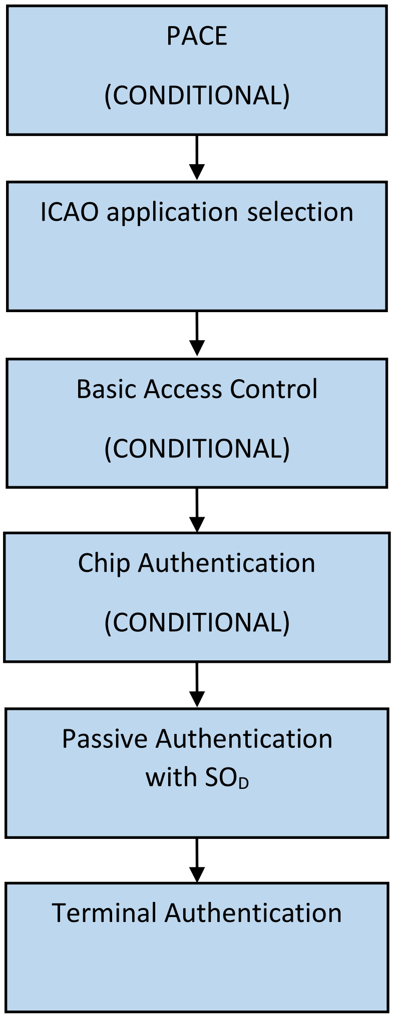
- **Inspection system (IS)**: A technical system used by the border control officer of the receiving State (i) in examining a Travel Document presented by the user and verifying its authenticity and (ii) verifying the presenter as Travel Document holder.

  The **Extended Inspection System (EIS)** performs the Advanced Inspection Procedure (see Figure 3-1) 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 [R6], and (v) is authorized by the issuing State or Organization 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**: In addition to the definition in Table 3-5, the definition of an attacker is refined as follows: 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), (ii) to forge a genuine Travel Document, or (iv) to trace a Travel Document.

Application Note 9 *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.*

Figure 3-1 Advanced Inspection Procedure



The Chip Authentication step in Figure 3-1 may be skipped if a PACE-CAM authentication has been successfully performed.

3.2 Assumptions

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

3.2.1 Assumptions according to BAC PP

The assumptions considered in accordance with the BAC PP are:

3.2.1.1 A.MRTD_Manufact

MRTD manufacturing on steps 4 to 7

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

3.2.1.2 A.MRTD_Delivery

MRTD delivery during steps 4 to 7

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

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

3.2.1.3 A.Pers_Agent

Personalization of the MRTD's chip

The Personalization Agent ensures the correctness of:

(i) the logical MRTD with respect to the MRTD holder,

(ii) the Document Basic Access Keys,

(iii) the Chip Authentication Public Key (EF.DG14) if stored on the MRTD's chip, and

(iv) the Document Signer Public Key Certificate if stored on the MRTD's chip

The Personalization Agent signs the Document Security Object. The Personalization Agent bears the Personalization Agent Authentication to authenticate himself to the TOE by symmetric cryptographic mechanisms.

3.2.1.4 A.BAC-Keys

Cryptographic quality of Basic Access Control Keys

The Document Basic Access Control Keys being generated and imported by the issuing State or Organization have to provide sufficient cryptographic strength. As a consequence of the 'ICAO Doc 9303' [R11], the Document Basic Access Control

Keys are derived from a defined subset of the individual printed MRZ data. It has to be ensured that these data provide sufficient entropy to withstand any attack based on the decision that the inspection system has to derive Document Access Keys from the printed MRZ data with enhanced-basic attack potential.

Application Note 10 *When assessing the MRZ data resp. the BAC keys entropy potential dependencies between these data (especially single items of the MRZ) have to be considered and taken into account. E.g. there might be a direct dependency between the Document Number when chosen consecutively and the issuing date.*

All other Assumptions listed in BAC PP are omitted as they are covered/extended by those defined in the sections below, as reported in the following table. These extensions do not conflict with strict conformance to BAC PP.

Table 3-6 Assumption from BAC PP covered/extended by other PPs

Assumption from BAC PP	covered/extended by
A.Insp_Sys	A.Insp_Sys (from PP EAC)

3.2.2 Assumptions according to PACE PP

3.2.2.1 A.Passive_Auth

PKI for Passive Authentication

The issuing and receiving States or Organizations establish a public key infrastructure for passive authentication i.e. digital signature creation and verification for the logical Travel Document. The issuing State or Organization runs a Certification Authority (CA) which securely generates, stores and uses the Country Signing CA Key pair.

The CA keeps the Country Signing CA Private Key secret and is recommended to distribute the Country Signing CA Public Key to ICAO, all receiving States maintaining its integrity. The Document Signer:

i. generates the Document Signer Key Pair,

ii. hands over the Document Signer Public Key to the CA for certification,

iii. keeps the Document Signer Private Key secret, and

iv. uses securely the Document Signer Private Key for signing the Document Security Objects of the Travel Documents.

The CA creates the Document Signer Certificates for the Document Signer Public Keys and distributes them to the receiving States and Organizations. It is assumed that the Personalization Agent ensures that the Document Security Object contains only the hash values of the genuine user data according to [R18].

3.2.3 Assumptions according to EAC PP

3.2.3.1 A.Insp_Sys

Inspection Systems for global interoperability

The Extended Inspection System (EIS) for global interoperability (i) includes the Country Signing CA Public Key and (ii) implements the terminal part of PACE [R19] and/or BAC [R3]. 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 to verify the logical Travel Document and establishes secure messaging. The Chip Authentication Protocol v.1 is skipped if PACE-CAM has previously been performed. EIS supports the Terminal Authentication Protocol v.1 in order to ensure access control and is authorized by the issuing State or Organization 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 [R5], as it repeats the requirements of P.Terminal and adds only assumptions for the Inspection Systems for handling the EAC functionality of the TOE.

3.2.3.2 A.Auth_PKI

PKI for Inspection Systems

The issuing and receiving States or Organizations establish a public key infrastructure for card verifiable certificates of the Extended Access Control. The Country Verifying Certification Authorities, the Document Verifier and Extended Inspection Systems hold authentication key pairs and certificates for their public keys encoding the access control rights. The Country Verifying Certification Authorities of the issuing States or Organizations are signing the certificates of the Document Verifier and the Document Verifiers are signing the certificates of the Extended Inspection Systems of the receiving States or Organizations. The issuing States or Organizations distribute the public keys of their Country Verifying Certification Authority to their 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 [R5] 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.

3.3 Threats

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

The TOE in collaboration with its IT environment shall avert the threats as specified below.

3.3.1 Threats according to BAC PP

All Threats listed in BAC PP are omitted as they are covered/extended by those defined in the sections below, as reported in the following table. These extensions do not conflict with strict conformance to BAC PP.

Table 3-7 Threat from BAC PP covered/extended by other PPs

Threat from BAC PP	covered/extended by
T.Chip_ID	T.Tracing (from PP PACE)
T.Skimming	T.Skimming (from PP PACE)
T.Eavesdropping	T.Eavesdropping (from PP PACE)
T.Forgery	T.Forgery (from PP PACE)
T.Abuse-Func	T.Abuse-Func (from PP PACE)
T.Information_Leakage	T.Information_Leakage (from PP PACE)
T.Phys-Tamper	T.Phys-Tamper (from PP PACE)
T.Malfunction	T.Malfunction (from PP PACE)

3.3.2 Threats according to PACE PP

3.3.2.1 T.Skimming

Skimming travel document/Capturing Card-Terminal Communication

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 interfaces 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 11 *A product using BIS-BAC cannot avert this threat in the context of the security policy defined in this ST.*

Application Note 12 *The shared PACE password may be printed or displayed on the Travel Document. Please note that if this is the case, the password does not effectively represent a secret, but nevertheless it is restricted-revealable, cf. OE.Travel Document _Holder.*

3.3.2.2 T.Eavesdropping

Eavesdropping on the communication between the TOE and the PACE terminal

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 13 *A product using BIS-BAC cannot avert this threat in the context of the security policy defined in this ST.*

3.3.2.3 T.Tracing

Tracing Travel document

Adverse action: An attacker tries to gather *TOE tracing data* (i.e. to trace the movement of the Travel document) unambiguously identifying it by establishing or listening to a communication via the contactless 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 14 *This threat completely covers and extends "T.Chip-ID" from BAC PP [R3].*

Application Note 15 *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 this ST.*

3.3.2.4 T.Forgery

Forgery of data

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 or BAC authenticated BIS 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

3.3.2.5 T.Abuse-Func

Abuse of Functionality

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 initialization and personalization in the operational phase after delivery to the Travel document holder.

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

Asset: integrity and authenticity of the Travel document, availability of the functionality of the Travel document

Application Note 16 *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.*

3.3.2.6 T.Information_Leakage

Information Leakage from Travel document

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 User Data and TSF data of the Travel document

Application Note 17 *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 from measurements of the contactless interface (emanation) 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).*

3.3.2.7 T.Phys-Tamper

Physical Tampering

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 18 *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.*

3.3.2.8 T.Malfunction

Malfunction due to Environmental Stress

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.

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 19 *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.*

3.3.3 Threats according to EAC PP

3.3.3.1 T.Read_Sensitive_Data

Read the sensitive biometric reference 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 threats T.Skimming (cf. [R3]) 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 visual readable on the physical 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 sensitive logical Travel document (i.e. biometric reference) data

3.3.3.2 T.Counterfeit

Counterfeit of Travel Document's chip

Adverse action: An 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 traveller 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 on 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 logical Travel Document data

3.4 Organizational Security Policies

The TOE and/or its environment shall comply to the following Organizational Security Policies (OSP) as security rules, procedures, practices, or guidelines imposed by an organization upon its operations.

3.4.1 Organizational Security Policies according to BAC PP

The TOE shall comply to the following organization security policies (OSP) as security rules, procedures, practices, or guidelines imposed by an organization upon its operations (see CC part 1, sec. 3.2 [R9]).

3.4.1.1 P.Personal_Data

Personal data protection policy

The biographical data and their summary printed in the MRZ and stored on the MRTD's chip (EF.DG1), the printed portrait and the digitized portrait (EF.DG2), the biometric reference data of finger(s) (EF.DG3), the biometric reference data of iris image(s) (EF.DG4)[18] and data according to LDS (EF.DG5 to EF.DG13, EF.DG16) stored on the MRTD's chip are personal data of the MRTD holder. These data groups are intended to be used only with agreement of the MRTD holder by inspection systems to which the MRTD is presented. The MRTD's chip shall provide the possibility for the Basic Access Control to allow read access to these data only for terminals successfully authenticated based on knowledge of the Document Basic Access Keys as defined in [R19].

Application Note 20 *The organizational security policy P.Personal_Data is drawn from the ICAO 'ICAO Doc 9303' [R19]. Note that the Document Basic Access Key is defined by the TOE environment and loaded to the TOE by the Personalization Agent.*

[18] Note that EF.DG3 and EF.DG4 are only readable after a successful EAC authentication, not being covered by this security target.

All other OSP listed in BAC PP are omitted as they are covered/extended by those defined in the sections below, as reported in the following table. These extensions do not conflict with strict conformance to BAC PP.

Table 3-8 OSP from BAC PP covered/extended by other PPs

OSP from BAC PP	covered/extended by
Manufactory	P.Manufact (from PP PACE)
P.Personalization	P.Personalization (from PP EAC)

3.4.2 Organizational Security Policies according to PACE PP

3.4.2.1 P.Manufact

Manufacturing of the Travel Document's chip

The IC Initialization Data are written by the IC Manufacturer to identify the IC uniquely and to provide the key for the authentication of the Initialization Agent.
The Initialization Agent configures the OS (TOE Initialization Data) and writes the key for the authentication of the Pre-personalization Agent.
The Pre-personalization Agent writes the Pre-Personalization Data.
The Initialization Agent and the Pre-personalization Agent are agents authorized by the Issuing State or Organization only.

3.4.2.2 P.Pre-Operational

Pre-operational handling of the Travel Document

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. section 1.5 above.

4. If the Travel Document Issuer authorizes an Initialization Agent, a Pre-personalization Agent or a Personalization Agent to personalize the Travel Document for Travel Document holders, the Travel Document Issuer has to ensure that the Initialization Agent, the Pre-personalization Agent and the Personalization Agent act in accordance with the Travel Document Issuer's policy.

3.4.2.3 P.Card_PKI

PKI for Passive Authentication (issuing branch)

Application Note 21 *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.*

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 (C_{CSCA}).

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 (C_{CSCA}) having to be made available to the Travel Document Issuer by strictly secure means, see [R19]. The CSCA shall create the Document Signer Certificates for the Document Signer Public Keys (C_{DS}) and make them available to the Travel Document Issuer, see [R20].

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.

3.4.2.4 P.Trustworthy_PKI

Trustworthiness of PKI

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

3.4.2.5 P.Terminal

Abilities and trustworthiness of terminals

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 [R19] [R20].

2. They shall implement the terminal parts of the PACE protocol [R19], of the Passive Authentication [R19] and use them in this order[19]. 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 C_{CSCA} and C_{DS}) in order to enable and to perform Passive Authentication (determination of the authenticity of data groups stored in the Travel Document [R18] [R19]).

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 the current PP.

3.4.3 Organizational Security Policies according to EAC PP

3.4.3.1 P.Sensitive_Data

Privacy of sensitive biometric reference 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 Organization authorizes the Document Verifiers of the receiving States to manage the authorization of inspection systems within the limits defined by the Document Verifier Certificate. The Travel Document's chip shall protect the confidentiality and integrity

[19] This order is commensurate with [R19]

of the sensitive private personal data even during transmission to the Extended Inspection System after Chip Authentication.

3.4.3.2 P.Personalization

Personalization of the Travel Document by issuing State or Organization only

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

4 Security objectives

This chapter describes the security objectives for the TOE and the security objectives for the TOE environment. The security objectives for the TOE environment are separated into security objectives for the development and production environment and security objectives for the operational environment.

4.1 Security objectives for the TOE

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

4.1.1 Security objectives for the TOE according to BAC PP

All Security Objectives for the TOE in BAC PP are omitted as they are covered/extended by those defined in the sections below, as reported in the following table. These extensions do not conflict with strict conformance to BAC PP.

Table 4-1 OT from BAC PP covered/extended by other PPs

OT from BAC PP	covered/extended by
OT.AC_Pers	OT.AC_Pers (from PP PACE)
OT.Data_Int	OT.Data_Integrity (from PP PACE)
OT.Data_Conf	OT.Data_Confidentiality (from PP PACE)
OT.Identification	OT.Identification (from PP PACE)
OT.Prot_Abuse-Func	OT.Prot_Abuse-Func (from PP PACE)
OT.Prot_Inf_Leak	OT.Prot_Inf_Leak (from PP PACE)
OT.Prot_Phys-Tamper	OT.Prot_Phys-Tamper (from PP PACE)
OT.Prot_Malfunction	OT.Prot_Malfunction (from PP PACE)

4.1.2 Security objectives for the TOE according to PACE PP

4.1.2.1 OT.Data_Integrity

Integrity of Data

The TOE must ensure integrity of the User Data and the TSF-data[20] 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 SCP03 authenticated terminal, by BAC authenticated BIS or by PACE authenticated BIS-PACE) after the SCP03, BAC or PACE Authentication.

4.1.2.2 OT.Data_Authenticity

Authenticity of Data

The TOE must ensure authenticity of the User Data and the TSF-data[21] stored on it by enabling verification of their authenticity at the terminal-side[22]. 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 SCP03 authenticated terminal or PACE authenticated BIS-PACE) after SCP03 or 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)[23].

4.1.2.3 OT.Data_Confidentiality

Confidentiality of Data

The TOE must ensure confidentiality of the User Data and the TSF-data[24] by granting read access only to the BAC or PACE authenticated BIS 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 SCP03 authenticated terminal or BAC or PACE authenticated BIS) after the SCP03, BAC or PACE Authentication.

4.1.2.4 OT.Tracing

Tracing Travel Document

The TOE must prevent gathering TOE tracing data by means of unambiguous identifying the Travel Document directly through establishing a communication via contactless interface

[20] Where appropriate, see Table 3-3 above
[21] Where appropriate, see Table 3-3 above
[22] Verification of SO_D
[23] Secure messaging after PACE authentication, see also [R19]
[24] Where appropriate, see Table 3-3 above

of the TOE, without knowledge of the correct values of shared authentication data (Initialization Key, Pre-personalization Key, Personalization key or PACE passwords) in advance.

4.1.2.5 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.

4.1.2.6 OT.Prot_Inf_Leak

Protection against Information Leakage

The TOE must provide protection against disclosure of confidential User Data and/or TSF-data stored and/or processed in the Travel Document

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

Application Note 22 *This objective pertains to measurements with subsequent complex signal processing due to normal operation of the TOE or operations enforced by an attacker.*

4.1.2.7 OT.Prot_Phys-Tamper

Protection against Physical Tampering

The TOE must provide protection of the confidentiality and integrity of the User Data, the TSF-data, and the Travel Document’s Embedded Software by means of

- 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
- measuring not using galvanic contacts but other types of physical interaction between charges (using tools used in solid-state physics research and IC failure analysis),
- manipulation of the hardware and its security features, as well as

- controlled manipulation of memory contents (User Data, TSF-data)

with a prior

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

4.1.2.8 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*.

4.1.2.9 OT.Identification

Identification of the TOE

The TOE must provide means to store Initialization[25] and Pre-Personalization 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).

Application Note 23 *The Initialization Data are split into IC Initialization Data and TOE Initialization Data; IC Initialization data include the Initialization key and TOE Initialization Data include the Pre-personalization keys.*

4.1.2.10 OT.AC_Pers

Access Control for Personalization of logical Travel Document

[25] Amongst other, IC identification data

The TOE must ensure that the logical Travel Document data in EF.DG1 to EF.DG16, the Document security object according to LDS [R18] and the TSF data can be written by an authorized Personalization Agent. The logical Travel Document data in EF.DG1 to EF.DG16, and the TSF data may be written during and cannot be changed after personalization of the document.

Application Note 24 *The OT.AC_Pers implies that the data of the LDS groups written during personalization for Travel Document holder (at least EF.DG1 and EF.DG2) cannot be changed using write access after personalization.*

Application Note 25 *The logical Travel Document data in EF.DG14 and EF.DG15 can be written also during the Pre-personalization step, according to the policy of issuing State or Organization.*

4.1.3 Security objectives for the TOE according to EAC PP

4.1.3.1 OT.Sens_Data_Conf

Confidentiality of sensitive biometric reference data

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

4.1.3.2 OT.Chip_Auth_Proof

The following Security Objective for the TOE is an addition to the objectives given by the Protection Profiles to cover the Active Authentication mechanism.

Proof of Travel Document's chip authenticity

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 Organization by means of either the PACE-CAM as defined in [R19] or the Chip Authentication Version 1 as defined in [R6]. The authenticity proof provided by Travel Document's chip shall be protected against attacks with high attack potential.

Application Note 26 *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 [R18] and (ii) the hash value of DG14 in the Document Security Object signed by the Document Signer.*

4.1.4 Additional Security objectives for the TOE

This Additional Security objectives for the TOE are always applicable.

4.1.4.1 OT.AC_Init

Access Control for Initialization of logical Travel Document

The TOE must ensure that the initialization data, which include at least the OS configuration data and the Pre-personalization Key, can be written in Step 5 Initialization by an authorized Initialization Agent only. The above data may be written only during and cannot be changed after initialization.

4.1.4.2 OT.AC_Pre-pers

Access Control for Pre-personalization of logical Travel Document

The TOE must ensure that the logical Travel Document data in EF.DG14 and EF.DG15, if any, as well as other TSF data can be written in step 6, pre-personalization, by an authorized Pre-personalization Agent.

4.1.4.3 OT.Active_Auth_Proof

Proof of Travel Document's chip authenticity

The TOE must support the Basic Inspection Systems to verify the identity and authenticity of the Travel Document's chip as issued by the identified issuing State or Organization by means of the Active Authentication as defined in [R19]. The authenticity proof provided by Travel Document's chip shall be protected against attacks with high attack potential.

4.2 Security objectives for the Operational Environment

4.2.1 Security objectives for the operational environment according to BAC PP

Issuing State or Organization

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

4.2.1.1 OE.MRTD_Manufact

Protection of the MRTD Manufacturing
Appropriate functionality testing of the TOE shall be used in step 4 to 7.
During all manufacturing and test operations, security procedures shall be used through steps 4, 5, 6 and 7 to maintain confidentiality and integrity of the TOE and its manufacturing and test data.

4.2.1.2 OE.MRTD_Delivery

Protection of the MRTD delivery

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

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

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

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

4.2.1.3 OE.BAC-Keys

Cryptographic quality of Basic Access Control Keys

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

All other OE listed in BAC PP are omitted as they are covered/extended by those defined in the sections below, as reported in the following table. These extensions do not conflict with strict conformance to BAC PP.

Table 4-2 OE from BAC PP covered/extended by other PPs

OE from BAC PP	covered/extended by
OE.Personalization	OE.Personalization (from PP PACE)
OE.Pass_Auth_Sign	OE.Passive_Auth_Sign (from PP PACE)
OE.Exam_MRTD	OE.Terminal (from PP PACE)
OE.Passive_Auth_Verif	OE.Terminal (from PP PACE)
OE.Prot_Logical_MRTD	OE.Terminal (from PP PACE)

4.2.2 Security objectives for the operational environment according to PACE PP

<u>**Travel Document Issuer as the general responsible**</u>

The Travel Document Issuer as the general responsible for the global security policy related will implement the following security objectives for the TOE environment.

4.2.2.1 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.

Travel Document Issuer and CSCA: Travel Document's PKI (issuing) branch

The Travel Document Issuer and the related CSCA will implement the following security objectives for the TOE environment (see also the Application Note 21 above).

4.2.2.2 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 (C_{CSCA}). 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 [R18]. The Personalization Agent has to ensure that the Document Security Object contains only the hash values of genuine user data according to [R18]. The CSCA must issue its certificates exclusively to the rightful organizations (DS) and DSs must sign exclusively correct Document Security Objects to be stored on Travel Document.

4.2.1.3 OE.Personalization

Personalization of Travel Document

The Travel Document Issuer must ensure that the Personalization Agent 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 Document (optical personalization) and store them in the Travel Document (electronic personalization) for the Travel Document holder as defined in [R18][26], (iv) write the document details data, (v) write the initial TSF data, (vi) sign the Document Security Object defined in [R19] (in the role of a DS).

Terminal operator: Terminal's receiving branch

4.2.1.4 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 [R19].

2. The related terminals implement the terminal parts of the PACE protocol [R19], of the Passive Authentication [R19] (by verification of the signature of the Document Security Object) and use them in this order[27]. 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, [R19]).

[26] See also [R19].

[27] This order is commensurate with [R19]

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 current ST.

Application Note 27 *OE.Terminal completely covers and extends “OE.Exam_MRTD”, “OE.Passive_Auth_Verif“ and “OE.Prot_Logical_MRTD” from BAC PP [R3].*

Travel Document holder Obligations

4.2.1.5 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.

Issuing State or Organization

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

4.2.3 Security objectives for the operational environment according to EAC PP

4.2.3.1 OE.Chip_Auth_Key_Travel_Document

Travel Document Authentication Key

The issuing State or Organization 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 Organizations 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 to counter the threat T.Counterfeit, as it specifies the pre-requisite for the Chip Authentication which is one of the features of the TOE described only in this Security Target.

4.2.3.2 OE.Authoriz_Sens_Data

Authorization for Use of Sensitive Biometric Reference Data

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

Justification: This security objective for the operational environment is needed in order to handle the Threat T.Read_Sensitive_Data, the Organizational 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 features of the TOE described only in this Security Target.

The following Security Objective for the Operational Environment is an addition to the objectives given by the Protection Profiles to cover the Active Authentication mechanism.

4.2.3.3 OE.Exam_Travel_Document

Examination of the physical part of the Travel Document

The inspection system of the receiving State or Organization 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 Organization, and (ii) implements the terminal part of PACE and/or the Basic Access Control. Extended Inspection Systems perform additionally to these points the Chip Authentication as either part of PACE-CAM or as 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 in order to handle the Threat T.Counterfeit and the Assumption A.Insp_Sys by demanding the Inspection System to perform the Chip Authentication as either part of PACE-CAM or as Chip Authentication protocol v.1. OE.Exam_Travel_Document also repeats partly the requirements from above OE.Terminal and therefore also counters T.Forgery and A.Passive_Auth. This is done because this ST introduces the Extended Inspection System, which is needed to handle the features of a Travel Document with Extended Access Control.

4.2.3.4 OE.Prot_Logical_Travel_Document

Protection of data from the logical Travel Document

The inspection system of the receiving State or Organization 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.

Justification: This security objective for the operational environment is needed in order to handle the Assumption A.Insp_Sys by requiring the Inspection System to perform secure messaging based on the Chip Authentication.

4.2.3.5 OE.Ext_Insp_Systems

Authorization of Extended Inspection Systems

The Document Verifier of receiving States or Organizations authorizes Extended Inspection Systems by creation of Inspection System Certificates for access to sensitive biometric reference data of the logical 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 in order to handle the Threat T.Read_Sensitive_Data, the Organizational 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.

4.2.4 Additional Security objectives for the operational environment for the TOE

This Additional Security objectives for the operational environment for the TOE are always applicable.

4.2.4.1 OE.Initialization

Initialization of Travel Document

The issuing State or Organization must ensure that the Initialization Agent acting on behalf of the issuing State or Organization

i. create the OS configuration data and TSF data for the Travel Document,

ii. initialize the Travel Document together with the defined physical and logical security measures to protect the confidentiality and integrity of these data.

4.2.4.2 OE.Pre-personalization

Pre-personalization of Travel Document

The issuing State or Organization must ensure that the Pre-personalization Agent, acting on behalf of the issuing State or Organization, pre-personalizes the Travel Document together with the defined physical and logical security measures to protect the confidentiality and integrity of these data.

4.2.4.3 OE.Active_Auth_Key_Travel_Document

The following Security Objective for the Operational Environment is an addition to the objectives given by the Protection Profiles to cover the Active Authentication mechanism.

Travel Document Active Authentication key

The issuing State or Organization has to establish the necessary public key infrastructure in order to (i) generate the Travel Document's Active Authentication Key Pair, (ii) sign and store the Active Authentication Public Key in the Active Authentication Public Key data in EF.DG15 and (iii) support inspection systems of receiving States or Organizations to verify the authenticity of the Travel Document's chip used for genuine Travel Document by certification of the Active Authentication Public Key by means of the Document Security Object.

Receiving State or Organization

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

4.3 Security objective rationale

Table 4-3 provides an overview for security objectives coverage.

Table 4-3 Security objective rationale

	OT.Sens Data Conf	OT.Chip Auth Proof	OT.Active Auth Proof	OT.AC Init	OT.AC Pre-pers	OT.AC Pers	OT.Data Integrity	OT.Data Authenticity	OT.Data Confidentiality	OT.Tracing	OT.Prot Abuse-Func	OT.Prot Inf Leak	OT.Identification	OT.Prot Phys-Tamper	OT.Prot Malfunction	OE.MRTD Manufact	OE.MRTD Delivery	OE.BAC-Keys	OE.Chip Auth Key Travel Document	OE.Active Auth Key Travel Documen	OE.Authoriz Sens Data	OE.Exam Travel Document	OE.Prot Logical Travel Document	OE.Ext Insp Systems	OE.Initialization	OE.Pre-Personalization	OE.Personalization	OE-Passive Auth Sign	OE.Terminal	OE.Travel Document Holder	OE.Legislative Compliance
T.Read_Sensitive_Data	X																				X			X							
T.Counterfeit		X	X																X	X		X									
T.Skimming							X	X	X									X												X	
T.Eavesdropping									X																						
T.Tracing										X			X					X												X	
T.Abuse-Func											X														X	X	X				
T.Information_Leakage												X																			
T.Phys-Tamper														X																	
T.Malfunction															X																
T.Forgery				X	X	X	X	X			X			X								X			X	X	X	X	X		
P.Personal_Data							X		X																						
P.Sensitive_Data	X																				X			X							
P.Personalization						X							X														X				
P.Manufact				X	X								X												X	X					
P.Pre-Operational				X	X	X							X												X	X	X				X
P.Terminal																						X							X		
P.Card_PKI																												X			
P.Trustworthy_PKI																												X			
A.MRTD_Manufact																X									X	X					
A.MRTD_Delivery																	X														
A.Pers_Agent																											X				
A.BAC-Keys																		X													
A.Insp_Sys																						X	X						X		
A.Auth_PKI																					X			X							
A.Passive_Auth																						X						X			

A detailed justification required for *suitability* of the security objectives to coup with the security problem definition is given below.

The threat **T.Skimming** addresses accessing the User Data (stored on the TOE or transferred between the TOE and the terminal) using the TOE's contactless interfaces. This threat is countered by the security objectives ***OT.Data_Integrity***, ***OT.Data_Authenticity***, and ***OT.Data_Confidentiality*** through the PACE authentication or through Basic Access Control using sufficiently strong derived keys as required by the security objective for the environment ***OE.BAC-Keys***. The objective ***OE.Travel_Document_Holder*** 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.

The threat **T.Eavesdropping** 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*** through a trusted channel based on the BAC or PACE authentication.

The threat **T.Tracing** addresses gathering TOE tracing data identifying it directly by establishing a communication via the contactless 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*** (no gathering TOE tracing data) and ***OE. Travel_Document_Holder*** (the attacker does not a priori know the correct values of the shared passwords). This threat is also countered as described by the security objective ***OT.Identification*** by Basic Access Control using sufficiently strong derived keys as required by the security objective for the environment ***OE.BAC-Keys***.

The threat **T.Forgery** 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_Init*** requires the TOE to limit the write access for the Travel Document to the trustworthy Initialization Agent (cf. ***OE.Initialization***). The security objective ***OT.AC_Pre-pers*** requires the TOE to limit the write access for the Travel Document to the trustworthy Pre-personalization Agent (cf. ***OE.Pre-personalization***). The security objectives ***OT.AC_Pers*** requires the TOE to limit the write access for the Travel Document to the trustworthy Personalization Agent (cf. ***OE.Personalization***). 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*** and ***OT.Data_Authenticity***, respectively. The objectives ***OT.Prot_Phys-Tamper*** and ***OT.Prot_Abuse-Func*** 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*** and performing the Passive Authentication using the Document Security Object as aimed by ***OE.Passive_Auth_Sign*** will be able to effectively verify integrity and authenticity of the data received from the TOE. Additionally, the examination of the presented Travel Document book or card 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.

The threat **T.Abuse-Func** 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*** ensures that the usage of functions having not to be used in the operational phase is effectively prevented.
This threat is countered by ***OT.Prot_Abuse-Func*** "Protection against Abuse of Functionality". Additionally, this objective is supported by the security objectives for the TOE environment ***OE.Initialization***, Initialization of logical MRTD, ***OE.Pre-personalization***, Pre-personalization of logical MRTD, and ***OE.Personalization***, Personalization of logical MRTD, which ensure that the TOE security functions for initialization, pre-personalization and personalization are disabled and the security functions for the operational state after delivery to the MRTD holder are enabled according to the intended use of the TOE.

The threats **T.Information_Leakage**, **T.Phys-Tamper**, and **T.Malfunction** are typical for integrated circuits like smart cards under direct attack with high attack potential. The protection of the TOE against these threats is obviously addressed by the directly related security objectives ***OT.Prot_Inf_Leak***, ***OT.Prot_Phys-Tamper***, and ***OT.Prot_Malfunction***, respectively.

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 identification and authenticity proof required by ***OT.Chip_Auth_Proof*** "Proof of Travel Document's chip authentication" using an authentication key pair to be generated by the issuing State or Organization. The Public Chip Authentication Key has to be written into EF.DG14 and signed by means of Documents Security Objects as demanded by ***OE.Chip_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 either part of PACE-CAM or as Chip Authentication Protocol Version 1 to verify the authenticity of the Travel Document's chip.
In addition, the threat **T.Counterfeit** "Counterfeit of Travel Document chip data" is countered by chip an identification and authenticity proof required by ***OT.Active_Auth_Proof*** "Proof of Travel Document's chip authentication" using an authentication key pair to be generated by the issuing State or Organization. The Public Active Authentication Key has to be written into EF.DG15 and signed by means of Documents Security Objects as demanded by ***OE.Active_Auth_Key_Travel_Document*** "Travel Document Authentication Key".

The OSP **P.Personal_Data** "Personal data protection policy" requires the TOE

(i) to support the protection of the confidentiality of the logical MRTD by means of the Basic Access Control, and

(ii) enforce the access control for reading as decided by the issuing State or Organization.

This policy is implemented by the security objectives ***OT.Data_Integrity*** “Integrity of Data” describing the unconditional protection of the integrity of the stored data and during transmission. The security objective ***OT.Data_Confidentiality*** “Confidentiality of data” describes the protection of the confidentiality.

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-personalization Data and the Personalization data as being fulfilled by ***OT.Identification***. ***OT.AC_Init***, ***OT.AC_Pre-pers***, ***OE.Initialization***, ***OE.Pre-personalization*** and together enforce the OSP’s properties ‘correctness of the User- and the TSF-data stored’ and ‘authorization of Travel Document Manufacturers’. Note:

- The IC Manufacturer equips the TOE with the Initialization Key according to ***OT.Identification***, Identification and Authentication of the TOE. The security objective ***OT.AC_Init*** limits the management of TSF data and the management of TSF to the Initialization Agent.
- The Initialization Agent equips the TOE with the Pre-personalization key(s) according to ***OT.Identification***, Identification and Authentication of the TOE. The security objective ***OT.AC_Pre-pers*** limits the management of TSF data and the management of TSF to the Pre-personalization Agent.

The OSP **P.Pre-Operational** is enforced by the following security objectives: ***OT.Identification*** is affine to the OSP’s property ‘traceability before the operational phase’; ***OT.AC_Init***, ***OT.AC_Pre-pers, OT.AC_Pers***, ***OE.Initialization***, ***OE.Pre-personalization, OE.Personalization*** together enforce the OSP’s properties ‘correctness of the User- and the TSF-data stored’ and ‘authorization of Initialization Agent, Pre-personalization Agent and Personalization Agent; ***OE.Legislative_Compliance*** is affine to the OSP’s property ‘compliance with laws and regulations’.

The OSP **P.Terminal** is obviously enforced by the objective ***OE.Terminal***, whereby the one-to-one mapping between the related properties is applicable. Additionally, this OSP is is countered by the security objective **OE.Exam_Travel_Document** additionally to the security objectives from PACE PP [7]. **OE.Exam_Travel_Document** enforces the terminals to perform the terminal part of the PACE protocol.

The OSP **P.Card_PKI** is enforced by establishing the issuing PKI branch as aimed by the objective ***OE.Passive_Auth_Sign*** (for the Document Security Object).

The OSP **P.Trustworthy_PKI** is enforced by ***OE.Passive_Auth_Sign*** (for CSCA, issuing PKI branch).

The OSP **P.Personalization** “Personalization of the Travel Document by issuing State or Organization only” addresses the (i) the enrolment of the logical Travel Document by the Personalization Agent as described in the security objective for the TOE environment ***OE.Personalization*** and (ii) the access control for the user data and TSF data as described by the security objectives ***OT.AC_Pers***. Note:

- The Pre-personalization Agent equips the TOE with the Personalization key(s) according to ***OT.Identification*** “Identification and Authentication of the TOE”. The security objective ***OT.AC_Pers*** limits the management of TSF data and the management of TSF to the Personalization Agent.

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 Organization 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”.

The assumption **A.MRTD_Manufact** “MRTD manufacturing on step 4 to 7” is covered by the security objectives for the TOE environment ***OE.Initialization***, Initialization of the logical MRTD, ***OE.Pre-personalization***, Pre-personalization of the logical MRTD, and ***OE.MRTD_Manufact***, Protection of the MRTD Manufacturing, that requires to use security procedures during all manufacturing steps.

The assumption **A.MRTD_Delivery** “MRTD delivery during step 4 to 7” is covered by the security objective for the TOE environment ***OE.MRTD_Delivery*** “Protection of the MRTD delivery” that requires to use security procedures during delivery steps of the MRTD.

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

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

The examination of the Travel Document addressed by the assumption **A.Insp_Sys** “Inspection Systems for global interoperability” is covered by the security objective 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 objective for the TOE environment ***OE.Prot_Logical_Travel_Document*** “Protection of data from the logical Travel Document” requires the Inspection System to protect the logical Travel Document data during the transmission and the internal handling. Additionally, this assumption is upheld by ***OE.Terminal***.

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 PACE PP [R5] 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”.

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”, which requires the CVCA to limit the read access to sensitive biometrics by issuing Document Verifier certificates for authorized receiving States or Organizations 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 Organization has to establish the necessary public key infrastructure.

5 Extended components definition

This security target uses components defined as extensions to CC part 2 [R10]. These components are drawn from the BAC PP [R3], PACE PP [R5] and the EAC PP [R4].

5.1 Definition of family FAU_SAS

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:

Table 5-1 Family FAU_SAS

FAU_SAS Audit data storage	
Family behaviour:	This family defines functional requirements for the storage of audit data.
Component levelling:	
FAU_SAS.1	Requires the TOE to provide the possibility to store audit data.
Management	There are no management activities foreseen.
Audit	There are no actions defined to be auditable.
FAU_SAS.1	**Audit storage**
Hierarchical to:	No other components
Dependencies:	No dependencies.
FAU_SAS.1.1	The TSF shall provide [assignment: *authorized users*] with the capability to store [assignment: *list of audit information*] in the audit records.

5.2 Definition of family FCS_RND

To describe the IT security functional requirements of the TOE, the family FCS_RND of the class FCS (Cryptographic support) is defined here. This family describes the functional requirements for random number generation used for cryptographic purposes. The component FCS_RND.1 is not limited to generation of cryptographic keys unlike the component FCS_CKM.1. The similar component FIA_SOS.2 is intended for non-cryptographic use.

The family 'Generation of random numbers (FCS_RND)' is specified as follows:

Table 5-2 Family FCS_RND

FCS_RND Generation of random numbers	
Family behaviour:	This family defines quality requirements for the generation of random numbers which are intended to be used for cryptographic purposes.
Component levelling:	
FCS_RND.1	Generation of random numbers requires that random numbers meet a defined quality metric.
Management:	There are no management activities foreseen.
Audit:	There are no actions defined to be auditable.
FCS_RND.1	**Quality metric for random numbers**
Hierarchical to:	No other components
Dependencies:	No dependencies.
FCS_RND.1.1	The TSF shall provide a mechanism to generate random numbers that meet [assignment: *a defined quality metric*].

5.3 Definition of family FIA_API

To describe the security requirements of the TOE a sensitive family (FIA_API) of the Class FIA (Identification and authentication) is defined in the PP [R4]. 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 28 *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 CC part 2 (cf. [R11] "Explicitly stated IT security requirements (APE_SRE)") from a TOE point of view.*

Table 5-3 Family FIA_API

FIA_API Authentication Proof of Identity	
Family behaviour:	This family defines functions provided by the TOE to prove their identity and to be verified by an external entity in the TOE IT environment.
Component levelling:	 FIA_API Authentication Proof of Identity 1
FIA_API.1	Authentication Proof of Identity.
Management:	The following actions could be considered for the management functions in FMT: Management of authentication information used to prove the claimed identity.
Audit:	There are no actions defined to be auditable.
FIA_API.1	**Authentication Proof of Identity**
Hierarchical to:	No other components
Dependencies:	No dependencies.
FIA_API.1.1	The TSF shall provide a [assignment: *authentication mechanism*] to prove the identity of the [assignment: *authorized user or rule*].

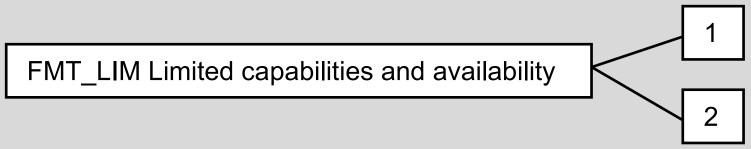
5.4 Definition of family FMT_LIM

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.

The family “Limited capabilities and availability (FMT_LIM)” is specified as follows.

Table 5-4 Family FMT_LIM

FMT_LIM Limited capabilities and availability	
Family behaviour:	This family defines requirements that limit the capabilities and availability of functions in a combined manner. Note that FDP_ACF restricts the access to functions whereas the Limited capability of

	this family requires the functions themselves to be designed in a specific manner.
Component levelling:	
FMT_LIM.1	Limited capabilities requires that the TSF is built to provide only the capabilities (perform action, gather information) necessary for its genuine purpose.
Management:	There are no management activities foreseen.
Audit:	There are no actions defined to be auditable.
FMT_LIM.2	Limited availability requires that the TSF restrict the use of functions (refer to Limited capabilities (FMT_LIM.1)). This can be achieved, for instance, by removing or by disabling functions in a specific phase of the TOE’s life-cycle.
Management:	There are no management activities foreseen.
Audit:	There are no actions defined to be auditable.

FMT_LIM.1	**Limited capabilities**
Hierarchical to:	No other components
Dependencies:	FMT_LIM.2 Limited availability.
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*].

FMT_LIM.2	**Limited availability**
Hierarchical to:	No other components
Dependencies:	FMT_LIM.1 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*].

Application Note 29 *The functional requirements FMT_LIM.1 and FMT_LIM.2 assume that there are two types of mechanisms (limited capabilities and limited availability) which together shall provide protection in order to enforce the policy. This also allows that*

- *the TSF is provided without restrictions in the product in its user environment but its capabilities are so limited that the policy is enforced,*

or conversely

- *the TSF is designed with test and support functionality that is removed from, or disabled in, the product prior to the Operational Use Phase.*

The combination of both requirements shall enforce the related policy.

5.5 Definition of family FPT_EMS

The 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 secret data stored in and used by the TOE 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, etc. This family describes the functional requirements for the limitation of intelligible emanations being not directly addressed by any other component of CC part 2 [R5].
This family covers the extended components definition of family FPT_EMSEC, as defined in BAC PP [R3].

The family 'TOE Emanation (FPT_EMS)' is specified as follows:

Table 5-5 Family FPT_EMS

FPT_EMS	
Family behaviour:	This family defines requirements to mitigate intelligible emanations.
Component levelling:	FPT_EMS TOE emanation 1
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.
Management:	There are no management activities foreseen.

Audit:	There are no actions defined to be auditable.
FPT_EMS.1	**TOE Emanation**
Hierarchical to:	No other components
Dependencies:	No dependencies.
FPT_EMS.1.1	The TOE shall not emit [assignment: *types of emissions*] in excess of [assignment: specified limits] enabling access to [assignment: *list of types of TSF data*] and [assignment: list of types of user data].
FPT_EMS.1.2	The TSF shall ensure [assignment: *type of users*] are unable to use the following interface [assignment: *type of connection*] to gain access to [assignment: *list of types of TSF data*] and [assignment: *list of types of user data*].

6 Security functional requirements

The CC allows several operations to be performed on functional requirements: *refinement*, *selection*, *assignment*, and *iteration* are defined in paragraph C.4 of Part 1 [R9] of the CC. Each of these operations is used in this PP.

The **refinement** operation is used to add detail to a requirement, and thus further restricts a requirement. Refinement of security requirements is denoted by the word "**Refinement**" in bold text and the added/changed words are in **bold text**. In cases where words from a CC requirement were deleted, a separate attachment indicates the words that were removed.

The **selection** operation is used to select one or more options provided by the CC in stating a requirement. Selections that have been made by the PP authors are denoted as underlined text. Selections made by the ST author are denoted as **underlined bold text** and the original text of the component is given by a footnote.

The **assignment** operation is used to assign a specific value to an unspecified parameter, such as the length of a password. Assignments that have been made by the PP authors are denoted as underlined text. Assignments made by the ST author are denoted as **underlined bold text** and the original text of the component is given by a footnote. In some cases, the assignment made by the PP authors defines a selection performed by the ST author. Thus, this text is underlined and italicized like *this*.

The **iteration** operation is used when a component is repeated with varying operations. Iteration is denoted by showing a slash "/", and the iteration indicator after the component identifier.

The definition of the subjects "Manufacturer", "Personalization Agent", "Extended Inspection System", "Country Verifying Certification Authority", "Document Verifier" and "Terminal" used in the following chapter is given in section 3.1.2. Note that all these subjects are acting for homonymous external entities. All used objects are defined either in section 10.2 or in the following table. The operations "write", "modify", "read" and "disable read access" are used in accordance with the general linguistic usage. The operations "store", "create", "transmit", "receive", "establish communication channel", "authenticate" and "re-authenticate" are originally taken from [R10]. The operation "load" is synonymous to "import" used in [R10].

This section on security functional requirements for the TOE is divided into subsections following the main security functionality.

6.1 Class FAU: Security audit

The TOE shall meet the requirement "Audit storage (FAU_SAS.1)" as specified below (Common Criteria Part 2 extended).

6.1.1 FAU_SAS.1

Audit storage

Hierarchical to: No other components.

Dependencies: No dependencies.

FAU_SAS.1.1:

The TSF shall provide the Manufacturer[28] with the capability to store the Initialization and Pre-personalization Data[29] in the audit records.

Application Note 30 *The SFR FAU_SAS.1 in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

Application Note 31 *The Manufacturer role is the default user identity assumed by the TOE in the life cycle phase 'manufacturing'. The IC Manufacturer, the Initialization Agent, and the Pre-personalization Agent in the Manufacturer role write the Initialization Data and/or Pre-personalization Data as TSF-Data into the TOE. The audit records are write-only-once data of the Travel Document (see FMT_MTD.1/INI_ENA, FMT_MTD.1/INI_DIS).*

6.2 Class FCS: Cryptographic support

The TOE shall meet the requirement "Cryptographic key generation (FCS_CKM.1)" as specified below (Common Criteria Part 2). The iterations are caused by different cryptographic key generation algorithms to be implemented and key to be generated by the TOE.

[28] [assignment: *authorised user*]
[29] [assignment: *list of audit information*]

6.2.1 FCS_CKM.1/BAC

Cryptographic key generation – Generation of Document Basic Access Key by the TOE

Hierarchical to: No other components.

Dependencies: [FCS_CKM.2 Cryptographic key distribution or
FCS_COP.1 Cryptographic operation]
FCS_CKM.4 Cryptographic key destruction

FCS_CKM.1.1/BAC:

The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm: Document Basic Access Key Derivation Algorithm[30] and specified cryptographic key sizes 112 bit[31], that meet the following: [R19], appendix D.1[32].

Application Note 32 *The TOE is equipped with the Document Basic Access Key generated and downloaded by the Personalization Agent. The Basic Access Control Authentication Protocol described in [R19], section 4.3, produces agreed parameters to generate the Triple-DES key and the Retail-MAC message authentication keys for secure messaging by the algorithm in [R19], section 9.7.4. The algorithm uses the random number RND.ICC generated by TSF as required by FCS_RND.1.*

6.2.2 FCS_CKM.1/SCP

Cryptographic key generation – Generation of SCP session Keys for Pre-personalization and Personalization by the TOE

Hierarchical to: No other components.

Dependencies: [FCS_CKM.2 Cryptographic key distribution or
FCS_COP.1 Cryptographic operation]
FCS_CKM.4 Cryptographic key destruction

[30] [assignment: *cryptographic key generation algorithm*]

[31] [assignment: *cryptographic key sizes*]

[32] [assignment: *list of standards*]

FCS_CKM.1.1/SCP:

The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm **Secure Channel Protocol '03'**[33] and specified cryptographic key sizes **128, 192 or 256 bits**[34] that meet the following: **[R12], section 6**[35].

Application Note 33 *the TSF allows to generate the session keys for the Pre-personalization and Personalization processes by the algorithm described in the Secure Channel Protocol '03' Card Specification, [R12], using the keys stored on the chip (the Pre-personalization keys in phase 2 and the Personalization keys in phase 3) and a sequence counter provided by the IC card to the pre-personalization terminal or to the personalization terminal in response to an INITIALIZE UPDATE command.*

6.2.3 FCS_CKM.1/DH_PACE

Cryptographic key generation – Diffie-Hellman for PACE session keys

Hierarchical to: No other components.

Dependencies: [FCS_CKM.2 Cryptographic key distribution or
FCS_COP.1 Cryptographic operation]
FCS_CKM.4 Cryptographic key destruction

FCS_CKM.1.1/DH_PACE:

The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm:

1. **Diffie-Helmann protocol compliant to PKCS #3 [R38]**[36] and specified cryptographic key sizes: **2048 bits**[37], and

[33] [assignment: *cryptographic key generation algorithm*]
[34] [assignment: *cryptographic key sizes*
[35] [assignment: *list of standards*]
[36] [selection: *Diffie-Hellman protocol compliant to PKCS #3, ECDH compliant to BSI TR-03111*]
[37] [assignment: *cryptographic key sizes*]

2. **ECDH compliant to [R8]**[38] and specified cryptographic key sizes: **256, 384, 512, 521 bits**[39]

that meet the following: **[R19]**[40].

Application Note 34 *The TOE generates a shared secret value K with the terminal during the PACE protocol, see [R19]. This protocol may be based on the Diffie-Hellman-Protocol compliant to PKCS #3 (i.e. modulo arithmetic based cryptographic algorithm, cf. [R38]) or on the ECDH compliant to TR-03111 [R8] (i.e. the elliptic curve cryptographic algorithm ECKA, cf. [R19] and [R8] for details). The shared secret value K is used for deriving the AES or DES session keys for message encryption and message authentication (PACE-K_{MAC}, PACE-K_{ENC}) according to [R19] for the TSF required by FCS_COP.1/PACE_ENC and FCS_COP.1/PACE_MAC.*

Application Note 35 *FCS_CKM.1/DH_PACE implicitly contains the requirements for the hashing functions used for key derivation by demanding compliance to [R19].*

Application Note 36 *All the curves reported in ICAO Doc 9303-11 [R19] are supported. However, the curves brainpoolP320r1, as well as those having field order shorter than 256 bits, are out of the scope of the evaluation (c.f. [R39]).*

6.2.4 FCS_CKM.1/CA

Cryptographic key generation – Diffie-Hellman for Chip Authentication session keys

Hierarchical to: No other components.

Dependencies: [FCS_CKM.2 Cryptographic key distribution or
FCS_COP.1 Cryptographic operation]
FCS_CKM.4 Cryptographic key destruction

FCS_CKM.1.1/CA:

The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm:

[38] [selection: *Diffie-Hellman protocol compliant to PKCS #3, ECDH compliant to BSI TR-03111*]
[39] [assignment: *cryptographic key sizes*]
[40] [assignment: *list of standards*]

1. **Diffie-Hellman**[41] and specified cryptographic key sizes: **2048 bits**[42], that meet the following: **based on the Diffie-Hellman key derivation protocol compliant to [R38] and [R6]**[43],

or

2. **ECDH**[44] and specified cryptographic key sizes **256, 384, 512, 521 bits**[45] that meet the following: **based on an ECDH protocol compliant to [R8]**[46].

Application Note 37 *FCS_CKM.1/CA implicitly contains the requirements for the hashing functions used for key derivation by demanding compliance to [R6].*

Application Note 38 *The TOE generates a shared secret value with the terminal during the Chip Authentication protocol version 1, see [R6]. This protocol may be based on the Diffie-Hellman-Protocol compliant to PKCS #3 (i.e. modulo arithmetic based cryptographic algorithm, cf. [R38]) or on the ECDH compliant to TR-03111 (i.e. the elliptic curve cryptographic algorithm - cf. [R8]). The shared secret value is used to derive the Chip Authentication session keys used for encryption and MAC computation for secure messaging (defined in Key Derivation Function [R6] [R7]).*

Application Note 39 *Chip Authentication session keys are not generated if PACE-CAM has been performed, as in this case Chip Authentication protocol version 1 is skipped.*

Application Note 40 *All the curves reported in ICAO Doc 9303-11 [R19] are supported. However, the curves brainpoolP320r1, as well as those having field order shorter than 256 bits, are out of the scope of the evaluation (c.f. [R39]).*

The TOE shall meet the requirement “Cryptographic key destruction (FCS_CKM.4)” as specified below (Common Criteria Part 2).

[41] [selection: *based on the Diffie-Hellman key derivation protocol compliant to PKCS #3, based on an ECDH protocol compliant to BSI TR-03111*]
[42] [assignment: *cryptographic key sizes*]
[43] [assignment: *list of standards*]
[44] [assignment: *cryptographic key generation algorithm*]
[45] [assignment: *cryptographic key sizes*]
[46] [selection: *based on the Diffie-Hellman key derivation protocol compliant to PKCS #3, based on an ECDH protocol compliant to BSI TR-03111*]

6.2.5 FCS_CKM.4

Cryptographic key destruction – Session keys

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation]

FCS_CKM.4.1:

The TSF shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method: **physical deletion by overwriting the memory data with zeros**[47] that meets the following: **none**[48].

Application Note 41 *The SFR FCS_CKM.4 in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

Application Note 42 *The TOE shall destroy the Initialization Key, as well as the AES encryption key, Triple-DES encryption key and the Retail-MAC message authentication keys for secure messaging.*

Application Note 43 *The TOE shall destroy any session keys in accordance with FCS_CKM.4 after (i) detection of an error in a received command by verification of the MAC, and (ii) after successful run of the Chip Authentication. (iii) The TOE shall destroy the PACE Session Keys after generation of a Chip Authentication Session Keys and changing the secure messaging to the Chip Authentication Session Keys. (iv) The TOE shall clear the memory area of any session keys before starting the communication with the terminal in a new after-reset-session as required by FDP_RIP.1. Concerning the Chip Authentication keys, FCS_CKM.4 is also fulfilled by FCS_CKM.1/CA.*

The TOE shall meet the requirement “Cryptographic operation (FCS_COP.1)” as specified below (Common Criteria Part 2). The iterations are caused by different cryptographic algorithms to be implemented by the TOE.

[47] [assignment: *cryptographic key destruction method*]
[48] [assignment: *list of standards*]

6.2.6 FCS_COP.1/SHA

Cryptographic operation – Hash for Key Derivation

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/SHA:

The TSF shall perform hashing[49] in accordance with a specified cryptographic algorithm **SHA-1, SHA-256**[50] and cryptographic key sizes none[51] that meet the following: **FIPS 180-4 [R34]**[52]**.**

Application Note 44 *This SFR requires the TOE to implement the hash function SHA-1 as a cryptographic primitive of the Basic Access Control Authentication Mechanism (see also FIA_UAU.4) according to [R19].*

6.2.7 FCS_COP.1/ENC

Cryptographic operation – Encryption/Decryption Triple DES

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/ENC:

[49] [assignment: *list of cryptographic operations*]

[50] [selection: *SHA-1, SHA-224, SHA-256 or other approved algorithms*]

[51] [assignment: *cryptographic key sizes*]

[52] [selection: *FIPS 180-2 or other approved standards*]

The TSF shall perform secure messaging (BAC) – encryption and decryption[53] in accordance with a specified cryptographic algorithm Triple-DES in CBC mode[54] and cryptographic key sizes 112 bits[55] that meet the following: NIST SP 800-67 [R32], NIST SP 800-38A [R32] and [R19] section 9.8[56].

Application Note 45 *FIPS 46-3 was withdrawn in 2005. The Triple Data Encryption Algorithm with 112 bit keys is still an NIST approved cryptographic algorithm as defined in NIST SP 800-67 [R32]. NIST SP 800-38A [R32] provides recommendation for block cipher modes.*

Application Note 46 *This SFR requires the TOE to implement the cryptographic primitive Triple-DES for secure messaging with encryption of the transmitted data. The keys are agreed between the TOE and the terminal as part of the Basic Access Control Mechanism according to the FCS_CKM.1 and FIA_UAU.4.*

6.2.8 FCS_COP.1/AUTH

Cryptographic operation – Authentication

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/AUTH:

The TSF shall perform symmetric authentication – encryption and decryption[57] in accordance with a specified cryptographic algorithm **AES**[58] and cryptographic key sizes: **128, 192 or 256 bit**[59] that meet the following: **FIPS 197 [R36]**[60].

[53] [assignment: *list of cryptographic operations*]
[54] [assignment: *cryptographic algorithm*]
[55] [assignment: *cryptographic key sizes*]
[56] [assignment: *list of standards*]
[57] [assignment: *list of cryptographic operations*]
[58] [selection: *Triple-DES, AES*]
[59] [selection: 112, 128, 168, 192, 256]
[60] [selection: *FIPS 46-3, FIPS 197*]

Application Note 47 *This SFR requires the TOE to implement the cryptographic primitive AES in CBC mode with 128,192 or 256-bit key according to [R36] for authentication attempt of a terminal as Initialization Agent in Step 5 Initialization of Phase 2 (using only AES-256 bits keys), Pre-personalization Agent in Step 6 Pre-personalization of Phase 2 (using AES 128, 192 or 256 bits) and as Personalization Agent in Step 7 Personalization of Phase 3 (using AES 128, 192 or 256 bits).*

6.2.9 FCS_COP.1/MAC

Cryptographic operation – Retail MAC

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/MAC:

The TSF shall perform secure messaging – message authentication code[61] in accordance with a specified cryptographic algorithm Retail MAC[62] and cryptographic key sizes 112 bits[63] that meet the following: ISO 9797 (MAC algorithm 3, block cipher DES, Sequence Message Counter, padding mode 2) [R27][64].

Application Note 48 *This SFR requires the TOE to implement the cryptographic primitive for secure messaging with encryption and message authentication code over the transmitted data. The key is agreed between the TSF by the Basic Access Control Authentication Mechanism according to the FCS_CKM.1 and FIA_UAU.4.*

6.2.10 FCS_COP.1/AA_SIGN/RSA

Cryptographic operation – Signature for Active Authentication

[61] [assignment: *list of cryptographic operations*]
[62] [assignment: *cryptographic algorithm*]
[63] [assignment: *cryptographic key sizes*]
[64] [assignment: *list of standards*]

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/AA_SIGN/RSA:

The TSF shall perform **digital signature for Active Authentication data**[65] in accordance with a specific cryptographic algorithm **RSA with SHA-224, SHA-256, SHA-384, SHA-512**[66] and cryptographic key sizes **2048, 3072 and 4096 bits**[67] that meet the following: **the Digital Signature standards (complying with ISO/IEC 9796-2 digital signature scheme 1 [R26]) used for Active Authentication defined by ICAO Doc 9303-11 [R19]**[68].

Application Note 49 *For RSA cryptography, the TOE makes use of the Infineon cryptographic library.*

Application Note 50 *Signature for Active Authentication data using cryptographic algorithm RSA with SHA-1 is also supported. However, this algorithm is out of the scope of the evaluation.*

Application Note 51 *Although signature for Active Authentication data using cryptographic algorithm RSA with SHA-224 is supported, this algorithm will become legacy in 2025, according to [R39].*

Application Note 52 *FCS_COP.1/AA_SIGN/RSA contains the requirements for the SHA hashing functions used for the Active Authentication by demanding compliance to the mechanism described in ICAO Doc 9303 [R19].*

6.2.11 FCS_COP.1/AA_SIGN/ECDSA

Cryptographic operation – Signature for Active Authentication

[65] [assignment: *list of cryptographic operations*]
[66] [assignment: *cryptographic algorithm*]
[67] [assignment: *cryptographic key sizes*]
[68] [assignment: *list of standards*]

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/AA_SIGN/ECDSA:

The TSF shall perform **digital signature for Active Authentication data**[69] in accordance with a specific cryptographic algorithm **ECDSA with SHA-224, SHA-256, SHA-384 and SHA-512**[70] and cryptographic key sizes **256, 384, 512 and 521 bits**[71] that meet the following: **Technical Guideline TR-03111 [R8] used for Active Authentication defined by ICAO Doc 9303-11 [R19]**[72].

Application Note 53 *It must be noted that, according to section 6.1.2.3 of [R19] a hash algorithm, whose output length is of the same length or shorter than the length of the ECC key in use, shall be used.*

Application Note 54 *Signature for Active Authentication data using cryptographic algorithm ECDSA with SHA-1 is also supported. However, this algorithm is out of the scope of the evaluation.*

Application Note 55 *Although signature for Active Authentication data using cryptographic algorithm ECDSA with SHA-224 is supported, this algorithm will become legacy in 2025, according to [R39].*

Application Note 56 *All the curves reported in ICAO Doc 9303-11 [R19] are supported. However, the curves brainpoolP320r1, as well as those having field order shorter than 256 bits, are out of the scope of the evaluation (c.f. [R39]).*

Application Note 57 *FCS_COP.1/AA_SIGN/ECDSA contains the requirements for the SHA hashing functions used for the Active Authentication by demanding compliance to the mechanism described in ICOA Doc 9303 [R19].*

[69] [assignment: *list of cryptographic operations*]
[70] [assignment: *cryptographic algorithm*]
[71] [assignment: *cryptographic key sizes*]
[72] [assignment: *list of standards*]

6.2.12 FCS_COP.1/PACE_ENC

Cryptographic operation – Encryption/Decryption AES/Triple-DES for PACE protocol

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/PACE_ENC:

The TSF shall perform secure messaging – encryption and decryption[73] in accordance with a specified cryptographic algorithm **AES and Triple-DES** in CBC mode[74] and cryptographic key sizes **112 bits (for Triple-DES) and 128, 192, 256 bits (for AES)**[75] that meet the following: compliant to [R19][76].

Application Note 58 *This SFR requires the TOE to implement the cryptographic primitive AES and Triple-DES for secure messaging with encryption of the transmitted data and encryption of the nonce in the first step of PACE. The related session keys are agreed between the TOE and the terminal as part of the PACE protocol according to FCS_CKM.1/DH_PACE (PACE-K$_{ENC}$).*

Application Note 59 *According to [R39] the algorithm Triple-DES is classified as “legacy”.*

6.2.13 FCS_COP.1/PACE_MAC

Cryptographic operation – MAC for PACE protocol

Hierarchical to: No other components.

[73] [assignment: *list of cryptographic operations*]
[74] [selection: *AES, Triple-DES*]
[75] [selection: 112, 128, 192, 256]
[76] [assignment: *list of standards*]

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/PACE_MAC:

The TSF shall perform secure messaging – message authentication code[77] in accordance with a specified cryptographic algorithm **CMAC and Retail MAC**[78] and cryptographic key sizes **112, 128, 192, 256 bits**[79] that meet the following: compliant to [R19][80].

Application Note 60 *This SFR requires the TOE to implement the cryptographic primitive for secure messaging with message authentication code over transmitted data. The related session keys are agreed between the TOE and the terminal as part of either the PACE protocol according to the FCS_CKM.1/DH_PACE (PACE-K_{MAC}). Note that in accordance with [4] the (two-key) Triple-DES could be used in Retail mode for secure messaging. However, Retail mode is not recommended, as the algorithm Triple-DES is classified as "legacy" (see [R39]).*

6.2.14 FCS_COP.1/CA_ENC

Cryptographic operation – Symmetric Encryption/Decryption for CA protocol

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/CA_ENC:

The TSF shall perform secure messaging – encryption and decryption[81] in accordance with a specified cryptographic

[77] [assignment: *list of cryptographic operations*]
[78] [selection: *CMAC, Retail-MAC*]
[79] [selection: *112, 128, 192, 256*]
[80] [assignment: *list of standards*]
[81] [assignment: *list of cryptographic operations*]

algorithm **<u>AES and Triple-DES</u>**[82] and cryptographic key sizes **<u>112 bits (for Triple-DES) and 128, 192, 256 bits (for AES)</u>**[83] that meet the following: **<u>ICAO Doc 9303-11 [R19]</u>**[84].

Application Note 61 *This SFR requires the TOE to implement the cryptographic primitives (i.e. Triple-DES and AES) for secure messaging with encryption of the transmitted data. The keys are agreed between the TOE and the terminal as part of the Chip Authentication according to the FCS_CKM.1/CA.*

Application Note 62 *According to [R39], the algorithm Triple-DES is classified as "legacy".*

6.2.15 FCS_COP.1/CA_MAC

Cryptographic operation – MAC for CA protocol

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/CA_MAC:

The TSF shall perform <u>secure messaging – message authentication code</u>[85] in accordance with a specified cryptographic algorithm **<u>CMAC and Retail MAC</u>**[86] and cryptographic key sizes **<u>112, 128, 192, 256 bits</u>**[87] that meet the following: **<u>ICAO Doc 9303-11 [R19]</u>**[88].

Application Note 63 *This SFR requires the TOE to implement the cryptographic primitive for secure messaging with encryption and message authentication code over the transmitted*

[82] [assignment: *cryptographic algorithm*]
[83] [assignment: *cryptographic key sizes*]
[84] [assignment: *list of standards*]
[85] [assignment: *list of cryptographic operations*]
[86] [assignment: *cryptographic algorithm*]
[87] [assignment: *cryptographic key sizes*]
[88] [assignment: *list of standards*]

data. The key is agreed by the TSF through Chip Authentication, performed either as part of PACE-CAM or by Chip Authentication Protocol Version 1 according to FCS_CKM.1/CA.

6.2.16 FCS_COP.1/SIG_VER

Cryptographic operation – Signature verification by Travel Document

Hierarchical to: No other components.

Dependencies: [FDP_ITC.1 Import of user data without security attributes, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_CKM.1 Cryptographic key generation]
FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/SIG_VER:

The TSF shall perform digital signature verification[89] in accordance with a specified cryptographic algorithm

1. **RSA as specified in Table 6-1**[90] and cryptographic key sizes: **2048, 3072 or 4096 bits**[91] that meet the following: **PKCS #1 [R37]**[92]**,**

or

2. **ECDSA as specified in Table 6-2**[93] and cryptographic key sizes: **256, 384 or 512 bits**[94] that meet the following: **FIPS 186-5 [R35]**[95].

Table 6-1 RSA algorithms for signature verification in Terminal Authentication

Object identifier	Signature algorithm	Hash algorithm
id-TA-RSA-PSS-SHA-256	RSASSA-PSS	SHA-256
id-TA-RSA-PSS-SHA-512	RSASSA-PSS	SHA-512

[89] [assignment: *list of cryptographic operations*]
[90] [assignment: *cryptographic algorithm*]
[91] [assignment: *cryptographic key sizes*]
[92] [assignment: *list of standards*]
[93] [assignment: cryptographic algorithm]
[94] [assignment: *cryptographic key sizes*]
[95] [assignment: *list of standards*]

Table 6-2 ECDSA algorithms for signature verification in Terminal Authentication

Object identifier	Signature algorithm	Hash algorithm
id-TA-ECDSA-SHA-224	ECDSA	SHA-224
id-TA-ECDSA-SHA-256	ECDSA	SHA-256
id-TA-ECDSA-SHA-384	ECDSA	SHA-384
id-TA-ECDSA-SHA-512	ECDSA	SHA-512

Application Note 64 *The signature verification is used to verify the card verifiable certificates and the authentication attempt of the terminal creating a digital signature for the TOE challenge.*

Application Note 65 *For RSA and EC cryptography, the TOE makes use of the Infineon cryptographic library.*

Application Note 66 *All the curves reported in ICAO Doc 9303-11 [R19] are supported. However, the curves brainpoolP320r1, as well as those having field order shorter than 256 bits, are out of the scope of the evaluation (cf. [R39]).*

Application Note 67 *Although signature for Terminal Authentication data using cryptographic algorithm ECDSA with SHA-224 is supported, this algorithm will become legacy in 2025, according to [R39].*

Application Note 68 *A hash algorithm, whose output length is of the same length or greater than the length of the ECC key in use, shall be used. (cf. [R8]).*

Application Note 69 *FCS_COP.1/SIG_VER implicitly contains the requirements for the SHA hashing functions used for the Terminal Authentication by demanding compliance to the mechanism described in [R6] [R7].*

The TOE shall meet the requirement “Quality metric for random numbers (FCS_RND.1)” as specified below (Common Criteria Part 2 extended).

6.2.17 FCS_RND.1

Quality metrics for random numbers

Hierarchical to: No other components.

Dependencies: No dependencies.

FCS_RND.1.1:

The TSF shall provide a mechanism to generate random numbers that meet **BSI AIS-31 [R2] (see Application Note 72)**[96].

Application Note 70 *The SFR FCS_RND.1 in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

Application Note 71 *This SFR requires the TOE to generate random numbers used for the authentication protocols as required by FIA_UAU.4.*

Application Note 72 *The TOE makes use of the Random Number Generation, meeting AIS31 PTG.2.*

6.3 Class FIA: Identification and authentication

For the sake of better readability, Table 6-3 provides an overview of the authentication mechanisms used.

Table 6-3 Overview of authentication SFRs

Mechanism	SFR for the TOE	Comments
Authentication Mechanism for Initialization Agent	FIA_AFL.1/Init FIA_UAU.4	AES (256 bits keys)
Authentication Mechanism for Pre-personalization Agent	FIA_UAU.4 FIA_AFL.1/Pre-pers	AES (128, 192 or 256 bits keys)
Authentication Mechanism for Personalization Agent	FIA_UAU.4 FIA_AFL.1/Pers	AES (128, 192 or 256 bits keys)
Chip Authentication Protocol v.1	FIA_API.1/CAV1 FIA_UAU.5 FIA_UAU.6	Triple-DES (112-bit keys) AES (128, 192, 256-bit keys) Retail MAC (112-bit keys) DH ECDH
Terminal Authentication Protocol v.1	FIA_UAU.5	RSASSA-PSS ECDSA
PACE protocol[97]	FIA_UAU.1/PACE	Triple-DES (112-bit keys)

[96] [assignment: *a defined quality metric*]

[97] Only listed for information purposes

	FIA_UAU.5/PACE FIA_AFL.1/PACE FIA_API.1/CAM	AES (128, 192, 256-bit keys) ECDH with Integrated Mapping, Generic Mapping and Chip Authentication Mapping.
Passive Authentication	FIA_UAU.5/PACE	Verification of the hashes of DGs
Active Authentication	FIA_API.1/AA	RSA ECDSA

Note the Chip Authentication Protocol Version 1 as defined in this security target includes:

- the asymmetric key agreement to establish symmetric secure messaging between the TOE and the terminal based on the Chip Authentication Public Key and the Terminal Public Key used later in the Terminal Authentication Protocol Version 1,
- the check whether the TOE is able to generate the correct message authentication code with the expected key for any message received by the terminal.

The Chip Authentication may be performed as either part of PACE-CAM or as Chip Authentication protocol v.1. Both may be used independent of the Terminal Authentication Protocol v.1. If the Terminal Authentication Protocol v.1 is used, the terminal shall use the same public keys presented during either the PACE-CAM or the Chip Authentication Protocol v.1.

6.3.1 FIA_AFL.1/Init

Authentication failure handling in Step 5 Initialization

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication

FIA_AFL.1.1/Init:

The TSF shall detect when **15**[98] unsuccessful authentication attempts occur related to **consecutive failed authentication attempts with respect to the initialization key**[99].

[98] [selection: *[assignment: positive integer number], an administrator configurable positive integer within [assignment: range of acceptable values]*]

[99] [assignment: list of authentication events]

FIA_AFL.1.2/Init:

When the defined number of consecutive unsuccessful authentication attempts has been **met**[100], the TSF shall **block the Initialization key**[101].

6.3.2 FIA_AFL.1/Pre-pers

Authentication failure handling in Step 6 "Pre-personalization"

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication

FIA_AFL.1.1/Pre-pers:

The TSF shall detect when **15**[102] unsuccessful authentication attempts occur related to **consecutive failed authentication attempts with respect to the Pre-personalization key**[103].

FIA_AFL.1.2/Pre-pers:

When the defined number of consecutive unsuccessful authentication attempts has been **met**[104], the TSF shall **block the Pre-personalization key**[105].

6.3.3 FIA_AFL.1/Pers

Authentication failure handling in Step 7 "Personalization"

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication

[100] [assignment: *met or surpassed*]
[101] [assignment: *list of actions*]
[102] [selection: *[assignment: positive integer number], an administrator configurable positive integer within [assignment: range of acceptable values]*]
[103] [assignment: list of authentication events]
[104] [assignment: *met or surpassed*]
[105] [assignment: *list of actions*]

FIA_AFL.1.1/Pers:

The TSF shall detect when **15**[106] unsuccessful authentication attempts occur related to **consecutive failed authentication attempts with respect to the Personalization key**[107].

FIA_AFL.1.2/Pers:

When the defined number of consecutive unsuccessful authentication attempts has been **met**[108], the TSF shall **block the Personalization key** [109].

6.3.4 FIA_AFL.1/BAC

Authentication failure handling in Step 8 "Operational Use"

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication

FIA_AFL.1.1/BAC:

The TSF shall detect when **one**[110] unsuccessful authentication attempts occur related to **consecutive failed authentication attempts with respect to the BAC key**[111].

FIA_AFL.1.2/BAC:

When the defined number of consecutive unsuccessful authentication attempts has been **met**[112], the TSF shall **delay each following authentication attempt. The delay will be**

[106] [selection: *[assignment: positive integer number], an administrator configurable positive integer within [assignment: range of acceptable values]*]

[107] [assignment: list of authentication events]

[108] [assignment: *met or surpassed*]

[109] [assignment: *list of actions*]

[110] [selection: *[assignment: positive integer number], an administrator configurable positive integer within [assignment: range of acceptable values]*]

[111] [assignment: list of authentication events]

[112] [assignment: *met or surpassed*]

increased for each consecutive unsuccessful authentication[113].

Application Note 73 *After a successful authentication, the retry counter is reset to its maximum value.*

Application Note 74 *The value of the delay is configurable during the Personalization step by the Personalization Agent (cf. [R16]).*

6.3.5 FIA_AFL.1/PACE

Authentication failure handling – PACE authentication using non-blocking authorization data

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication

FIA_AFL.1.1/PACE:

The TSF shall detect when **one**[114] unsuccessful authentication attempt occurs related to authentication attempts using the PACE password as shared password[115].

FIA_AFL.1.2/PACE:

When the defined number of consecutive unsuccessful authentication attempts has been met[116], the TSF shall **delay each following authentication attempt and the delay will be increased for each consecutive unsuccessful authentication**[117].

Application Note 75 *After a successful authentication, the retry counter is reset to its maximum value.*

[113] [assignment: *list of actions*]
[114] [assignment*: positive integer number*]
[115] [assignment: *list of authentication events*]
[116] [selection: *met*, *surpassed*]
[117] [assignment: *list of actions*]

Application Note 76 *The value of the delay is configurable during the Pre-personalization step by the Pre-personalization Agent (cf. [R15]).*

The TOE shall meet the requirement “Timing of identification (FIA_UID.1)” as specified below (Common Criteria Part 2).

6.3.6 FIA_UID.1/BAC

Timing of identification

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UID.1.1/BAC:

The TSF shall allow

1. to read the IC Initialization Data in Phase 2 “Manufacturing”,
2. to read the random identifier in Phase 3 “Personalization of the MRTD”,
3. to read the random identifier in Phase 4 “Operational Use”[118]

Refinement

4. **to carry out the Active Authentication mechanism according to [R19]**.

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

FIA_UID.1.2/BAC:

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

[118] [assignment: *list of TSF-mediated actions*]

Application Note 77 *In the Phase 2 "Manufacturing of the TOE" the Manufacturer is the only user role available for the TOE. The Pre-personalization Agent may create the user role Personalization Agent for transition from Phase 2 to Phase 3 "Personalization of the* MRTD*". The users in role Personalization Agent identify by themselves by means of selecting the authentication key. After personalization in the Phase 3 (i.e. writing the digital MRZ and the Document Basic Access Keys) the user role Basic Inspection System is created by writing the Document Basic Access Keys. The Basic Inspection System is identified as default user after power up or reset of the TOE i.e. the TOE will use the Document Basic Access Key to authenticate the user as Basic Inspection System.*

Application Note 78 *In the "Operational Use" phase the* MRTD *must not allow anybody to read the ICCSN, the* MRTD *identifier or any other unique identification before the user is authenticated as Basic Inspection System (cf. T.Chip_ID). Note that the terminal and the* MRTD *chip use a (randomly chosen) identifier for the communication channel to allow the terminal to communicate with more than one RFID. If this identifier is randomly selected it will not violate the OT.Identification.*

6.3.7 FIA_UID.1/PACE

Timing of identification

Hierarchical to:	No other components.
Dependencies:	No dependencies.

FIA_UID.1.1/PACE:

The TSF shall allow

1. to establish the communication channel,
2. carrying out the PACE protocol according to [R19],
3. to read the Initialization Data if it is not disabled by TSF according to FMT_MTD.1/INI_DIS,
4. to carry out the Chip Authentication Protocol v.1 according to [R6],
5. to carry out the Terminal Authentication Protocol v.1 according to [R6][119],

[119] [assignment: *list of TSF-mediated actions*]

6. **<u>to carry out the Active Authentication mechanism according to [R19]</u>**[120]

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.

Application Note 79 *The SFR FIA_UID.1/PACE in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in the PACE PP [R5] by EAC aspect 4. This extension does not conflict with the strict conformance to PACE PP.*

Application Note 80 *After personalization in the Phase 3 the PACE domain parameters, the Chip Authentication data and Terminal Authentication Reference Data are written into the TOE. The Inspection System is identified as default user after power up or reset of the TOE i.e. the TOE will run the PACE protocol, to gain access to the Chip Authentication Reference Data and to run the Chip Authentication Protocol Version 1. After successful authentication of the chip the terminal may identify itself as (i) Extended Inspection System by selection of the templates for the Terminal Authentication Protocol Version 1 or (ii) if necessary and available by authentication as Personalization Agent (using the Personalization key).*

Application Note 81 *In Step 5, Initialization, of Phase 2, Manufacturing of the TOE, the Initialization Agent is the only user role known to the TOE which writes the Initialization Data in the audit records of the IC. The user in role Initialization Agent identifies himself by means of the GIM mechanism described in the initialization guidance. In Step 6, Pre-personalization, of Phase 2, Manufacturing of the TOE, the Pre-personalization Agent is the only user role known to the TOE which writes the Pre-personalization Data in the audit records of the IC. The Pre-personalization Agent creates the user role Personalization Agent for transition from Phase 2 to Phase 3, Personalization of the Travel Document. The users in roles Pre-personalization Agent or Personalization Agent identify themselves by means of selecting the authentication key. After personalization in Phase 3, the PACE domain parameters, the Chip Authentication data, and Terminal Authentication Reference Data are written into the TOE. The Inspection System is identified as default user after power up or reset of the TOE i.e. the TOE will run the PACE protocol, to gain access to the Chip Authentication Reference Data and to run the Chip Authentication Protocol Version 1. After successful authentication of the chip the terminal may identify itself as (i) Extended*

[120] [assignment: *list of TSF-mediated actions*]

Inspection System by selection of the templates for the Terminal Authentication Protocol Version 1, or (ii) if necessary and available by authentication as Personalization Agent (using the Personalization key).

Application Note 82 *User identified after a successfully performed PACE protocol is a terminal. Please note that neither CAN nor MRZ effectively represent secrets, but are restricted-revealable; i.e. it is either the Travel Document holder itself or an authorised other person or device (Basic Inspection System with PACE).*

Application Note 83 *In the life-cycle phase 'Manufacturing' the Manufacturer is the only user role known to the TOE. The Manufacturer writes the Initialization Data and/or the Pre-personalization Data in the audit records of the IC.*
Note that the Initialization Agent, the Pre-personalization Agent and the Personalization Agent act on behalf of the Travel Document Issuer under his and CSCA and DS policies. Hence, they define authentication procedure(s) for the Initialization Agent, the Pre-personalization Agent and the Personalization Agent. The TOE must functionally support these authentication procedures being subject to evaluation within the assurance components ALC_DEL.1 and AGD_PRE.1. The TOE assumes the user roles Initialization Agent, Pre-personalization Agent or Personalization Agent, when a terminal proves the respective Terminal Authorization Level as defined by the related policy (policies).

The TOE shall meet the requirement "Timing of authentication (FIA_UAU.1)" as specified below (Common Criteria Part 2).

6.3.8 FIA_UAU.1/BAC

Timing of authentication

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification

FIA_UAU.1.1/BAC:

The TSF shall allow

1. to read the IC Initialization data in Phase 2 "Manufacturing",
2. to read the random identifier in Phase 3 "Personalization of the MRTD",

3. to read the random identifier in Phase 4 “Operational Use”[121].

   Refinement

4. **to carry out the Active Authentication mechanism according to [R19]**.

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

FIA_UAU.1.2/BAC:

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

Application Note 84 *The Basic Inspection System and the Personalization Agent authenticate themselves.*

6.3.9 FIA_UAU.1/PACE

Timing of authentication

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification

FIA_UAU.1.1/PACE:

The TSF shall allow

1. to establish the communication channel,
2. carrying out the PACE Protocol according to [R19],
3. to read the Initialization Data if it is not disabled by TSF according to FMT_MTD.1/INI_DIS,
4. to identify themselves by selection of the authentication key,
5. to carry out the Chip Authentication Protocol Version 1 according to [R6],

[121] [assignment: *list of TSF-mediated actions*]

6. to carry out the Terminal Authentication Protocol Version 1 according to [R6][122],
7. **to carry out the Active Authentication mechanism according to [R19]**[123]

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.

Application Note 85 *The SFR FIA_UAU.1/PACE in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in the PACE PP [R5] by EAC aspect 5. This extension does not conflict with the strict conformance to PACE PP.*

Application Note 86 *The user authenticated after a successfully performed PACE protocol is a terminal. Please note that neither CAN nor MRZ effectively represent secrets, but are restricted-revealable; i.e. it is either the Travel Document holder itself or an authorised other person or device (BIS-PACE). If PACE was successfully performed, secure messaging is started using the derived session keys (PACE-K_{MAC}, PACE-K_{ENC}), cf. FTP_ITC.1/PACE.*

The TOE shall meet the requirements of “Single-use authentication mechanisms (FIA_UAU.4)” as specified below (Common Criteria Part 2).

6.3.10 FIA_UAU.4/BAC

Single-use authentication mechanisms – Single-use authentication of the Terminal by the TOE

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.4.1:

[122] [assignment: *list of TSF-mediated actions*]
[123] [assignment: *list of TSF-mediated actions*]

The TSF shall prevent reuse of authentication data related to

1. Basic Access Control Authentication Mechanism,
2. Authentication Mechanism based on **AES**[124].

Application Note 87 *The Basic Access Control Mechanism is a mutual device authentication mechanism defined in [R19]. In the first step, the terminal authenticates itself to the* MRTD's *chip and the* MRTD's *chip authenticates to the terminal in the second step. In this second step, the* MRTD's *chip provides the terminal with a challenge-response-pair which allows a unique identification of the* MRTD's *chip with some probability depending on the entropy of the Document Basic Access Keys. Therefore, the TOE shall stop further communications if the terminal is not successfully authenticated in the first step of the protocol to fulfil the security objective OT.Identification and to prevent T.Chip_ID.*

6.3.11 FIA_UAU.4/PACE

Single-use authentication mechanisms - Single-use authentication of the Terminal by the TOE

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.4.1/PACE:

The TSF shall prevent reuse of authentication data related to

1. PACE Protocol according to [R19],
2. Authentication Mechanisms based on **AES**[125],
3. Terminal Authentication Protocol v.1 according to [R6][126].

Application Note 88 *The SFR FIA_UAU.4.1 in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in PACE PP [R5] by the EAC aspect 3. This extension does not conflict with the strict conformance to PACE PP. The generation of random numbers (random nonce) used for the authentication protocol (PACE) and Terminal Authentication as required by FIA_UAU.4/PACE is required by FCS_RND.1 from [R5].*

[124] [selection: *Triple-DES, AES or other approved algorithms*]
[125] [selection: *Triple-DES, AES or other approved algorithms*]
[126] [assignment: *identified authentication mechanism(s)*]

Application Note 89 *The authentication mechanisms use a challenge freshly and randomly generated by the TOE to prevent reuse of a response generated by a terminal in a successful authentication attempt.*

Application Note 90 *In addition, the authentication as Pre-personalization Agent or as Personalization Agent makes use of a diversifier, thus ensuring protection against replay attacks, such as the use of an internal counter as a diversifier. Note that replay attacks have no effect in Initialization, as they can only re-propose the same configuration data.*

The TOE shall meet the requirement “Multiple authentication mechanisms (FIA_UAU.5)” as specified below (CC part 2).

6.3.12 FIA_UAU.5/BAC

Multiple authentication mechanisms

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.5.1:

The TSF shall provide

1. Basic Access Control Authentication Mechanism,
2. Symmetric authentication mechanism based on **AES**[127].

to support user authentication.

FIA_UAU.5.2:

The TSF shall authenticate any user’s claimed identity according to the following rules:

1. the TOE accepts the authentication attempt as Personalization Agent by **the Symmetric Authentication Mechanism based on SCP03 with Personalization keys**
2. the TOE accepts the authentication attempt as Basic Inspection System only by means of the Basic Access

[127] [selection: *Triple-DES, AES or other approved mechanisms*]

Control Authentication Mechanism with the Document Basic Access Keys[128],

Refinement:

3. **the TOE accepts the authentication attempt as Initialization Agent by the following mechanism: Symmetric Authentication Mechanism based on AES with Initialization key, according to the Initialization guidance [R14],**
4. **the TOE accepts the authentication attempt as Pre-personalization Agent by the Symmetric Authentication Mechanism based on SCP03 with Pre-personalization keys, according to [R12].**

Application Note 91 *The Symmetric Authentication Mechanism for the Initialization Agent is based on AES with 256-bit key as described in the Initialization guidance.*

Application Note 92 *The Symmetric Authentication Mechanism for the Pre-personalization Agent and Personalization Agent is based on the SCP03 protocol [R12] based on AES. Note that Application Note 31 in the BAC PP [R3] is subordinated to the compliance with the EAC PP.*

Application Note 93 *The authentication mechanisms for the Initialization Agent, the Pre-personalization Agent and the Personalization Agent, as well as the Basic Access Control Mechanism include the secure messaging for all commands exchanged after successful authentication of the terminal.*

6.3.13 FIA_UAU.5/PACE

Multiple authentication mechanisms

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.5.1/PACE:

The TSF shall provide

1. PACE Protocol according to [R19],

[128] [assignment: *rules describing how the multiple authentication mechanisms provide authentication*]

2. Passive Authentication according to [R19],
3. Secure messaging in MAC-ENC mode according to [R19],
4. Symmetric Authentication Mechanisms based on **Triple-DES and AES**[129]
5. Terminal Authentication Protocol v.1 according to [R6][130]

to support user authentication.

FIA_UAU.5.2/PACE:

The TSF shall authenticate any user's claimed identity according to the following rules:

1. 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.
2. The TOE accepts the authentication attempt as Personalization Agent by **the Symmetric Authentication Mechanism based on SCP03 with Personalization keys**[131].
3. 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 v.1.
4. 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 Protocol v.1 and the secure messaging established by the Chip Authentication Mechanism v.1[132]

Refinement: or the public key presented during PACE-CAM and the secure messaging established by PACE-CAM.

5. **The TOE accepts the authentication attempt as Initialization Agent by the Symmetric Authentication**

[129] [selection: *Triple-DES, AES or other approved algorithms*]
[130] [assignment: *list of multiple authentication mechanism(s)*]
[131] [selection: *the Authentication Mechanism with Personalization keys*]
[132] [assignment: *rules describing how the multiple authentication mechanisms provide authentication*]

<u>Mechanism based on AES with Initialization keys, according to the Initialization guidance [R14]</u> [133].

6. **<u>The TOE accepts the authentication attempt as Pre-personalization Agent by the Symmetric Authentication Mechanism based on SCP03 with Pre-personalization keys</u>**[134].

Application Note 94 *Please note that Passive Authentication does not authenticate any TOE's user, but provides evidence enabling an external entity (the terminal connected) to prove the origin of ePassaport application.*

Application Note 95 *The PACE protocol may use both Triple-DES and AES to encipher the random generated in step 1 of the protocol. However, the algorithm Triple-DES is classified as "legacy" (see [R39]).*

Application Note 96 *The Embedded Software uses the IC resources to perform Triple-DES and AES.*

Application Note 97 *The SFR FIA_UAU.5.1/PACE in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in PACE PP [R5] by EAC aspects 4), 5), and 6). The SFR FIA_UAU.5.2/PACE in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in PACE PP [R5] by EAC aspects 2), 3), 4) and 5). These extensions do not conflict with the strict conformance to PACE PP.*

The TOE shall meet the requirement "Re-authenticating (FIA_UAU.6)" as specified below (Common Criteria Part 2).

6.3.14 FIA_UAU.6/BAC

Re-authenticating – Re-authenticating of Terminal by the TOE

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.6.1:

[133] [assignment: *rules describing how the multiple authentication mechanisms provide authentication*]
[134] [selection: *the Authentication Mechanism with Personalization keys*]

The TSF shall re-authenticate the user under the conditions each command sent to the TOE during a BAC mechanism based communication after successful authentication of the terminal with Basic Access Control Authentication Mechanism[135].

Application Note 98 *The Basic Access Control Mechanism specified in [R19] includes the secure messaging for all commands exchanged after successful authentication of the Inspection System. The TOE checks by secure messaging in MAC_ENC mode each command based on Retail-MAC whether it was sent by the successfully authenticated terminal (see FCS_COP.1/MAC for further details). The TOE does not execute any command with incorrect message authentication code. Therefore, the TOE re-authenticates the user for each received command and accepts only those commands received from the previously authenticated BAC user.*

Application Note 99 *Note that in case the TOE should also fulfil [R4], the BAC communication might be followed by a Chip Authentication mechanism establishing a new secure messaging that is distinct from the BAC based communication. In this case the condition in FIA_UAU.6 above should not contradict to the option that commands are sent to the TOE that are no longer meeting the BAC communication but are protected by a more secure communication channel established after a more advanced authentication process.*

6.3.15 FIA_UAU.6/PACE

Re-authenticating – Re-authenticating of Terminal by the TOE

Hierarchical to: No other components.

Dependencies: No dependencies.

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[136].

[135] [assignment: *list of conditions under which re-authentication is required*]
[136] [assignment: *list of conditions under which re-authentication is required*]

Application Note 100 *The PACE protocol specified in [R19] starts secure messaging used for all commands exchanged after successful PACE authentication. The TOE checks each command by secure messaging in encrypt-then-authenticate mode based on CMAC or Retail-MAC, whether it was sent by the successfully authenticated terminal (see FCS_COP.1/PACE_MAC for further details). The TOE does not execute any command with incorrect message authentication code. Therefore, the TOE re-authenticates the terminal connected, if a secure messaging error occurred, and accepts only those commands received from the initially authenticated terminal.*

6.3.16 FIA_UAU.6/EAC/CAV1

Re-authenticating – Re-authenticating of Terminal by the TOE after Chip Authentication version 1

Hierarchical to: No other components.

Dependencies: No dependencies.

*FIA_UAU.6.1/EAC/*CAV1*:*

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[137].

6.3.17 FIA_UAU.6/EAC/CAM

Re-authenticating – Re-authenticating of Terminal by the TOE after PACE-CAM

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.6.1/EAC/CAM:

The TSF shall re-authenticate the user under the conditions each command sent to the TOE after successful run of **PACE with Chip Authentication Mapping** shall be verified as being sent by the Inspection System[138].

[137] [assignment: *list of conditions under which re-authentication is required*]

[138] [assignment: *list of conditions under which re-authentication is required*]

Application Note 101 *The Password Authenticated Connection Establishment and the Chip Authentication Protocol specified in [R19] include secure messaging for all commands exchanged after successful authentication of the Inspection System. The TOE checks by secure messaging in MAC_ENC mode each command based on a corresponding MAC algorithm whether it was sent by the successfully authenticated terminal (see FCS_COP.1/CA_MAC for further details). The TOE does not execute any command with incorrect message authentication code. Therefore, the TOE re-authenticates the user for each received command and accepts only those commands received from the previously authenticated user.*

The TOE shall meet the requirement "Authentication Proof of Identity (FIA_API.1)" as specified below (Common Criteria Part 2 extended).

6.3.18 FIA_API.1/CAV1

Authentication Proof of Identity by Chip Authentication version 1

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_API.1.1/CAV1:

The TSF shall provide Chip Authentication Protocol Version 1 according to [R19][139] to prove the identity of the TOE[140].

6.3.19 FIA_API.1/CAM

Authentication Proof of Identity by PACE with Chip Authentication Mapping

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_API.1.1/CAM:

[139] [assignment: *authentication mechanism*]

[140] [assignment: *authorized user or rule*]

The TSF shall provide **PACE with Chip Authentication Mapping according to [R19]**[141] to prove the identity of the **TOE**[142].

Application Note 102 *FIA_API.1/CAV1 and FIA_API.1/CAM require the TOE to implement Chip Authentication either as part of PACE-CAM specified in [R19] or by Chip Authentication Mechanism Version 1 specified in [R6]. In the case of PACE-CAM, the terminal verifies the authenticity of the chip using the Chip Authentication Data sent by the Travel Document. In the case of Chip Authentication Version 1, the TOE and the terminal generate a shared secret using the Diffie-Hellman Protocol (EC-DH) and two session keys for secure messaging in ENC_MAC mode according to [R19]. the terminal verifies by means of secure messaging whether the Travel Document's chip was able or not to run his protocol properly using its Chip Authentication Private Key corresponding to the Chip Authentication key (EF.DG14).*

6.3.20 FIA_API.1/AA

Authentication Proof of Identity by Active Authentication

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_API.1.1/AA:

The TSF shall provide **Active Authentication Protocol according to [R19]**[143] to prove the identity of the **TOE**[144].

6.4 Class FDP: User data protection

The TOE shall meet the requirement “Subset access control (FDP_ACC.1)” as specified below (Common Criteria Part 2).

[141] [assignment: *authentication mechanism*]
[142] [assignment: *authorized user or rule*]
[143] [assignment: *authentication mechanism*]
[144] [assignment: *authorized user or rule*]

6.4.1 FDP_ACC.1/TRM

Subset access control

Hierarchical to: No other components.

Dependencies: FDP_ACF.1 Security attribute based access control

FDP_ACC.1.1/TRM:

The TSF shall enforce the Access Control SFP[145] on terminals gaining access to the User Data and data stored in EF.SOD of the logical Travel Document[146].

Application Note 103 *The SFR FDP_ACC.1.1 in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in BAC PP [R3] and PACE PP [R5] by data stored in EF.SOD of the logical Travel Document. This extension does not conflict with the strict conformance to BAC PP and PACE PP.*

The TOE shall meet the requirement "Security attribute based access control (FDP_ACF.1)" as specified below (Common Criteria Part 2).

6.4.2 FDP_ACF.1/TRM

Security attribute based access control – Terminal Access

Hierarchical to: No other components.

Dependencies: FDP_ACC.1 Subset access control
FMT_MSA.3 Static attribute initialization

FDP_ACF.1.1/TRM:

The TSF shall enforce the Access Control SFP[147] to objects based on the following:

1. Subjects:
   a. Terminal,

[145] [assignment: *access control SFP*]
[146] [assignment: *list of subjects, objects, and operations among subjects and objects covered by the SFP*]
[147] [assignment: *access control SFP*]

b. BIS-PACE,

c. Extended Inspection System.

Refinement:

d. **Initialization Agent,**

e. **Pre-personalization Agent,**

f. **Personalization Agent,**

g. **Basic 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[148].

Refinement:

e. **TOE Initialization data, which include the Pre-personalization key**,

f. **TOE Pre-personalization data, which include other TSF data ,**

g. **TOE Personalization data, which include other TSF data**

3. Security attributes:

a. authentication status of terminals,

b. PACE Authentication,

c. Terminal Authentication v.1,

d. Authorization of the Terminal[149].

FDP_ACF.1.2/TRM:

[148] e.g. Chip Authentication Version 1 and ephemeral keys

[149] [assignment: *list of subjects and objects controlled under the indicated SFP, and, for each, the SFP-relevant security attributes, or named groups of SFP-relevant security attributes*]

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

1. A BIS-PACE is allowed to read data objects from FDP_ACF.1.1/TRM according to [R19] after a successful PACE authentication as required by FIA_UAU.1/PACE[150].

Refinement:

2. **the successfully authenticated Basic Inspection System is allowed to read the data in EF.COM, EF.SOD, EF.DG1, EF.DG2 and EF.DG5 to EF.DG16 of the logical MRTD,**
3. **the successfully authenticated Initialization Agent is allowed to write the pre-personalization key of the logical MRTD,**
4. **the successfully authenticated Pre-personalization Agent is allowed to write the data of the EF.DG14 and EF.DG15, as well as other TSF data of the logical MRTD,**
5. **the successfully authenticated Personalization Agent is allowed to write the data of the EF.COM, EF.SOD, EF.DG1 to EF.DG13, EF.DG16, as well as other TSF, and to read the data of the EF.COM, EF.SOD, EF.DG1 to EF.DG16 of the logical MRTD.**

FDP_ACF.1.3/TRM:

The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: none[151].

FDP_ACF.1.4/TRM:

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

1. 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.

[150] [assignment: *rules governing access among controlled subjects and controlled objects using controlled operations or controlled objects*]

[151] [assignment: *rules, based on security attributes, that explicitly authorise access of subjects to objects*]

2. Terminals not using secure messaging are not allowed to read, to write, to modify, to use any data stored on the Travel Document.
3. Any terminal being not successfully authenticated as Extended Inspection System with the Read access to DG3 (Fingerprint) granted by the relative certificate holder authorization encoding is not allowed to read the data objects 2b) of FDP_ACF.1.1/TRM.
4. Any terminal being not successfully authenticated as Extended Inspection System with the Read access to DG4 (Iris) granted by the relative certificate holder authorization encoding is not allowed to read the data objects 2c) of FDP_ACF.1.1/TRM.
5. Nobody is allowed to read the data objects 2d) of FDP_ACF.1.1/TRM.
6. Terminals authenticated as CVCA or as DV are not allowed to read data in the EF.DG3 and EF.DG4[152].

Refinement:

7. **Any Terminal is not allowed to modify any of the EF.DG1 to EF.DG16 of the logical MRTD.**

Application Note 104 *The read access to user data in the personalization phase is protected by Personalization Key.*

Application Note 105 *The SFR FDP_ACF.1.1/TRM in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in BAC PP [R3] and PACE PP [R5] by additional subjects and objects. The SFRs FDP_ACF.1.2/TRM in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in BAC PP by additional rules. The FDP_ACF.1.3/TRM in this ST cover the definition in PACE PP [R5]. The SFR FDP_ACF.1.4/TRM in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in PACE PP [R5] by 3) to 6). And the definition in BAC PP [R3] by 7). These extensions do not conflict with the strict conformance to BAC PP and PACE PP.*

Application Note 106 *The relative Certificate Holder Authorization encoded in the CV certificate of the inspection system is defined in [R7]. The TOE verifies the certificate chain established by the Country Verifying Certification Authority, the Document Verifier Certificate and the Inspection System Certificate (cf. FMT_MTD.3). The Terminal Authorization is the intersection of the Certificate Holder Authorization in the certificates of the Country Verifying*

[152] [assignment: *rules, based on security attributes, that explicitly authorise access of subjects to objects*]

Certification Authority, the Document Verifier Certificate and the Inspection System Certificate in a valid certificate chain.

Application Note 107 *Please note that the Document Security Object (SO_D) stored in EF.SOD (see [R18]) does not belong to the user data, but to the TSF data. The Document Security Object can be read out by Inspection Systems using PACE, see [R19].*

Application Note 108 *Please note that the control on the user data transmitted between the TOE and the PACE terminal is addressed by FTP_ITC.1/PACE.*

The TOE shall meet the requirement “Subset residual information protection” (FDP_RIP.1) as specified below (Common Criteria Part 2).

6.4.3 FDP_RIP.1

Subset residual information protection

Hierarchical to: No other components.

Dependencies: No dependencies.

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**[153] the following objects:

1. session keys (immediately after closing related communication session),
2. the ephemeral private key ephem-SK_{PICC}-PACE (by having generated a DH shared secret K[154])[155].
3. **none**[156]

The TOE shall meet the requirement “Basic data exchange confidentiality (FDP_UCT.1)” as specified below (Common Criteria Part 2).

[153] [selection: *allocation of the resource to, deallocation of the resource from*]
[154] According to [R19]
[155] [assignment: *list of objects*]
[156] [assignment: *list of objects*].

6.4.4 FDP_UCT.1/TRM

Basic data exchange confidentiality – Travel Document

Hierarchical to: No other components.

Dependencies: [FTP_ITC.1 Inter-TSF trusted channel, or
FTP_TRP.1 Trusted path]
[FDP_ACC.1 Subset access control, or
FDP_IFC.1 Subset information flow control]

FDP_UCT.1.1/TRM:

The TSF shall enforce the Access Control SFP[157] to be able to transmit and receive[158] user data in a manner protected from unauthorized disclosure.

Application Note 109 *The SFR FDP_UCT.1/TRM in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

The TOE shall meet the requirement "Basic data exchange integrity (FDP_UIT.1)" as specified below (Common Criteria Part 2).

6.4.5 FDP_UIT.1/TRM

Data exchange integrity

Hierarchical to: No other components.

Dependencies: [FTP_ITC.1 Inter-TSF trusted channel, or
FTP_TRP.1 Trusted path]
[FDP_ACC.1 Subset access control, or
FDP_IFC.1 Subset information flow control]

FDP_UIT.1.1/TRM:

[157] [assignment: *access control SFP(s) and/or information flow control SFP(s)*]
[158] [selection: *transmit, receive*]

The TSF shall enforce the Access Control SFP[159] to be able to transmit and receive[160] user data in a manner protected from modification, deletion, insertion and replay[161] errors.

FDP_UIT.1.2/TRM:

The TSF shall be able to determine on receipt of user data, whether modification, deletion, insertion and replay[162] has occurred.

Application Note 110 *The SFR FDP_UIT/TRM in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

Application Note 111 *FDP_UCT.1/TRM and FDP_UIT.1/TRM require the protection of the User Data transmitted from the TOE to the terminal by secure messaging with encryption and message authentication codes either after successful PACE-CAM or after successful Chip Authentication Version 1 to the Inspection System. The Password Authenticated Connection Establishment, and the Chip Authentication Protocol v.1 establish different key sets to be used for secure messaging (each set of keys for the encryption and the message authentication key).*

6.5 Class FTP: Trusted path/channels

6.5.1 FTP_ITC.1/PACE

Inter-TSF trusted channel after PACE or Chip Authentication

Hierarchical to: No other components.

Dependencies: No dependencies.

FTP_ITC.1.1/PACE:

The TSF shall provide a communication channel between itself and another trusted IT product that is logically distinct from

[159] [assignment: *access control SFP(s) and/or information flow control SFP(s)*]
[160] [selection: *transmit, receive*]
[161] [selection: *modification, deletion, insertion, replay*]
[162] [selection: *modification, deletion, insertion, replay*]

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:

The TSF shall **enforce** communication via the trusted channel for any data exchange between the TOE and the Terminal[163].

Application Note 112 *The trusted IT product is the terminal. In FTP_ITC.1.3/PACE, the word "initiate" is changed to 'enforce", as the TOE is a passive device that can not initiate the communication. All the communication is initiated by the Terminal, and the TOE enforces the trusted channel.*

Application Note 113 *The trusted channel is established after successful performing the Chip Authentication protocol or the PACE protocol (FIA_UAU.1/PACE). If the PACE was successfully performed, secure messaging is immediately started using the derived session keys (PACE-K_{MAC}, PACE-K_{ENC}); If the Chip Authentication protocol was successfully performed, secure messaging is immediately restarted using the derived session keys. This secure messaging enforces preventing tracing while Passive Authentication and the required properties of operational trusted channel; the cryptographic primitives being used for the secure messaging are as required by FCS_COP.1/PACE_ENC and FCS_COP.1/PACE_MAC. The establishing phase of the trusted channel does not enable tracing due to the requirements FIA_AFL.1/PACE. Note that Terminal Authentication also requires secure messaging with the session keys established after Chip Authentication, either as part of PACE-CAM or as Chip Authentication Protocol Version 1.*

Application Note 114 *Please note that the control on the user data stored in the TOE is addressed by FDP_ACF.1/TRM.*

6.5.2 FTP_ITC.1/SCP

Inter-TSF trusted channel after SCP Authentication

[163] [assignment: *list of functions for which a trusted channel is required*]

Hierarchical to: No other components.

Dependencies: No dependencies.

FTP_ITC.1.1/SCP:

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/SCP:

The TSF shall permit another trusted IT product to initiate communication via the trusted channel.

FTP_ITC.1.3/SCP:

The TSF shall **enforce** communication via the trusted channel for **any data exchange between the TOE and the Terminal in Pre-personalization and in Personalization** [164].

Application Note 115 *This SFR requires any data exchanged after a SCP03 authentication in Pre-personalization or in Personalization to be transmitted over a secured channel. In particular, Active Authentication data are transmitted through the secure channel established by the Pre-personalization Terminal.*

6.6 Class FMT: Security management

The SFRs FMT_SMF.1 and FMT_SMR.1 provide basic requirements on the management of the TSF data.

The TOE shall meet the requirement "Specification of Management Functions (FMT_SMF.1)" as specified below (Common Criteria Part 2).

[164] [assignment: *list of functions for which a trusted channel is required*]

6.6.1 FMT_SMF.1

Specification of Management Functions

Hierarchical to: No other components.

Dependencies: No dependencies.

FMT_SMF.1.1:

The TSF shall be capable of performing the following security management functions:

1. Initialization,
2. Pre-Personalization,
3. Personalization,
4. Configuration[165].

Application Note 116 *The SFR FMT_SMF.1 in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

Application Note 117 *The ability to initialize, personalize, and configure the TOE is restricted to a successfully authenticated Initialization Agent, Pre-personalization or Personalization Agent by means of symmetric keys.*

The TOE shall meet the requirement "Security roles (FMT_SMR.1)" as specified below (Common Criteria Part 2).

6.6.2 FMT_SMR.1/BAC

Security roles

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification

FMT_SMR.1.1:

The TSF shall maintain the roles

[165] [assignment: *list of security management functions to be provided by the TSF*]

1. Manufacturer,
2. Personalization Agent,
3. Basic Inspection System[166].

FMT_SMR.1.2:

The TSF shall be able to associate users with roles.

Application Note 118 *The role Manufacturer collectively refers to the IC Manufacturer, the Card Manufacturer, the Initialization Agent and the Pre-personalization Agent*

Application Note 119 *The SFR FMT_LIM.1 and FMT_LIM.2 address the management of the TSF and TSF data to prevent misuse of test features of the TOE over the life cycle phases.*

6.6.3 FMT_SMR.1/PACE

Security roles

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification

FMT_SMR.1.1/PACE:

The TSF shall maintain the roles

1. Manufacturer,
2. Personalization Agent,
3. Terminal,
4. PACE authenticated BIS-PACE,
5. Country Verifying Certification Authority,
6. Document Verifier,
7. Domestic Extended Inspection System,
8. Foreign Extended Inspection System[167].

[166] [assignment: *the authorised identified roles*]
[167] [assignment: *the authorised identified roles*]

FMT_SMR.1.2/PACE:

The TSF shall be able to associate users with roles.

Application Note 120 *The SFR FMT_SMR.1.1/PACE in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in PACE PP [R5] by 5) to 8). This extension does not conflict with the strict conformance to PACE PP.*

Application Note 121 *For explanation on the role Manufacturer and Personalization Agent please refer to the glossary. The role Terminal is the default role for any terminal being recognised by the TOE as not PACE authenticated BIS-PACE ('Terminal' is used by the Travel Document presenter).*

Application Note 122 *The role Country Verifying Certification Authority refers to the Personalization Agent during the Personalization phase (step 7), and to the Inspection System during the Operational use phase (step 8).*

Application Note 123 *The role Document Verifier refers to the Inspection System during the Operational use phase (step 8).*

The TOE recognises the Travel Document holder or an authorised other person or device (BIS-PACE) by using PACE authenticated BIS-PACE (FIA_UAU.1/PACE).

The SFRs FMT_LIM.1 and FMT_LIM.2 address the management of the TSF and TSF data to prevent misuse of test features of the TOE over the life cycle phases.

The TOE shall meet the requirement "Limited capabilities (FMT_LIM.1)" as specified below (Common Criteria Part 2 extended).

6.6.4 FMT_LIM.1

Limited capabilities

Hierarchical to: No other components.

Dependencies: FMT_LIM.2 Limited availability

FMT_LIM.1.1:

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

Deploying Test Features after TOE Delivery does not allow:

1. User Data to be disclosed or manipulated,
2. TSF data to be disclosed or manipulated,
3. software to be reconstructed,
4. substantial information about construction of TSF to be gathered which may enable other attacks, and
5. sensitive User Data (EF.DG3 and EF.DG4) to be disclosed[168].

Application Note 124 *The SFR FMT_LIM.1 in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in BAC PP [R3] and PACE PP [R5]. This extension does not conflict with the strict conformance to BAC PP and PACE PP.*

The TOE shall meet the requirement “Limited availability (FMT_LIM.2)” as specified below (Common Criteria Part 2 extended).

6.6.5 FMT_LIM.2

Limited availability

Hierarchical to: No other components.

Dependencies: FMT_LIM.1 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 does not allow:

1. User Data to be disclosed or manipulated,
2. TSF data to be disclosed or manipulated,

[168] [assignment: *limited capability and availability policy*]

3. software to be reconstructed,
4. substantial information about construction of TSF to be gathered which may enable other attacks, and
5. sensitive User Data (EF.DG3 and EF.DG4) to be disclosed[169].

Application Note 125 *The SFR FMT_LIM.1 in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in BAC PP [R3] and PACE PP [R5]. This extension does not conflict with the strict conformance to BAC PP and PACE PP.*

Application Note 126 *The formulation of "Deploying Test Features …" in FMT_LIM.2.1 might be a little bit misleading since the addressed features are no longer available (e.g. by disabling or removing the respective functionality). Nevertheless, the combination of FMT_LIM.1 and FMT_LIM.2 is introduced to provide an optional approach to enforce the same policy.*
Note that the term "software" in item 3 of FMT_LIM.1.1 and FMT_LIM.2.1 refers to both IC Dedicated and IC Embedded Software.

The following SFRs are iterations of the component "Management of TSF data" (FMT_MTD.1). The TSF data include, but are not limited to, those identified below.

The TOE shall meet the requirement "Management of TSF data (FMT_MTD.1)" as specified below (Common Criteria Part 2). The iterations address different management functions and different TSF data.

6.6.6 FMT_MTD.1/INI_ENA

Management of TSF data – Writing of Initialization Data and Pre-personalization Data

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/INI_ENA:

[169] [assignment: *limited capability and availability policy*]

The TSF shall restrict the ability to write[170] the Initialization Data and Pre-personalization Data[171] to the Manufacturer[172].

Application Note 127 *The SFR FMT_MTD.1/INI_ENA in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

Application Note 128 *Initialization Data are composed by IC Initialization Data and TOE Initialization Data. IC Initialization Data are written by the IC Manufacturer in step 3 and include, but are not limited to, the Initialization key, TOE Initialization Data are written by the Initialization Agent in step 5 and include, but are not limited to, the Pre-personalization key.*

Application Note 129 *Pre-personalization data are written by the Pre-personalization Agent in Step 6, according to the life cycle described in section 1.5.*

6.6.7 FMT_MTD.1/INI_DIS

Management of TSF data – Reading and Using Initialization Data and Pre-personalization Data

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/INI_DIS:

The TSF shall restrict the ability to read out[173] the Initialization Data and the Pre-personalization Data[174] to the Personalization Agent[175].

Application Note 130 *The SFR FMT_MTD.1/INI_DIS in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

[170] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[171] [assignment: *list of TSF data*]
[172] [assignment: *the authorised identified roles*]
[173] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[174] [assignment: *list of TSF data*]
[175] [assignment: *the authorised identified roles*]

6.6.8 FMT_MTD.1/CVCA_INI

Management of TSF data – Initialization of CVCA Certificate and Current Date

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/CVCA_INI:

The TSF shall restrict the ability to write[176] the

1. initial Country Verifying Certification Authority Public Key,
2. initial Country Verifying Certification Authority Certificate,
3. initial Current Date[177]
4. **none**[178]

to **the Personalization Agent**[179].

Application Note 131 *The initial Country Verifying Certification Authority Public Key may be written by the Manufacturer in the production or pre-personalization phase or by the Personalization Agent (cf. [R7]). The initial Country Verifying Certification Authority Public Keys (and their updates later on) are used to verify the Country Verifying Certification Authority Link-Certificates. The initial Country Verifying Certification Authority Certificate and the initial Current Date are needed for verification of the certificates and the calculation of the Terminal Authorization.*

6.6.9 FMT_MTD.1/CVCA_UPD

Management of TSF data – Country Verifying Certification Authority

Hierarchical to: No other components.

[176] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[177] [assignment: *list of TSF data*]
[178] [assignment: *list of TSF data*]
[179] [assignment: *the authorised identified roles*]

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/CVCA_UPD:

The TSF shall restrict the ability to update[180] the

1. Country Verifying Certification Authority Public Key,
2. Country Verifying Certification Authority Certificate[181]

to Country Verifying Certification Authority[182].

Application Note 132 *The Country Verifying Certification Authority updates its asymmetric key pair and distributes the public key by means of the Country Verifying CA link certificates (cf. [R7]). The TOE updates its internal trust-point if a valid Country Verifying CA link certificates (cf. FMT_MTD.3) is provided by the terminal (cf. [R7]).*

6.6.10 FMT_MTD.1/DATE

Management of TSF data – Current date

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/DATE:

The TSF shall restrict the ability to modify[183] the Current Date[184] to

1. Country Verifying Certification Authority,
2. Document Verifier,
3. Domestic Extended Inspection System[185].

[180] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[181] [assignment: *list of TSF data*]
[182] [assignment: *the authorised identified roles*]
[183] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[184] [assignment: *list of TSF data*]
[185] [assignment: *the authorised identified roles*]

Application Note 133 *The authorized roles are identified in their certificate (cf. [R7]) and authorized by validation of the certificate chain (cf. FMT_MTD.3). The authorized role of the terminal is part of the Certificate Holder Authorization in the card verifiable certificate provided by the terminal for the identification and the Terminal Authentication (cf. [R7]).*

6.6.11 FMT_MTD.1/CAPK

Management of TSF data – Chip Authentication Private Key

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/CAPK:

The TSF shall restrict the ability to **load**[186] the Chip Authentication Private Key[187] to **the Pre-personalization Agent**[188].

Application Note 134 *The verb "load" means here that the Chip Authentication Private Key is generated securely outside the TOE and written into the TOE memory.*

6.6.12 FMT_MTD.1/KEY_WRITE

Management of TSF data – Key Write

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/KEY_WRITE:

[186] [selection: *create, load*]
[187] [assignment: *list of TSF data*]
[188] [assignment: *the authorised identified roles*]

The TSF shall restrict the ability to write[189] the Document Basic Access Keys[190] to the Personalization Agent[191].

6.6.13 FMT_MTD.1/KEY_READ

Management of TSF data – Key Read

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/ KEY_READ:

The TSF shall restrict the ability to read[192] the

1. PACE passwords,
2. Chip Authentication Private Key,
3. Personalization keys[193],

Refinement:

4. **Basic Access Key**
5. **Initialization key,**
6. **Pre-personalization keys,**
7. **Active Authentication Private Key.**

to none[194].

Application Note 135 *The SFR FMT_MTD.1/KEY_READ in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in BAC PP [R3] and PACE PP [R5]. This extension does not conflict with the strict conformance to BAC PP and PACE PP.*

[189] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[190] [assignment: *list of TSF data*]
[191] [assignment: *the authorised identified roles*]
[192] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[193] [assignment: *list of TSF data*]
[194] [assignment: *the authorised identified roles*]

6.6.14 FMT_MTD.1/PA

Management of TSF data – Personalization Agent

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/PA:

The TSF shall restrict the ability to write[195] the Document Security Object (SO_D)[196] to the Personalization Agent[197].

Application Note 136 *By writing SO_D into the TOE, the Personalization Agent confirms (on behalf of DS) the correctness of all the personalization data related. This consists of user- and TSF-data.*

6.6.15 FMT_MTD.1/AAPK

Management of TSF data – Active Authentication Private Key

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MTD.1.1/AAPK:

The TSF shall restrict the ability to **write**[198] the **Active Authentication Private Key**[199] to **the Pre-personalization Agent**[200].

Application Note 137 *The addition of this SFR does not impair the conformance to the Protection Profiles.*

[195] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[196] [assignment: *list of TSF data*]
[197] [assignment: *the authorised identified roles*]
[198] [selection: *change_default, query, modify, delete, clear, [assignment: other operations]*]
[199] [assignment: *list of TSF data*]
[200] [assignment: *the authorised identified roles*]

The TOE shall meet the requirement “Secure TSF data (FMT_MTD.3)” as specified below (Common Criteria Part 2).

6.6.16 FMT_MTD.3

Secure TSF data

Hierarchical to: No other components.

Dependencies: FMT_MTD.1 Management of TSF data

FMT_MTD.3.1:

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[201].

Refinement: The certificate chain is valid if and only if:

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

The Inspection System Public Key contained in the Inspection System Certificate in a valid certificate chain is

[201] [assignment: l*ist of TSF data*]

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.

Application Note 138 *The Terminal Authentication is used for Extended Inspection System as required by FIA_UAU.4/PACE and FIA_UAU.5/PACE. The Terminal Authorization is used as TSF data for access control required by FDP_ACF.1/TRM.*

6.7 Class FPT: Protection of the security functions

The TOE shall prevent inherent and forced illicit information leakage for User Data and TSF-data. The security functional requirement FPT_EMS.1 addresses the inherent leakage. With respect to the forced leakage they have to be considered in combination with the security functional requirements “Failure with preservation of secure state (FPT_FLS.1)” and “TSF testing (FPT_TST.1)” on the one hand and “Resistance to physical attack (FPT_PHP.3)” on the other. The SFRs “Limited capabilities (FMT_LIM.1)”, “Limited availability (FMT_LIM.2)” and “Resistance to physical attack (FPT_PHP.3)” together with the SAR “Security architecture description” (ADV_ARC.1) prevent bypassing, deactivation and manipulation of the security features or misuse of TOE security functionality.

The TOE shall meet the requirement “TOE emanation (FPT_EMS.1)” as specified below (Common Criteria Part 2 extended).

6.7.1 FPT_EMS.1

TOE Emanation

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_EMS.1.1:

The TOE shall not emit **electromagnetic and current emissions**[202] in excess of **intelligible threshold**[203] enabling access to

1. Chip Authentication Session Keys,
2. PACE Session Keys (PACE-K_{MAC}, PACE-K_{ENC}),
3. the ephemeral private key ephem-SK_{PICC}-PACE,
4. **Initialization key,**
5. **Pre-personalization keys,**
6. **Active Authentication Private Key**[204],
7. Personalization keys,
8. Chip Authentication Private Key[205], and
9. **EF.DG1 to EF.DG16, EF.SOD, EF.COM**[206].

FPT_EMS.1.2:

The TSF shall ensure any users[207] are unable to use the following interface smart card circuits contacts[208] to gain access to

1. Chip Authentication Session Keys,
2. PACE session Keys (PACE-K_{MAC}, PACE-K_{ENC}),
3. the ephemeral private key ephem-SK_{PICC}-PACE,
4. **Initialization key,**
5. **Pre-personalization keys,**
6. **Active Authentication Private Key**[209],
7. Personalization keys,
8. Chip Authentication Private Key[210], and
9. **EF.DG1 to EF.DG16, EF.SOD, EF.COM**[211].

[202] [assignment: *type of emissions*]
[203] [assignment: *specified limits*]
[204] [assignment: *list of types of TSF data*]
[205] [assignment: *list of types of TSF data*]
[206] [assignment: *list of types of user data*]
[207] [assignment: *type of users*]
[208] [assignment: *type of connection*]
[209] [assignment: *list of types of TSF data*]
[210] [assignment: *list of types of TSF data*]
[211] [assignment: *list of types of user data*]

Application Note 139 *The SFR FPT_EMS.1.1 in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in BAC PP [R3] and PACE PP [R5] by EAC aspects 1., 5. and 6. The SFR FPT_EMS.1.2 in this ST covers the definition in the EAC PP [R4] that, in turn, extends the definition in PACE PP [7] by EAC aspects 4) and 5). These extensions do not conflict with the strict conformance to BAC PP and PACE PP.*

Application Note 140 *The TOE shall prevent attacks against the listed secret data where the attack is based on external observable physical phenomena of the TOE. Such attacks may be observable at the interfaces of the TOE or may be originated from internal operation of the TOE or may be caused by an attacker that varies the physical environment under which the TOE operates. The set of measurable physical phenomena is influenced by the technology employed to implement the smart card. The Travel Document's chip provide a smart card contactless interface according to ISO/IEC 14443 [R29] [R30]. Examples of measurable phenomena include, but are not limited to variations in the power consumption, the timing of signals and the electromagnetic radiation due to internal operations or data transmissions.*

The following security functional requirements address the protection against forced illicit information leakage including physical manipulation.

The TOE shall meet the requirement "Failure with preservation of secure state (FPT_FLS.1)" as specified below (Common Criteria Part 2).

6.7.2 FPT_FLS.1

Failure with preservation of secure state

Hierarchical to:	No other components.
Dependencies:	No dependencies.

FPT_FLS.1.1:

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

1. exposure to operating conditions causing a TOE malfunction,
2. failure detected by TSF according to FPT_TST.1[212]

[212] [assignment: *list of types of failures in the TSF*]

3. **none.**[213]

Application Note 141 *The SFR FPT_FLS.1 in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

The TOE shall meet the requirement "TSF testing (FPT_TST.1)" as specified below (Common Criteria Part 2).

6.7.3 FPT_TST.1

TSF testing

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_TST.1.1:

The TSF shall run a suite of self-tests **during initial start-up**[214]**, and at the conditions: before any use of TSF data**[215]to demonstrate the correct operation of the TSF[216].

FPT_TST.1.2:

The TSF shall provide authorized users with the capability to verify the integrity of the TSF data[217].

FPT_TST.1.3:

The TSF shall provide authorized users with the capability to verify the integrity of stored TSF executable code[218].

[213] [assignment: *list of types of failures in the TSF*].

[214] [selection: *during initial start-up, periodically during normal operation, at the request of the authorised user, at the conditions [assignment: conditions under which self-test should occur]*]

[215] [*assignment: conditions under which self test should occur*]

[216] [selection: *[assignment: parts of TSF], the TSF*]

[217] [selection: *[assignment: parts of TSF], TSF data*]

[218] [selection: *[assignment: parts of TSF], TSF*]

Application Note 142 *The SFR FPT_TST.1 in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

Application Note 143 *A dedicated software in the protected ROM of the IC IFX_CCI_000039h provides full test capabilities, not accessible by the Security IC Embedded Software after delivery.*

Application Note 144 *At start-up, the OS checks whether a reset has been triggered by a sensor. If this is the case, a reset counter is incremented. If the count exceeds 32, then the chip is irreversibly blocked. Before any read of the TSF data, the EEPROM memory is checked for possible fault injection events. If this is the case, the reset counter is incremented and the chip goes into an endless loop. During normal operation, tests of the random number generation and integrity checks are also executed.*

The TOE shall meet the requirement “Resistance to physical attack (FPT_PHP.3)” as specified below (Common Criteria Part 2).

6.7.4 FPT_PHP.3

Resistance to physical attack

Hierarchical to:	No other components.
Dependencies:	No dependencies.
FPT_PHP.3.1:	
	The TSF shall resist physical manipulation and physical probing[219] to the TSF[220] by responding automatically such that the SFRs are always enforced.

Application Note 145 *The SFR FPT_PHP.3 in this ST covers the definition in the PACE PP [R5] that, in turn, extends the definition in the BAC PP [R3]. This extension does not conflict with the strict conformance to BAC PP.*

[219] [assignment: *physical tampering scenarios*]
[220] [assignment: *list of TSF devices/elements*]

Application Note 146 *The TOE will implement appropriate measures to continuously counter physical manipulation and physical probing. Due to the nature of these attacks (especially manipulation) the TOE can by no means detect attacks on all of its elements. Therefore, permanent protection against these attacks is required ensuring that the TSP could not be violated at any time. Hence, 'automatic response' means here (i) assuming that there might be an attack at any time and (ii) countermeasures are provided at any time.*

7 Security assurance requirements

7.1 BAC Authentication method

The assurance components for the evaluation of the TOE and its development and operating environment are those taken from the Evaluation Assurance Level 4 (EAL4), augmented by taking the component ALC_DVS.2.

Table 7-1 summarizes the assurance components that define the security assurance requirements for the TOE.

Table 7-1 Security assurance requirements: EAL4 augmented with ALC_DVS.2

Assurance class	Assurance components
ADV *Development*	ADV_ARC.1 *Security architecture description*
	ADV_FSP.4 *Complete functional specification*
	ADV_IMP.1 *Implementation representation of the TSF*
	ADV_TDS.3 *Basic modular design*
AGD *Guidance documents*	AGD_OPE.1 *Operational user guidance*
	AGD_PRE.1 *Preparative procedures*
ALC *Life cycle support*	ALC_CMC.4 *Production support, acceptance procedures and automation*
	ALC_CMS.4 *Problem tracking CM coverage*
	ALC_DEL.1 *Delivery procedures*
	ALC_DVS.2 *Sufficiency of security measures*
	ALC_LCD.1 *Developer defined life-cycle model*
	ALC_TAT.1 *Well-defined development tools*
ASE	ASE_CCL.1

Security target evaluation	*Conformance claims*
	ASE_ECD.1 *Extended components definition*
	ASE_INT.1 *ST introduction*
	ASE_OBJ.2 *Security objectives*
	ASE_REQ.2 *Derived security requirements*
	ASE_SPD.1 *Security problem definition*
	ASE_TSS.1 *TOE summary specification*
ATE *Tests*	ATE_COV.2 *Analysis of coverage*
	ATE_DPT.1 *Testing: basic design*
	ATE_FUN.1 *Functional testing*
	ATE_IND.2 *Independent testing - sample*
AVA *Vulnerability assessment*	AVA_VAN.3 *Focused vulnerability analysis*

7.2 EAC/PACE Authentication method

The assurance components for the evaluation of the TOE and its development and operating environment are those taken from the Evaluation Assurance Level 5 (EAL5), augmented by taking the components ALC_DVS.2 and AVA_VAN.5.

Table 7-2 summarizes the assurance components that define the security assurance requirements for the TOE.

Table 7-2 Security assurance requirements: EAL5 augmented with ALC_DVS.2 and AVA_VAN.5

Assurance class	Assurance components
ADV	ADV_ARC.1

Development	*Security architecture description*
	ADV_FSP.5 *Complete semiformal functional specification with additional error information*
	ADV_IMP.1 *Implementation representation of the TSF*
	ADV_INT.2 *Well-structured internals*
	ADV_TDS.4 *Semiformal modular design*
AGD *Guidance documents*	AGD_OPE.1 *Operational user guidance*
	AGD_PRE.1 *Preparative procedures*
ALC *Life cycle support*	ALC_CMC.4 *Production support, acceptance procedures and automation*
	ALC_CMS.5 *Development tools CM coverage*
	ALC_DEL.1 *Delivery procedures*
	ALC_DVS.2 *Sufficiency of security measures*
	ALC_LCD.1 *Developer defined life-cycle model*
	ALC_TAT.2 *Compliance with implementation standards*
ASE *Security target evaluation*	ASE_CCL.1 *Conformance claims*
	ASE_ECD.1 *Extended components definition*
	ASE_INT.1 *ST introduction*
	ASE_OBJ.2 *Security objectives*
	ASE_REQ.2 *Derived security requirements*
	ASE_SPD.1 *Security problem definition*
	ASE_TSS.1

	TOE summary specification
ATE *Tests*	ATE_COV.2 *Analysis of coverage*
	ATE_DPT.3 *Testing: modular design*
	ATE_FUN.1 *Functional testing*
	ATE_IND.2 *Independent testing - sample*
AVA *Vulnerability assessment*	AVA_VAN.5 *Advanced methodical vulnerability analysis*

Application Note 147 *The TOE shall protect the assets against high attack potential. This includes intermediate storage in the chip as well as secure channel communications established using either PACE-CAM or the Chip Authentication Protocol v.1 (OE.Prot_Logical_Travel_Document). If the TOE is operated in non-certified mode using the BAC-established communication channel, the confidentiality of the standard data shall be protected against attackers with at least Enhanced-Basic attack potential (AVA_VAN.3).*

8 Security requirements rationale

8.1 Security functional requirements rationale

Table 8-1 provides an overview for security functional requirements coverage of security objectives.

Table 8-1 Coverage of security objectives for the TOE by SFRs

	OT.Sens_Data_Conf	OT.Chip_Auth_Proof	OT.Active_Auth_Proof	OT.AC_Init	OT.AC_Pre-pers	OT.AC_Pers	OT.Data_Integrity	OT.Data_Authenticity	OT.Data_Confidentiality	OT.Identification	OT.Prot_Abuse-Func	OT.Prot_Inf_Leak	OT.Tracing	OT.Prot_Phys-Tamper	OT.Prot_Malfunction
FAU_SAS.1				X	X	X				X					
FCS_CKM.1/BAC							X		X						
FCS_CKM.1/SCP					X	X	X	X							
FCS_CKM.1/DH_PACE							X	X	X						
FCS_CKM.1/CA	X	X					X	X	X						
FCS_CKM.4	X			X	X	X	X	X	X						
FCS_COP.1/SHA				X	X	X	X		X						
FCS_COP.1/ENC							X		X						
FCS_COP.1/AUTH				X	X	X	X								
FCS_COP.1/MAC					X	X	X		X						
FCS_COP.1/AA_SIGN/RSA			X					X							
FCS_COP.1/AA_SIGN/ECDSA			X					X							
FCS_COP.1/PACE_ENC									X						
FCS_COP.1/PACE_MAC							X	X							
FCS_COP.1/CA_ENC	X	X			X	X	X		X						
FCS_COP.1/CA_MAC	X	X			X	X	X								
FCS_COP.1/SIG_VER	X														
FCS_RND.1	X			X	X	X	X	X	X						
FIA_AFL.1/Init										X			X		

FIA_AFL.1/Pre-pers										X			X		
FIA_AFL.1/Pers										X			X		
FIA_AFL.1/BAC									X	X					
FIA_AFL.1/PACE													X		
FIA_UID.1/BAC									X	X					
FIA_UID.1/PACE	X			X	X	X	X	X	X						
FIA_UAU.1/BAC									X	X					
FIA_UAU.1/PACE	X			X	X	X	X	X	X						
FIA_UAU.4/BAC				X	X	X	X		X						
FIA_UAU.4/PACE	X			X	X	X	X	X	X						
FIA_UAU.5/BAC				X	X	X	X		X						
FIA_UAU.5/PACE	X			X	X	X	X	X	X						
FIA_UAU.6/BAC							X		X						
FIA_UAU.6/PACE							X	X	X						
FIA_UAU.6/EAC/CAV1	X						X	X	X						
FIA_UAU.6/EAC/CAM	X						X	X	X						
FIA_API.1/CAV1		X													
FIA_API.1/CAM		X													
FIA_API.1/AA			X												
FDP_ACC.1/TRM	X						X		X						
FDP_ACF.1/TRM	X			X	X	X	X		X						
FDP_RIP.1							X	X	X						
FDP_UCT.1/TRM	X						X		X						
FDP_UIT.1/TRM							X		X						
FTP_ITC.1/PACE							X	X	X				X		
FTP_ITC.1/SCP							X	X	X				X		
FMT_SMF.1		X		X	X	X	X	X	X	X					
FMT_SMR.1/BAC				X	X	X	X		X						
FMT_SMR.1/PACE		X		X	X	X	X	X	X	X					
FMT_LIM.1											X				
FMT_LIM.2											X				
FMT_MTD.1/INI_ENA				X	X	X				X					
FMT_MTD.1/INI_DIS						X				X					
FMT_MTD.1/CVCA_INI	X														
FMT_MTD.1/CVCA_UPD	X														

FMT_MTD.1/DATE	X														
FMT_MTD.1/CAPK	X	X					X								
FMT_MTD.1/KEY_WRITE						X	X		X						
FMT_MTD.1/KEY_READ	X	X	X	X	X	X	X	X	X						
FMT_MTD.1/PA						X	X	X	X						
FMT_MTD.1/AAPK			X				X								
FMT_MTD.3	X														
FPT_EMS.1				X	X	X						X			
FPT_FLS.1				X	X	X						X			X
FPT_TST.1												X			X
FPT_PHP.3				X	X	X	X					X		X	

The security objective **OT.Identification** “Identification of the TOE” addresses the storage of Initialization and Pre-Personalization 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 Initialization and Pre-personalization Data (including the Personalization key). The SFR ***FMT_MTD.1/INI_DIS*** requires the Personalization Agent to disable access to Initialization and Pre-personalization Data in the life cycle phase ‘operational use’. The SFRs ***FMT_SMF.1*** and ***FMT_SMR.1/PACE*** support the functions and roles related. The SFRs ***FIA_UID.1/BAC*** and ***FIA_UAU.1/BAC*** do not allow reading of any data uniquely identifying the MRTD’s chip before successful authentication of the Basic Inspection Terminal and will stop communication after unsuccessful authentication attempt (cf. Application Note 87). In case of failed authentication attempts, ***FIA_AFL.1/Init***, ***FIA_AFL.1/Pre-pers***, ***FIA_AFL.1/Pers*** block the authentication key, whilst ***FIA_AFL.1/BAC*** enforces additional waiting time prolonging the necessary amount of time for facilitating a brute force attack.

The security objective **OT.AC_Init**, Access Control for Initialization of logical Travel Document, addresses the access control of the writing the logical Travel Document in Step 5, Initialization.
The authentication of the terminal as Initialization Agent shall be performed by TSF according to SFRs ***FCS_RND.1***, ***FIA_UAU.4/BAC, FIA_UAU.4/PACE***, ***FIA_UAU.5/BAC*** *and* ***FIA_UAU.5/PACE***.
The Initialization Agent is authenticated by decrypting the initialization cryptograms using a mechanism based on AES as described in the initialization guidance (***FCS_COP.1/AUTH***) with the Initialization key. The Initialization Agent is authenticated by means of AES-256 cryptography (***FCS_COP.1/AUTH)*** and SHA-256 hash algorithm ***(FCS_COP.1/SHA***) with the Initialization key.

The justification for the SFRs ***FAU_SAS.1*** and ***FMT_MTD.1/INI_ENA*** arises from the justification for **OT.Identification** above with respect to the Initialization Data. The write access to the logical *Travel Document* data is defined by the SFRs ***FIA_UID.1/PACE***, ***FIA_UAU.1/PACE***, and ***FDP_ACF.1/TRM*** in the same way: only the successfully authenticated Initialization Agent is allowed to write the personalization key. The SFRs ***FMT_SMR.1/BAC** and **FMT_SMR.1/PACE*** list the roles (including Initialization Agent) and the SFR ***FMT_SMF.1*** lists the TSF management functions (including Initialization). The SFRs ***FMT_MTD.1/KEY_READ*** and ***FPT_EMS.1*** restrict the access to the Initialization key, together with the SFRs ***FCS_CKM.4***, ***FPT_FLS.1***, and ***FPT_PHP.3***, the confidentiality of this key.

The security objective **OT.AC_Pre-pers** “Access Control for Pre-personalization of logical Travel Document” addresses the access control of the writing the logical Travel Document in Step 6 “Pre-personalization”. The Pre-personalization Agent is authenticated by using the SCP03 mechanism based on AES (***FCS_CKM.1/SCP***, ***FCS_COP.1/SHA, FCS_COP.1/AUTH***, ***FCS_RND.1*** and ***FCS_COP.1/MAC*** for key generation) with the Pre-personalization keys. The authentication of the terminal as Pre-personalization Agent shall be performed by TSF according to SFRs ***FIA_UAU.4/BAC, FIA_UAU.4/PACE, FIA_UAU.5/BAC*** and ***FIA_UAU.5/PACE***. If the Pre-personalization Terminal wants to authenticate itself to the TOE by means of the Authentication Mechanism with Pre-personalization key, the TOE will use the TSF according to ***FCS_RND.1*** (for the generation of the challenge), ***FCS_COP.1/CA_ENC*** (to verify the authentication attempt and for secure messaging), 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 justification for the SFRs ***FAU_SAS.1*** and ***FMT_MTD.1/INI_ENA*** arises from the justification for **OT.Identification** above with respect to the Pre-personalization Data. The write access to the logical Travel Document data is defined by the SFRs **FIA_UID.1/PACE**, **FIA_UAU.1/PACE**, and **FDP_ACF.1/TRM** in the same way: only the successfully authenticated Pre-personalization Agent is allowed to write the data of the groups EF.DG14, EF.DG15 of the logical Travel Document. The SFR ***FMT_SMR.1/BAC*** and ***FMT_SMR.1/PACE*** lists the roles (including Pre-personalization Agent) and the SFR ***FMT_SMF.1*** lists the TSF management functions (including Pre-personalization). The SFRs ***FMT_MTD.1/KEY_READ*** and ***FPT_EMS.1*** restrict the access to the Personalization keys, the Chip Authentication Private Key, the PACE passwords, and the Active Authentication key and ensures, together with the SFRs ***FCS_CKM.4***, ***FPT_EMS.1***, ***FPT_FLS.1***, and ***FPT_PHP.3***, the confidentiality of this key.

The security objective **OT.AC_Pers** “Access Control for Personalization of logical Travel Document” addresses the access control of the writing the logical Travel Document. The write access to the logical MRTD data are defined by the SFR ***FDP_ACF.1/TRM*** as follows: only the successfully authenticated Personalization Agent is allowed to write the data of the groups EF.DG1 to EF.DG16 of the logical MRTD only once. The Personalization Agent is authenticated by using the SCP03 mechanism based on AES (***FCS_CKM.1/SCP***,

FCS_COP.1/SHA, ***FCS_COP.1/AUTH***, ***FCS_RND.1*** and ***FCS_COP.1/MAC*** for key generation), with the Personalization keys. The authentication of the terminal as Personalization Agent shall be performed by TSF according to SFRs ***FIA_UAU.4/BAC, FIA_UAU.4/PACE, FIA_UAU.5/BAC*** and ***FIA_UAU.5/PACE***. If the Personalization Terminal wants to authenticate itself to the TOE by means of the Authentication Mechanism with the Personalization key, the TOE will use the TSF according to ***FCS_RND.1*** (for the generation of the challenge), ***FCS_COP.1/CA_ENC*** (to verify the authentication attempt and for secure messaging), 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 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 Personalization Data. The write access to the logical Travel Document data is defined by the SFRs ***FIA_UID.1/PACE***, ***FIA_UAU.1/PACE*** and ***FDP_ACF.1/TRM*** in the same way: only the successfully authenticated Personalization Agent is allowed to write the data of the groups EF.DG1 to EF.DG13, EF.DG16 of the logical Travel Document. ***FMT_MTD.1/PA*** covers the related property of **OT.AC_Pers** (writing SO_D and, in generally, personalization data). The SFR ***FMT_SMR.1/BAC*** and ***FMT_SMR.1/PACE*** lists the roles (including Personalization Agent) and the SFR ***FMT_SMF.1*** lists the TSF management functions (including Personalization) setting the Document Basic Access Keys according to the SFR ***FMT_MTD.1/KEY_WRITE*** as authentication reference data. The SFRs ***FMT_MTD.1/KEY_READ*** and ***FPT_EMS.1*** restrict the access to the Personalization keys, the Chip Authentication Private Key, the PACE passwords, and the Active Authentication key and ensures, together with the SFRs ***FCS_CKM.4***, ***FPT_FLS.1***, and ***FPT_PHP.3*** the confidentiality of this key.

Application Note 148 *The Personalization Agent can authenticate itself using the SCP03 authentication mechanism only. No other authentication mechanism is available to the Personalization Agent.*

Application Note 149 *The TOE does not allow the addition of data in the operational use phase. Therefore, the BAC mechanism is not used by the Personalization Agent.*

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*** and ***FDP_ACF.1/TRM***: only the Pre-personalization Agent or the Personalization Agent are allowed to write the data in EF.DG1 to EF.DG16 of the logical Travel Document 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 SO_D containing signature over the User Data stored on the TOE and used for the Passive Authentication is allowed to be written by the Personalization Agent only and, hence, is to be considered as trustworthy. The Personalization Agent must identify and authenticate themselves according to ***FIA_UID.1/PACE*** and ***FIA_UAU.1/PACE*** before accessing these data. The Pre-personalization Agent must identify and authenticate themselves according to ***FIA_UID.1/PACE*** and ***FIA_UAU.1/PACE*** before accessing data in Step 6 “Pre-personalization”. ***FIA_UAU.4/PACE***, ***FIA_UAU.5/PACE***, and ***FCS_CKM.4*** represent some required specific properties of the protocols used. The SFRs ***FMT_SMR.1/BAC*** and ***FMT_SMR.1/PACE*** list the roles and the SFR ***FMT_SMF.1*** lists the TSF management functions. The authentication of the terminal as Personalization Agent shall be performed by TSF according to SFRs ***FIA_UAU.4/BAC***, ***FIA_UAU.5/BAC***, and ***FIA_UAU.6/BAC*** using either ***FCS_COP.1/ENC*** and ***FCS_COP.1/MAC*** or ***FCS_COP.1/AUTH***.

The SFRs ***FIA_UAU.6/BAC, FIA_UAU.6/PACE, FIA_UAU.6/EAC/CAV1, FIA_UAU.6/EAC/CAM***, ***FDP_UCT.1/TRM***, and ***FDP_UIT.1/TRM*** require the protection of the transmitted data by means of secure messaging implemented by the cryptographic functions according to ***FCS_CKM.1/BAC*** (for the generation of the Document BAC keys), ***FCS_COP.1/SHA***, ***FCS_RND.1*** (for key generation), ***FCS_CKM.1/SCP*** (for the generation of the personalization keys), ***FCS_COP.1/ENC***, and ***FCS_COP.1/MAC*** (for encryption and MAC mode). The SFR ***FMT_MTD.1/KEY_WRITE*** requires the Personalization Agent to establish the Document Basic Access Keys in a way that they cannot be read by anyone in accordance to ***FMT_MTD.1/KEY_READ***.

Unauthorised modifying of the exchanged data is addressed, in the first line, in Pre-personalization and Personalization by ***FTP_ITC.1/SCP***, and in the Operational Use phase by ***FDP_UCT.1/TRM, FDP_UIT.1/TRM*** and ***FTP_ITC.1/PACE*** using ***FCS_COP.1/PACE_MAC*** for PACE. For secured data exchange in Pre-personalization and in Personalization, a prerequisite for establishing this trusted channel is a successful SCP03 Authentication using ***FCS_CKM.1/SCP***. 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*** and ***FIA_UAU.6/BAC*** resp. ***FIA_UAU.6/EAC/CAV1***, ***FIA_UAU.6/EAC/CAM***. 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 K_{MAC}).

The TOE supports the inspection system detect any modification of the transmitted logical Travel Document data after Chip Authentication v.1. The SFRs ***FIA_UAU.6/EAC/CAV1***, ***FIA_UAU.6/EAC/CAM***, and ***FDP_UIT.1/TRM*** require the integrity protection of the transmitted data after Chip Authentication performed either as part of PACE-CAM or as Chip Authentication Protocol v.1 by means of secure messaging implemented by the cryptographic functions according to ***FCS_CKM.1/CA*** (for the generation of shared secret and for the derivation of the new session keys) and ***FCS_COP.1/CA_ENC***, ***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 SFRs ***FMT_MTD.1/CAPK***, ***FMT_MTD.1/AAPK***, and ***FMT_MTD.1/KEY_READ*** require that the Chip Authentication Key and Active Authentication key cannot be written unauthorized or read afterwards. The SFR ***FCS_RND.1*** represents a general support for cryptographic operations needed.

The security objective **OT.Data_Authenticity** aims ensuring authenticity of the User- and TSF data (after the PACE Authentication or Active Authentication) by enabling its verification at the terminal-side (PACE) and by an active verification by the TOE itself (PACE and Active Authentication).
This objective is mainly achieved by ***FTP_ITC.1/PACE*** using ***FCS_COP.1/PACE_MAC***, as well as ***FTP_ITC.1/SCP***. A prerequisite for establishing the trusted channel in the Operational Use phase 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*** and possessing the special properties ***FIA_UAU.5/PACE***, ***FIA_UAU.6/PACE*** resp. ***FIA_UAU.6/EAC/CAV1***, ***FIA_UAU.6/EAC/CAM***. A prerequisite for establishing the trusted channel in Pre-personalization and in Personalization is a successful SCP03 authentication using ***FCS_CKM.1/SCP***. ***FDP_RIP.1*** requires erasing the values of session keys (here for K_{MAC}).

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 SO_D containing signature over the User Data stored on the TOE and used for the Passive Authentication is allowed to be written by the Personalization 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.
The security objective **OT.Data_Authenticity** is also achieved by ***FCS_COP.1/AA_SIGN/RSA*** and ***FCS_COP.1/AA_SIGN/ECDSA***.

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 and requires the TOE to ensure the confidentiality of the logical MRTD data groups EF.DG1 to EF.DG16. The SFRs ***FIA_UID.1/BAC*** and ***FIA_UAU.1/BAC*** allow only those actions before identification respective authentication which do not violate **OT.Data_Conf**. In case of failed authentication attempts, ***FIA_AFL.1/BAC*** enforces additional waiting time prolonging the necessary amount of time for facilitating a brute force attack.
This objective for the data stored is mainly achieved by ***FDP_ACC.1/TRM*** and ***FDP_ACF.1/TRM***. ***FIA_UAU.4/BAC,*** ***FIA_UAU.4/PACE***, ***FIA_UAU.5/BAC***, ***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***, as well as by ***FTP_ITC.1/SCP***. 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*** and possessing the special properties ***FIA_UAU.5/BAC***, ***FIA_UAU.5/PACE***, ***FIA_UAU.6/BAC***, ***FIA_UAU.6/PACE*** resp. ***FIA_UAU.6/EAC/CAV1***, ***FIA_UAU.6/EAC/CAM***. ***FDP_RIP.1*** requires erasing the values of session keys (here for K_{ENC}). Moreover, the SFR ***FIA_UAU.6/BAC*** requests secure messaging after successful authentication of the terminal with Basic Access Control Authentication Mechanism, which includes the protection of the transmitted data in encryption and MAC mode by means of the cryptographic functions according to ***FCS_COP.1/ENC*** and ***FCS_COP.1/MAC*** (cf. the SFR ***FDP_UCT.1/TRM*** and ***FDP_UIT.1/TRM***, for key generation), ***FCS_COP.1/ENC***, and ***FCS_COP.1/MAC*** (for encryption and MAC mode). The SFRs ***FCS_CKM.1/BAC***, ***FCS_CKM.4***, ***FCS_COP.1/SHA***, and ***FCS_RND.1*** establish the key management for the secure messaging keys.
The SFR ***FMT_MTD.1/KEY_WRITE*** addresses the key management, and ***FMT_MTD.1/KEY_READ*** prevents reading of the Document Basic Access Keys and restricts the access to the PACE passwords and the Chip Authentication Private Key. ***FMT_MTD.1/PA*** requires that SO_D containing signature over the User Data stored on the TOE and used for the Passive Authentication is allowed to be written by the Personalization 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***, ***FMT_SMR.1/BAC*** and ***FMT_SMR.1/PACE*** support the functions and roles related.

The security objective **OT.Sens_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) performed as part of PACE-CAM or as Chip Authentication Protocol v.1 before any authentication attempt as Extended Inspection System. During the protected communication following the CA, the reuse of authentication data is prevented by ***FIA_UAU.4/PACE***. The SFRs ***FIA_UAU.6/EAC/CAV1***, ***FIA_UAU.6/EAC/CAM***, and ***FDP_UCT.1/TRM*** requires the confidentiality protection of the transmitted data after Chip Authentication 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), and ***FCS_COP.1/CA_ENC***, ***FCS_COP.1/CA_MAC*** (for

ENC_MAC_Mode secure messaging). The session keys are destroyed according to ***FCS_CKM.4*** after use. The SFRs ***FMT_MTD.1/CAPK*** and ***FMT_MTD.1/KEY_READ*** require that the Chip Authentication Key cannot be written unauthorized or read afterwards.

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 updated by authorized identified role as of ***FMT_MTD.1/CVCA_INI***, ***FMT_MTD.1/CVCA_UPD***, and ***FMT_MTD.1/DATE***.

The security objective **OT.Chip_Auth_Proof** "Proof of Travel Document's chip authenticity" is ensured by the Chip Authentication provided by ***FIA_API.1/CAV1*** or ***FIA_API.1/CAM*** (depending on the Chip Authentication protocol used) proving the identity of the TOE. The Chip Authentication 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***. Chip Authentication, performed as part of PACE-CAM [R19] or by Chip Authentication Protocol v.1 [R6], requires additional TSF according to ***FCS_CKM.1/CA*** (for the derivation of the session keys) and ***FCS_COP.1/CA_ENC***, ***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.

The security objective **OT.Active_Auth_Proof** "Proof of Travel Document's chip authenticity" is ensured by the Active Authentication Mechanism [R19] provided by ***FIA_API.1/AA***, proving the identity of the TOE. The Active Authentication Protocol defined by ***FIA_API.1/AA*** is performed using a TOE internally stored confidential private key as required by ***FMT_MTD.1/AAPK*** and ***FMT_MTD.1/KEY_READ***. This key is written to the TOE as defined by ***FMT_MTD.1/AAPK***. The Active Authentication Protocol requires additional TSF according to ***FCS_COP.1/AA_SIGN/RSA*** and ***FCS_COP.1/AA_SIGN/ECDSA*** (for the digital signature of Active Authentication data).

The security objective **OT.Prot_Abuse-Func** "Protection against Abuse of Functionality" is ensured by the SFRs ***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.

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:

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

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 the shared authentication data (Initialization key, Pre-personalization keys, Personalization keys, PACE passwords). This objective is achieved as follows:

- while establishing communication in pre-operational phases by ***FIA_AFL.1/Init, FIA_AFL.1/Pre-pers*** and ***FIA_AFL.1/Pers***;
- for listening to SPC03 communication – by ***FTP_ITC.1/SCP;***
- while establishing PACE communication with a PACE password, e.g. CAN or MRZ (non-blocking authorization data) – by ***FIA_AFL.1/PACE***;
- for listening to PACE communication (of importance for the current ST, since SO_D is card-individual) – by ***FTP_ITC.1/PACE***.

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

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.

8.2 Dependency rationale

The dependency analysis for the security functional requirements shows that the basis for mutual support and internal consistency between all defined functional requirements is satisfied. All dependencies between the chosen functional components are analysed, and non-dissolved dependencies are appropriately explained.

Table 8-2 shows the dependencies between the SFRs of the TOE.

Table 8-2 Dependencies between the SFRs for the TOE

SFR	Dependencies	Support of the dependencies
FAU_SAS.1	No dependencies	-
FCS_CKM.1/BAC	[FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_COP.1/ENC, FCS_COP.1/MAC Fulfilled by FCS_CKM.4
FCS_CKM.1/SCP	[FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_COP.1/CA_ENC, FCS_COP.1/CA_MAC Fulfilled by FCS_CKM.4
FCS_CKM.1/DH_PACE	[FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation], FCS_CKM.4 Cryptographic key destruction	*Fulfilled by FCS_COP.1/PACE_ENC, FCS_COP.1/PACE_MAC* Fulfilled by FCS_CKM.4
FCS_CKM.1/CA	[FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_COP.1/CA_ENC, FCS_COP.1/CA_MAC Fulfilled by FCS_CKM.4
FCS_CKM.4	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation]	Fulfilled by FCS_CKM.1/DH_PACE, FCS_CKM.1/CA, FCS_CKM.1/SCP
FCS_COP.1/SHA	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	*Justification 1 for non-satisfied dependencies* Fulfilled by FCS_CMK.4
FCS_COP.1/ENC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.1/BAC, FCS_CKM.1/SCP Fulfilled by FCS_CKM.4
FCS_COP.1/AUTH	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	*Justification 3 for non-satisfied dependencies* *Justification 3 for non-satisfied dependencies*
FCS_COP.1/MAC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.1/BAC, FCS_CKM.1/SCP Fulfilled by FCS_CKM.4
FCS_COP.1/AA_SIGN/RSA	[FDP_ITC.1 Import of user data without security attributes,	*Justification 2 for non-satisfied dependencies*

	FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	*Justification 2 for non-satisfied dependencies*
FCS_COP.1/AA_SIGN/ECDSA	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	*Justification 2 for non-satisfied dependencies* *Justification 2 for non-satisfied dependencies*
FCS_COP.1/PACE_ENC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.1/DH_PACE Fulfilled by FCS_CKM.4
FCS_COP.1/PACE_MAC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.1/DH_PACE Fulfilled by FCS_CKM.4
FCS_COP.1/CA_ENC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.1/CA Fulfilled by FCS_CKM.4
FCS_COP.1/CA_MAC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.1/CA Fulfilled by FCS_CKM.4
FCS_COP.1/SIG_VER	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation], FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.1/CA Fulfilled by FCS_CKM.4
FCS_RND.1	No dependencies	-
FIA_AFL.1/Init	FIA_UAU.1 Timing of authentication	Fulfilled by FIA_UAU.1/PACE
FIA_AFL.1/Pre-pers	FIA_UAU.1 Timing of authentication	Fulfilled by FIA_UAU.1/PACE
FIA_AFL.1/Pers	FIA_UAU.1 Timing of authentication	Fulfilled by FIA_UAU.1/PACE
FIA_AFL.1/BAC	FIA_UAU.1 Timing of authentication	Fulfilled by FIA_UAU.1/BAC
FIA_AFL.1/PACE	FIA_UAU.1 Timing of authentication	Fulfilled by FIA_UAU.1/PACE
FIA_UID.1/BAC	No dependencies	-
FIA_UID.1/PACE	No dependencies	-

FIA_UAU.1/BAC	FIA_UID.1 Timing of identification	Fulfilled by FIA_UID.1/BAC
FIA_UAU.1/PACE	FIA_UID.1 Timing of identification	Fulfilled by FIA_UID.1/PACE
FIA_UAU.4/BAC	No dependencies	-
FIA_UAU.4/PACE	No dependencies	-
FIA_UAU.5/BAC	No dependencies	-
FIA_UAU.5/PACE	No dependencies	-
FIA_UAU.6/BAC	No dependencies	-
FIA_UAU.6/PACE	No dependencies	-
FIA_UAU.6/EAC/CAV1	No dependencies	-
FIA_UAU.6/EAC/CAM	No dependencies	-
FIA_API.1/CAV1	No dependencies	-
FIA_API.1/CAM	No dependencies	-
FIA_API.1/AA	No dependencies	-
FDP_ACC.1/TRM	FDP_ACF.1 Security attribute based access control	Fulfilled by FDP_ACF.1/TRM
FDP_ACF.1/TRM	FDP_ACC.1 Subset access control, FMT_MSA.3 Static attribute initialization	Fulfilled by FDP_ACC.1/TRM *Justification 1 for non-satisfied dependencies*
FDP_RIP.1	No dependencies	-
FDP_UCT.1/TRM	[FTP_ITC.1 Inter-TSF trusted channel or FTP_TRP.1 Trusted path], [FDP_ACC.1 Subset access control or FDP_IFC.1 Subset information flow control]	Fulfilled by FTP_ITC.1/PACE Fulfilled by FDP_ACC.1/TRM
FDP_UIT.1/TRM	[FTP_ITC.1 Inter-TSF trusted channel or FTP_TRP.1 Trusted path], [FDP_ACC.1 Subset access control or FDP_IFC.1 Subset information flow control]	Fulfilled by FTP_ITC.1/PACE Fulfilled by FDP_ACC.1/TRM
FTP_ITC.1/PACE	No dependencies	-
FTP_ITC.1/SCP	No dependencies	-
FMT_SMF.1	No dependencies	-
FMT_SMR.1/BAC	FIA_UID.1 Timing of identification	Fulfilled by FIA_UID.1/BAC
FMT_SMR.1/PACE	FIA_UID.1 Timing of identification	Fulfilled by FIA_UID.1/PACE
FMT_LIM.1	FMT_LIM.2	Fulfilled by FMT_LIM.2
FMT_LIM.2	FMT_LIM.1	Fulfilled by FMT_LIM.1
FMT_MTD.1/INI_ENA	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/INI_DIS	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/CVCA_INI	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE

FMT_MTD.1/CVCA_UPD	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/DATE	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/CAPK	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/KEY_WRITE	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1
FMT_MTD.1/KEY_READ	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/PA	FMT_SMF.1 Specification of management functions FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/AAPK	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled by FMT_SMF.1 Fulfilled by FMT_SMR.1/PACE
FMT_MTD.3	FMT_MTD.1 Management of TSF data	Fulfilled by FMT_MTD.1/CVCA_INI, FMT_MTD.1/CVCA_UPD
FPT_EMS.1	No dependencies	-
FPT_FLS.1	No dependencies	-
FPT_TST.1	No dependencies	-
FPT_PHP.3	No dependencies	-

Justifications for non-satisfied dependencies between the SFR for TOE:

Justification 1: The access control TSF according to FDP_ACF.1/TRM uses security attributes which are defined during personalization and are fixed over the whole life time of the TOE. No management of these security attributes (i.e. SFRs FMT_MSA.1 and FMT_MSA.3) is necessary here.

Justification 2: Since AA does not provide for the generation or destruction of cryptographic keys, neither the SFR FCS_CKM.1 nor the SFR FCS_CKM.4 apply.

Justification 3: The hash algorithm required by the SFR FCS_COP.1/SHA does not need any key material. Therefore, neither a key generation (FCS_CKM.1) nor an import (FDP_ITC.1/2) is necessary.

Justification 4: The SFR FCS_COP.1/AUTH refers to the symmetric Initialization Key, Pre-personalization Key and Personalization Key permanently stored, respectively, during IC manufacturing, initialization, and pre-personalization (cf. FMT_MTD.1/INI_ENA) by the

Manufacturer. Thus, there is no necessity to generate or import these keys during the addressed TOE life cycle by the means of FCS_CKM.1 or FDP_ITC. Since these keys are permanently stored within the TOE, there is no need for FCS_CKM.4, too.

Justification 5: The SFRs FDP_UCT.1 and FDP_UIT.1 require the use of secure messaging between the MRTD and the BIS. There is no need for the SFR FTP_ITC.1, e.g. to require this communication channel to be logically distinct from other communication channels, since there is only one channel. Since the TOE does not provide a direct human interface, a trusted path as required by FTP_TRP.1 is not applicable here.

8.3 Security assurance requirements rationale

8.3.1 BAC Authentication method

The EAL4 was chosen to permit a developer to gain maximum assurance from positive security engineering based on good commercial development practices which, though rigorous, do not require substantial specialist knowledge, skills, and other resources. EAL4 is the highest level at which it is likely to be economically feasible to retrofit to an existing product line. EAL4 is applicable in those circumstances where developers or users require a moderate to high level of independently assured security in conventional commodity TOEs and are prepared to incur sensitive security specific engineering costs.

The TOE assurance level is augmented with respect to the EAL4 package for what refers to development security (ALC_DVS.2 instead of ALC_DVS.1).

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 has no dependencies on other assurance requirements.

8.3.2 EAC/PACE Authentication method

The EAL5 was chosen to permit a developer to gain maximum assurance from positive security engineering based on good commercial development practices which, though rigorous, do not require substantial specialist knowledge, skills, and other resources. EAL5 is applicable in those circumstances where developers or users require a moderate to high level of independently assured security in conventional commodity TOEs and are prepared to incur sensitive security specific engineering costs.

The selection of the component ALC_DVS.2 provides a higher assurance of the security of the Travel Document’s development and manufacturing, especially for the secure handling of the Travel Document’s material.

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 fulfil the security objectives OT.Sens_Data_Conf and OT.Chip_Auth_Proof.

The component ALC_DVS.2 has no dependencies on other assurance requirements.

The component AVA_VAN.5 depends on:

- ADV_ARC.1, Security architectural description
- ADV_FSP.4, Complete 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.

8.4 Security requirements – Mutual support and internal consistency

The following part of the security requirements rationale shows that the set of security requirements for the TOE consisting of the security functional requirements (SFRs) and the security assurance requirements (SARs) together form a mutually supportive and internally consistent whole.

The analysis of the TOE’s security requirements with regard to their mutual support and internal consistency demonstrates what follows.

The dependency analysis in section 8.2 “Dependency rationale” shows that the basis for mutual support and internal consistency between all defined functional requirements is satisfied. All dependencies between the chosen functional components are analysed, and non-satisfied dependencies are appropriately explained.

All subjects and objects addressed by more than one SFR in section 6 “Security functional requirements” are also treated in a consistent way: the SFRs impacting them do not require any contradictory property and behaviour of these “shared” items.

The assurance classes, EAL4 for BAC authentication method and EAL5 for EAC/PACE authentication method, are an established set of mutually supportive and internally consistent assurance requirements. The dependency analysis for the sensitive assurance components in section 8.3 “Security assurance requirements rationale” shows that the assurance requirements are mutually supportive and internally consistent as all (sensitive) dependencies are satisfied and no inconsistency appears.

Inconsistency between functional and assurance requirements could only arise if there are functional assurance dependencies which are not met, a possibility which has been shown not to arise in section 8.2 “Dependency rationale” and 8.3 “Security assurance requirements rationale”. Furthermore, as also discussed in section 8.3 “Security assurance requirements rationale”, the chosen assurance components are adequate for the functionality of the TOE. Therefore, the assurance requirements and security functional requirements support each other and there are no inconsistencies between the goals of these two groups of security requirements.

9 TOE summary specification

9.1 Coverage of SFRs

Table 9-1 describes how each security functional requirement claimed in this security target is satisfied by the TOE.

Table 9-1 Implementation of the security functional requirements in the TOE

Security functional requirement	Implementation
FAU_SAS.1	The Manufacturer stores IC identification data in the audit records.
FCS_CKM.1/BAC	The TOE generates session keys for Secure Messaging soon after a successful BAC authentication of the Basic Inspection System, as described in Appendix D.1 of ICAO Doc 9303/11 [R19].
FCS_CKM.1/SCP	The TOE generates session keys for Secure Messaging soon after a successful SCP authentication of the Pre-Personalization and Personalization Agent, as described in the Secure Channel Protocol ‘03’ Card Specification, [R12].
FCS_CKM.1/DH_PACE	The TOE generates session keys for Secure Messaging soon after a successful PACE or PACE-CAM authentication of the inspection terminal.
FCS_CKM.1/CA	The TOE generates session keys for Secure Messaging soon after a successful Chip Authentication v1 of the inspection terminal.
FCS_CKM.4	Session keys are overwritten with zeros when a Secure Messaging session is closed.
FCS_COP.1/SHA	The TOE implements the digesting algorithms SHA-1.
FCS_COP.1/ENC	During a Secure Messaging session, the TOE encrypts transmitted data to ensure confidentiality, and decrypts received data, to restore original content. To this end, the TOE uses Triple-DES in CBC mode with 112-bit session key.
FCS_COP.1/AUTH	The TOE provides a mechanism to authenticate the Initialization Agent. To this end, the TOE adopts a proprietary protocol described in [R14] through the decryption of Card Activation Cryptogram by using an AES-256 bit key (Initialization key).

	The TOE provides a mechanism to authenticate the Pre-personalization Agent and the Personalization Agent. To this end, the TOE adopts the SCP protocol described in the Secure Channel Protocol '03' Card Specification, [R12], using the AES with 128, 192 or 256-bit Pre-personalization and Personalization keys.
FCS_COP.1/AA_SIGN/RSA	The TOE performs signature for Active Authentication using the RSA cryptography.
FCS_COP.1/AA_SIGN/ECDSA	The TOE performs signature for Active Authentication using the EC cryptography.
FCS_COP.1/PACE_ENC	During a Secure Messaging session after a PACE authentication, the TOE encrypts transmitted data to ensure confidentiality, and decrypts received data, to restore original content. To this end, the TOE uses Triple-DES in CBC mode with 112-bit session key or AES with 128, 192 or 256 bit keys.
FCS_COP.1/PACE_MAC	During a Secure Messaging session after a PACE authentication, the TOE computes a Message Authentication Code (MAC) to check integrity of received data, and to allow integrity check by the terminal. The MAC computation is performed according to CMAC or Retail MAC algorithm and cryptographic key sizes 112, 128, 192 or 256 bits.
FCS_COP.1/CA_ENC	During a Secure Messaging session after a PACE-CAM or Chip Authentication v1, the TOE encrypts transmitted data to ensure confidentiality, and decrypts received data, to restore original content. To this end, the TOE uses Triple-DES in CBC mode with 112-bit session key or AES with 128, 192 or 256 bit keys.
FCS_COP.1/CA_MAC	During a Secure Messaging session after a PACE-CAM authentication or Chip Authentication v1, the TOE computes a Message Authentication Code (MAC) to check integrity of received data, and to allow integrity check by the terminal. The MAC computation is performed according to CMAC or Retail MAC algorithm and cryptographic key sizes 112, 128, 192 or 256 bits.
FCS_COP.1/SIG_VER	The TOE performs signature verification for Terminal Authentication using the RSA and ECDSA algorithms.
FCS_RND.1	The TOE generates random numbers for use in the authentication protocols.
FIA_AFL.1/Init	In case of unsuccessful authentication, the Initialization Agent has only a limited number of consecutive authentications attempts after which only a limited set of commands is allowed. The maximum number of consecutive unsuccessful authentication is set to 15.

FIA_AFL.1/Pre-pers	In case of unsuccessful authentication, the Pre-personalization Agent has only a limited number of authentications attempts after which the Pre-personalization keys are blocked. The maximum number of consecutive failures is set to 15.
FIA_AFL.1/Pers	In case of unsuccessful authentication, the Personalization Agent has only a limited number of consecutive authentications attempts after which only a limited set of commands is allowed. The maximum number of consecutive unsuccessful authentication is set to 15.
FIA_AFL.1/BAC	When an unsuccessful BAC authentication happens, the next authentication will be delayed and the delay will be increased for each consecutive unsuccessful BAC authentication to counter brute force attacks. The delay will be reset after the next first successful authentication.
FIA_AFL.1/PACE	When an unsuccessful PACE authentication happens, the next authentication will be delayed. The delay will be increased for each consecutive unsuccessful PACE authentication. The delay will be reset after the next first successful authentication.
FIA_UID.1/BAC	The TOE applies access control policies to guarantee that: • access to the initialization data and to the random identifier for contactless protocol is allowed before users are identified, • read access to any other data requires a successful execution of SCP03 protocol (in Personalization) or BAC protocol (in the operational use phase). The required access privileges are set for each data set by the agent that writes the related persistent object.
FIA_UID.1/PACE	The TOE applies access control policies to guarantee that the following actions can be performed before the user is identified: • Establishment of a secure communication channel, • PACE authentication • Read access to the initialization data • Chip Authentication (as CA v1 or as part of PACE-CAM), • Terminal Authentication, • Active Authentication. Any other action is forbidden without prior user identification. The required access privileges are set for each data set by the agent that writes the related persistent object.

FIA_UAU.1/BAC	The TOE applies access control policies to guarantee that read access to data, in each TOE life cycle phase, is given to authorized users only. Initialization data and the random identifier for contactless protocol, can be accessed without any authentication. Read access in Personalization requires a successful completion of the SCP03 protocol. Read access in the operational use phase requires a BAC authentication. The required access privileges are set for each data set by the agent that writes the related persistent object.
FIA_UAU.1/PACE	The TOE applies access control policies to guarantee that the following actions can be performed before the user is authenticated: • Establishment of a secure communication channel, • PACE authentication • Read access to the initialization data • Chip Authentication (as CA v1 or as part of PACE-CAM), • Terminal Authentication, • Active Authentication. Any other action is forbidden without prior user authentication. The required access privileges are set for each data set by the agent that writes the related persistent object.
FIA_UAU.4/BAC	In case of unsuccessful authentication attempts, the TOE closes the current session, overwrites session keys with zeros and stops any further communication with the terminal.
FIA_UAU.4/PACE	In case of unsuccessful authentication attempts, the TOE closes the current session, overwrites session keys with zeros and stops any further communication with the terminal.
FIA_UAU.5/BAC	The TOE provides: • the BAC mechanism to authenticate the user in the operational use phase with 112-bit BAC keys, • the AES to authenticate the Initialization Agent with a 256-bit key • the SCP03 protocol to authenticate the Pre-personalization Agent with a 128, 192 or 256-bit Pre-personalization key, • the SCP03 protocol to authenticate the Personalization Agent with a 128, 192 or 256-bit Personalization key.
FIA_UAU.5/PACE	The TOE provides: • the PACE mechanism to authenticate the user in the operational use,

	• the SCP03 mechanism to authenticate the Pre-personalization and Personalization agent, • Passive authentication to verify integrity of logical user data, • Secure Messaging in MAC-ENC mode, to guarantee confidentiality and integrity of data exchanged over a communication channel, • Terminal Authentication as final part of the EAC v1 mechanism.
FIA_UAU.6/BAC	Secure Messaging established after a successful BAC authentication provides re-authentication of the user.
FIA_UAU.6/PACE	Secure Messaging established after a successful PACE authentication allows re-authentication of the user.
FIA_UAU.6/EAC/CAV1	Secure Messaging established after a successful Chip Authentication v1 provides re-authentication of the user.
FIA_UAU.6/EAC/CAM	Secure Messaging established after a successful PACE-CAM authentication provides re-authentication of the user.
FIA_API.1/CAV1	The TOE proves the genuineness of the chip by performing Chip Authentication v1. Other methods to achieve that proof are described below for FIA_API.1/CAM and FIA_API.1/AA.
FIA_API.1/CAM	The TOE proves the genuineness of the chip by performing Chip Authentication as part of PACE-CAM. Other methods to achieve that proof are described below for FIA_API.1/CAV1 and FIA_API.1/AA.
FIA_API.1/AA	The TOE proves the genuineness of the chip by performing Active Authentication. Other methods to achieve that proof are described below for FIA_API.1/CAM and FIA_API.1/CAV1.
FDP_ACC.1/TRM	The TOE applies an Access Control Policy to check that terminals wanting to access protected data possess the required privileges and have successfully completed the required authentication. The TSF checks the possess of the above requirements before any access to protected data.
FDP_ACF.1/TRM	The TOE keeps a security status for each of the data object related to the protected data listed in this SFR to guarantee entitlement to read, write and/or modify those data. The TSF checks the security status is checked before any access to the protected data.
FDP_RIP.1	The TOE clears session keys and private ephemeral keys by overwriting them with zeroes. The TOE also clears the context under which those keys have been used.

FDP_UCT.1/TRM	The TOE protects data confidentiality of received and transmitted data by means of Triple-DES or AES cryptography within Secure Messaging sessions in MAC-ENC mode.
FDP_UIT.1/TRM	The TOE guarantees data integrity by means of a Message Authentication Code (MAC) within Secure Messaging sessions in MAC-ENC mode. The MAC: • is computed on data to be transmitted and sent to the terminal together with the data and • is checked upon data reception to allow tampering detection.
FTP_ITC.1/PACE	After PACE or Chip Authentication the TOE establishes a secure channel with the terminal (the trusted IT product). After that, all data are exchanged in Secure Messaging in ENC_MAC mode. Therefore, confidentiality is protected by encryption and checking of MAC allows tampering detection.
FTP_ITC.1/SCP	After SCP Authentication the TOE establishes a secure channel with the terminal (the trusted IT product). After that, all data are exchanged in Secure Messaging in ENC_MAC mode. Therefore, confidentiality is protected by encryption and checking of MAC allows tampering detection.
FMT_SMF.1	The TOE provides features for storing Initialization data, Pre-personalization Data, Personalization Data and Configuration Data, ensuring that only the entitled agents are able to do so.
FMT_SMR.1/BAC	The TOE distinguishes between the roles IC Manufacturer, Initialization Agent, Pre-personalization Agent, Personalization Agent and Basic Inspection System, and grants each of them the access privileges allowed by the security policies. All the above roles are implicitly identified via the corresponding authentication key.
FMT_SMR.1/PACE	The TOE distinguishes between the roles IC Manufacturer, Pre-personalization Agent, Personalization Agent, Terminal, PACE-authenticated Basic Inspection System, CVCA, Document Verifier, Basic Inspection System, Domestic and Foreign Extended Inspection System. All these roles are granted the access privileges allowed by the security policies and are implicitly identified via the corresponding authentication key.
FMT_LIM.1	The test features of the OS, as well as the authentication mechanism granting access to them, are permanently disabled in the evaluated configuration of the OS. As regards the test features of the IC, information on their limitation is provided in the TOE summary specification of the

	public security target of the supported IC for platform SFRs FMT_LIM.1, FMT_LIM.2 [R23].
FMT_LIM.2	As specified for SFR FMT_LIM.1.
FMT_MTD.1/INI_ENA	The access control policy enforced by the TOE guarantees that in the Initialization and Pre-personalization steps only the entitled agents can write data. The TSF checks the possess of access privileges before any access is made.
FMT_MTD.1/INI_DIS	The access control policy enforced by the TOE guarantees that Initialization Data and Pre-personalization Data can be read by the Personalization Agent only. The TSF checks the possess of access privileges before any access is made to those data.
FMT_MTD.1/CVCA_INI	The access control policy enforced by the TOE guarantees that CVCA certificate, as well as current data can be written by the Personalization Agent only. The TSF checks the possess of access privileges before any access is made to those data.
FMT_MTD.1/CVCA_UPD	The access control policy enforced by the TOE guarantees that CVCA certificate can be updated by the CVCA only. The TSF checks the possess of access privileges before any access is made to those data.
FMT_MTD.1/DATE	The access control policy enforced by the TOE guarantees that the current data can be updated by the CVCA, or DV or Domestic EIS only. The TSF checks the possess of access privileges before any access is made to those data.
FMT_MTD.1/CAPK	The access control policy enforced by the TOE guarantees that the Chip Authentication private key can be loaded by the Pre-personalization Agent only. The TSF checks the possess of access privileges before any access is made to those data.
FMT_MTD.1/KEY_WRITE	The access control policy enforced by the TOE guarantees that BAC keys can be written by the Personalization Agent only. The TSF checks the possess of access privileges before any access is made to those keys.
FMT_MTD.1/KEY_READ	The property defining read access conditions of: • Document BAC keys, • PACE passwords, • Chip Authentication private key, • Pre-personalization keys,

	• Personalization keys, • Active Authentication private key, • Initialization keys. are set, when those keys are written, so that the keys cannot be read by anyone under any circumstances. The TSF checks the access privileges before any access is made to those keys.
FMT_MTD.1/PA	The property defining write access conditions of Document Security Object (SO_D) are set, when those keys are written, so that the SO_D can only be written by the Personalization Agent. The TSF checks the access privileges before any access is made the SO_D.
FMT_MTD.1/AAPK	The access control policy enforced by the TOE guarantees that the Active Authentication private key can be written by the Pre-personalization Agent only. The TSF checks the possess of access privileges before any access is made to those data.
FMT_MTD.3	The TSF checks the security and the validity of values in the certificate chain before using those data for Terminal Authentication and Access Control mechanisms.
FPT_EMS.1	Leakage of confidential data through side channels is prevented by the security features of the Platform, in accordance with the security recommendations contained in the Platform guidance documentation [R24].
FPT_FLS.1	In case self-test fails or a physical attack is detected, the OS enters an endless loop, so that all cryptographic operations and data output interfaces are inhibited.
FPT_TST.1	During initial start-up, the IC performs a self-test procedure that tests alarm lines and environmental sensor mechanisms (cf. [R24]), and the OS checks the integrity of the TSF by computing a hash value of the code and comparing it with a reference hash value stored internally. Moreover, the integrity of TSF data is checked whenever they are used. In case any one of such checks fails, the OS enters an endless loop, so that the resulting fall of communication informs the user about the integrity error.
FPT_PHP.3	Detection of physical attacks is ensured by the security features of the Platform.

9.2 Assurance measures

Assurance measures applied to the TOE are fully compliant to those described in part 3 of the Common Criteria v3.1 [R11].
The implementation is based on a description of the security architecture of the TOE and on a semi-formal high-level and low-level design of the components of the TOE. The description is sufficient to generate the TOE without other design requirements. These documents, together with the source code of the software, address the ADV_ARC, ADV_FSP, ADV_TDS and ADV_IMP families.

The configuration management plan addresses the ALC_CMC and ALC_CMS families and enforces good practices to securely manage configuration items including, but not limiting to, design documentation, user documentation, source code, test documentation and test data.
The configuration management process guarantees the separation of the development configuration libraries from the configuration library containing the releases and also supports the generation of the TOE.
All the configuration items are managed with the help of automated tools. In particular configuration items regarding security flaws are managed with the support of an issue tracking system, while all the other configuration items are managed with the help of a version control system.

The software test process, addressing the class ATE, is machine-assisted to guarantee a repeatable error-free execution of the same test chains in both the system test and in the validation phases.

A secure delivery of the TOE is guaranteed by the application of dedicated procedures. The prevention measures, the checks and all the actions to be performed at the developer’s site are described in the secure delivery procedure addressing the family ALC_DEL, while the security measures related to delivery to be applied at the user’s site are defined in the pre-personalization guidance. The latter document also addresses the family AGD_PRE.

The necessary information for the document personalization is provided by a dedicated guidance and the information for its usage after delivery to the legitimate holder is provided by the guidance for the operational use. These documents address the AGD_OPE assurance family.

To protect the confidentiality and integrity of the TOE design and implementation, the development and production environment and tools conform to the security policies defined in the documentation dedicated to the development security, which addresses the family ALC_DVS.

The life-cycle model adopted in the manufacturing phases and the tools supporting the development and production of the TOE are described in dedicated documents addressing the families ALC_LCD and ALC_TAT.

An independent vulnerability analysis, meeting requirements of the family AVA_VAN, is conducted by a third party.

Due to the composite nature of the evaluation, which is based on the CC evaluation of the hardware, the assurance measures related to the platform (IC) are covered by documents from the IC manufacturer. The security procedures described in such documents have been taken into consideration.

The assurance measures detailed in this section cover the security assurance requirements described in section 8.3.

10 References

10.1 Acronyms

AA	Active Authentication
AES	Advanced Encryption Standard
ASCII	American Standard Code for Information Interchange
BAC	Basic Access Control
BIS	Basic Inspection System
CA	Chip Authentication/Certification Authority
CAM	Chip Authentication Mapping
CAN	Card Access Number
CBC	Cipher Block Chaining
CC	Common Criteria
CHA	Certificate Holder Authorization
CSCA	Country Signing Certification Authority
CV	Card Verifiable
CVCA	Country Verifying Certification Authority
DEMA	Differential Electromagnetic Analysis
DES	Data Encryption Standard
DF	Dedicated File
DG	Data Group
DH	Diffie-Hellman
DPA	Differential Power Analysis
DS	Document Signer
DV	Document Verifier

EAC	Extended Access Control
EAL	Evaluation Assurance Level
ECC	Elliptic Curve Cryptography
ECDH	Elliptic Curve Diffie-Hellman
ECDSA	Elliptic Curve Digital Signature Algorithm
EEPROM	Electrically Erasable Programmable Read-Only Memory
EF	Elementary File
EIS	Extended Inspection System
FID	File Identifier
GIS	General Inspection System
GM	Generic Mapping
IC	Integrated Circuit
ICAO	International Civil Aviation Organization
ICC	Integrated Circuit Card
ICCSN	Integrated Circuit Card Serial Number
IM	Integrated Mapping
IS	Inspection System
IT	Information Technology
LDS	Logical Data Structure
MAC	Message Authentication Code
MF	Master File
MRTD	Machine Readable Travel Document
MRZ	Machine Readable Zone
OCR	Optical Character Recognition
OS	Operating System
OSP	Organization Security Policy

PACE	Password Authenticated Connection Establishment
PICC	Proximity Integrated Circuit Chip
PIS	Primary Inspection System
PKI	Public Key Infrastructure
PP	Protection Profile
RFID	Radio Frequency Identification
ROM	Read-Only Memory
RSA	Rivest-Shamir-Adleman
SAP	Security Architecture Properties
SAR	Security Assurance Requirement
SCP	Secure Channel Protocol
SFP	Security Function Policy
SFR	Security Functional Requirement
SHA	Secure Hash Algorithm
SPA	Simple Power Analysis
ST	Security Target
TA	Terminal Authentication
TDES	Triple DES
TOE	Target of Evaluation
TR	Technical Report
TRNG	True Random Number Generator
TSF	TOE Security Functionality
TSP	TOE Security Policy
UID	Unique Identifier
VIZ	Visual Inspection Zone

10.2 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 [R7].
Active Authentication (AA)	Security mechanism defined in ICAO Doc 9303 [R19], by which means the Travel Document 's chip proves and the inspection system verifies the identity and authenticity of the MTRD's chip as part of a genuine Travel Document, issued by a known state or organization.
Advanced Inspection Procedure (with PACE)	A specific order of authentication steps between an Travel Document and a terminal as required by [R6], namely (i) PACE, (ii) Chip Authentication v.1, (iii) Passive Authentication with SO_D, and (iv) Terminal Authentication v.1.
Application Note	Additional 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-personalization 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 Organization.
Basic Access Control (BAC)	Security mechanism defined by ICAO [R19] by which means the Travel Document's chip proves and the inspection system protects their communication by means of secure messaging with the Document BAC Keys.
Basic Inspection System with Basic Access Control Protocol (BIS-BAC)	A technical system being used by an official organization and operated by a governmental organization verifying correspondence between the stored and printed MRZ. BIS-BAC implements the terminal's part of the Basic Access Control protocol, and authenticates itself to the Travel Document using the Document Basic Access Keys drawn from printed MRZ data for reading the less sensitive data (Travel Document details data and biographical data) stored on the Travel Document. See [R18] [R19].
Basic Inspection System with PACE Protocol (BIS-PACE)	A technical system being used by an inspecting authority and verifying the Travel Document presenter as the Travel Document holder (e.g. 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, authenticates itself to the Travel Document using a shared password (PACE password), and supports Passive Authentication. See [R18] [R19].
Biographical Data	The personalized details of the bearer of the document appearing as text in the Visual Inspection Zone (VIZ) and Machine Readable Zone (MRZ) on the biographical data page of an Travel Document [R18].
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 of 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.
Chip Authentication (CA)	Authentication protocol used to verify the genuineness of the Travel Document's chip.
Counterfeit	An unauthorized copy or reproduction of a genuine security document made by whatever means.
Country Signing Certification Authority (CSCA)	An organization 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. The CSCA also issues the self-signed CSCA certificate (C_{CSCA}) having to be distributed by strictly secure diplomatic means; see [R20]. The Country Signing Certification Authority issuing certificates for Document Signers (cf. [R20]) 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 [R7].
Country Signing Certification Authority Certificate (C_{CSCA})	Certificate of the Country Signing Certification Authority Public Key (PKCSCA) issued by the Country Signing Certification Authority and stored in the inspection system.

Country Verifying Certification Authority (CVCA)	An organization 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 [R7]. The Country Signing Certification Authority (CSCA) issuing certificates for Document Signers (cf. [R20]) 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 [R7].
Current Date	The maximum of the effective dates of valid CVCA, DV, and domestic Inspection System certificates known to the TOE. It is used to validate card verifiable certificates.
CV Certificate	Card Verifiable certificate according to [R7].
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 Keys	Pair of symmetric (two-key) TDES keys used for secure messaging with encryption and message authentication of data transmitted between the Travel Document's chip and an inspection system using BAC [R19]. They are derived from the MRZ and used within BAC to authenticate an entity able to read the printed MRZ of the Travel Document; see [R19].
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 (SO_D)	An RFC 3369 Signed Data Structure [R22], signed by the Document Signer (DS). It carries the hash values of the LDS DGs and is stored in the Travel Document's chip. It may carry the Document Signer Certificate (C_{DS}) [R18] [R20].
Document Signer (DS)	An organization enforcing the policy of the CSCA and signing the Document Security Object stored on the Travel Document for passive authentication. A Document Signer is authorized by the CSCA issuing the Document Signer certificate (C_{DS}); see [R20]. This role is usually delegated to a Personalization Agent.

Document Verifier (DV)	An organization enforcing the policies of the CVCA and of a Service Provider (e.g. of a governmental organization or 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, authorized by at least the CVCA to issue certificates for terminals; see [R7]. There can be domestic and foreign DVs. 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 and a foreign CVCA enforcing the Travel Document issuer's privacy policy).
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.
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 [R18].
ePassaport 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 [R18] [R19].
Extended Access Control (EAC)	Security mechanism identified in BSI TR-03110 [R6] 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 the BIS, authorized by the Issuing State or Organization to read the optional biometric reference data and supports the terminal's 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 [R18].
General Inspection System (GIS)	A Basic Inspection System which implements sensitively the Chip Authentication mechanism.

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 Travel Documents.
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 cycle phases.
IC Dedicated Support Software	The 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	The 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	Unique IC identifier written by the IC Manufacturer onto the chip to control the IC as Travel Document material during the IC manufacturing and the delivery process to the Initialization Agent.
IC Initialization Data	Any data defined by the TOE Manufacturer and injected into the non-volatile memory by the IC Manufacturer (Phase 2) in Step 3, IC Manufacturing.
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.
Improperly Documented Person	A person who uses, or attempts to use: (a) an expired or invalid document; (b) a counterfeit, forged or altered document; (c) someone else’s document; or (d) no document, if required.

Initialization Agent	The agent who initializes the Travel Document by writing Initialization Data.
Initialization Data	Any data defined by the TOE Manufacturer and injected into the non-volatile memory by the IC Manufacturer or by the Initialization Agent (Phase 2). These data are, for instance, used for OS configuration, for traceability, and for IC identification as Travel Document's material (IC identification data).
Inspection	The act of a State examining a Travel Document presented to it by a user (the Travel Document holder) and verifying its authenticity.
Inspection System (IS)	A technical system used by the border control officer of the receiving State or Organization (i) examining a Travel Document presented by the user and verifying its authenticity, and (ii) verifying the user 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 those created by the Issuing State or Organization.
Issuing Organization	Organization authorized to issue an official Travel Document (e.g. the United Nations Organization, issuer of the Laissez-passer).
Issuing State	The Country issuing an official Travel Document.
Logical Data Structure (LDS)	The collection of groupings of data elements stored in the optional capacity expansion technology [R18]. The capacity expansion technology used is the Travel Document's chip.
Logical Travel Document	Data of the Travel Document holder stored according to the Logical Data Structure [R18] as specified by ICAO on the contactless integrated circuit.
Machine Readable Travel Document (MRTD)	Official document issued by a State or Organization which is used by the holder for various purposes (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 [R18].
Machine Readable Zone (MRZ)	Fixed dimensional area located on the front of the Travel Document 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 [R18].

	The MRZ password is a restricted-revealable secret that is derived from the Machine Readable Zone and may be used for both PACE and BAC.
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 [R18].
Metadata of a CV Certificate	Data within the certificate body (except for public key) as described in [R7]. The metadata of a CV certificate comprise the following elements: i. Certificate Profile Identifier, ii. Certificate Authority Reference, iii. Certificate Holder Reference, iv. Certificate Holder Authorisation Template, v. Certificate Effective Date, vi. Certificate Expiration Date.
Optional Biometric Reference Data	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 fingerprints and not to use iris images as optional biometric reference data.
PACE Password	A password needed for PACE authentication, e.g. CAN or MRZ.
PACE Terminal (PCT)	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. A PCT implements the terminal's part of the PACE protocol, and authenticates itself to the Travel Document using a shared password (e.g. CAN or MRZ).

Passive Authentication	Security mechanism implementing (i) verification of the digital signature of the Document Security Object, and (ii) comparing the hash values of the read data fields with the hash values contained in the Document Security Object; see [R19] [R20].
Password Authenticated Connection Establishment (PACE)	A communication establishment protocol defined in [4]. The PACE protocol is a password-authenticated Diffie-Hellman key agreement protocol providing implicit password-based authentication of the communication partners (e.g. a smart card and the terminal connected): i.e. PACE provides a verification whether the communication partners share the same value of a password). Based on this authentication, PACE also provides a secure communication, whereby confidentiality and authenticity of data transferred within this communication channel are maintained.
Personalization	The process by which the personalization data are stored in and unambiguously, inseparably associated with the Travel Document. This may also include the optional biometric data collected during the enrolment.
Personalization Agent	An organization acting on behalf of the Travel Document issuer to personalize 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 Travel Document holder, iii. writing a subset of these data on the physical Travel Document (optical personalization) and storing them in the Travel Document (electronic personalization) for the Travel Document holder as defined in [R18], iv. writing the document details data, v. writing the initial TSF data, vi. signing the Document Security Object defined in [R18] (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. Generating signature key pair(s) is not in the scope of the tasks of this role.
Personalization Agent Authentication Information	TSF data used for authentication proof and verification of the Personalization Agent.
Personalization Agent Key	Symmetric cryptographic authentication key used (i) by the Personalization Agent to prove their identity and get access to the logical Travel Document, and (ii) by the Travel

	Document's chip to verify the authentication attempt of a terminal as Personalization Agent.
Personalization Data	A set of data incl. (i) individual-related data (biographic and biometric data) of the Travel Document holder, (ii) dedicated document details data, and (iii) dedicated initial TSF data (incl. the Document Security Object). Personalization data are gathered and then written into the non-volatile memory of the TOE by the Personalization Agent in the personalization life cycle phase.
Physical Travel Document	Electronic document in the form of paper, plastic and chip using secure printing to present data including (but not limited to): i. biographical data, ii. data of the Machine Readable Zone, iii. photographic image, and iv. other data.
Pre-personalization	Process of writing pre-personalization data to the TOE, including the creation of the Travel Document application.
Pre-personalization Agent	The agent who performs pre-personalization by writing Pre-personalization Data.
Pre-personalization Data	Any data that is injected into the non-volatile memory of the TOE by the Pre-personalization Agent (phase 2) for traceability of non-personalized Travel Documents and/or for secure shipment within or between life cycle phases 2 and 3. It contains (but is not limited to) the Active Authentication key pair and the Personalization Agent key.
Presenter	Person presenting the Travel Document to the inspection system and claiming the identity of the Travel Document holder.
Random Identifier	Random identifier used to establish a communication to the TOE in Phase 3 and 4 preventing the unique identification of the MRTD, thus participates in the prevention of traceability.
Receiving State or Organization	The Country or the Organization to which the Travel Document holder is applying for entry or control [R18].
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 [R29] [R30].
Secure Messaging	Secure messaging using encryption and message authentication code according to ISO/IEC 7816-4 [R19].

Service Provider	An official organization (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 Inspection Procedure	A specific order of authentication steps between an Travel Document and a terminal as required by [R19], namely (i) PACE or BAC and (ii) Passive Authentication with SO_D. The Standard Inspection Procedure can generally be used by BIS-PACE and BIS-BAC.
Terminal	A terminal is any technical system communicating with the TOE either through the contact-based or contactless interface, verifying correspondence between the password stored in the Travel Document and the related value presented to the terminal by the Travel Document presenter. A terminal may implement the terminal's part of the PACE protocol, and thus authenticate itself to the Travel Document using a shared password (e.g. CAN or MRZ).
Terminal Authorization	Intersection of the Certificate Holder Authorizations defined by the Inspection System Certificate, the Document Verifier Certificate, and the Country Verifying Certification Authority, which shall be all valid for the Current Date.
TOE Initialization Data	Any data defined by the TOE Manufacturer and injected into the non-volatile memory by the Initialization Agent (phase 2) in step 6, Initialization.
TOE Tracing Data	Technical information about the current and previous locations of the Travel Document gathered by inconspicuously (for the Travel Document holder) recognising the Travel Document.
Travel Document	An official document of identity issued by a State or Organization, which may be used by the rightful holder.
Travel Document's Chip	A contactless integrated circuit chip complying with ISO/IEC 14443 [R29] [R30] and programmed according to the Logical Data Structure as specified by ICAO [R18].
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.

Travel Document Holder	The rightful holder of the Travel Document for whom the issuing State or Organization personalized the Travel Document.
Travel document Issuer (issuing authority)	Organisation authorised to issue an electronic Passport to the travel document holder
Travel document presenter	A person presenting the travel document to a terminal and claiming the identity of the travel document holder.
Traveller	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 [R9].
User Data	Data created by and for the user that does not affect the operation of the TSF [R9].
Verification	The process of comparing a submitted biometric sample against the biometric reference template of a single applicant whose identity is being claimed, to determine whether it matches the applicant’s template [R18].
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.

10.3 Technical references

[R1] **BSI:** *Certification Report BSI-DSZ-CC-1107-V5-2024 for IFX_CCI_00002Dh, 000039h, 00003Ah, 000044h, 000045h, 000046h, 000047h, 000048h, 000049h, 00004Ah, 00004Bh, 00004Ch, 00004Dh, 00004Eh design step T11 with firmware 80.306.16.0, 80.306.16.1 or 80.312.02.0, optional NRG™ SW 05.03.4097, optional HSL v3.52.9708, UMSLC lib v01.30.0564, optional SCL v2.15.000 or v2.11.003, optional ACL v3.35.001, v3.34.000, v3.33.003 or v3.02.000, optional RCL v1.10.007, optional HCL v1.13.002 and user guidance from Infineon Technologies AG, 4 September 2024*

[R2] **BSI:** *Funktionalitätsklassen und Evaluationsmethodologie für physikalische Zufallszahlengeneratoren, Version 3.1, 15 May 2013*

[R3] **BSI:** *Common Criteria Protection Profile, Machine Readable Travel Document with „ICAO Application", Basic Access Control, Version 1.10, March 2009, ref. BSI-CC-PP-0055*

[R4] **BSI:** *Common Criteria Protection Profile, Machine Readable Travel Document with „ICAO Application", Extended Access Control with PACE (EAC PP), version 1.3.2, December 2012, ref. BSI-CC-PP-0056-V2-2012*

[R5] **BSI:** *Common Criteria Protection Profile, Machine Readable Travel Document using Standard Inspection Procedure with PACE (PACE PP), version 1.01, July 2014, ref. BSI-CC-PP-0068-V2-2011-MA-01*

[R6] **BSI:** *Technical Guideline TR-03110-1, Advanced Security Mechanisms for Machine Readable Travel Documents and eIDAS Token – Part 1: eMRTDs with BAC/PACEv2 and EACv1, version 2.20, February 2015*

[R7] **BSI:** *Technical Guideline TR-03110-3, Advanced Security Mechanisms for Machine Readable Travel Documents and eIDAS Token – Part 3: Common Specifications, version 2.21, December 2016*

[R8] **BSI:** *Technical Guideline TR-03111, Elliptic Curve Cryptography, version 2.10, 2018-06-01*

[R9] **CCMB:** *Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and general model, version 3.1, revision 5, April 2017, ref. CCMB-2017-04-001*

[R10] **CCMB:** *Common Criteria for Information Technology Security Evaluation, Part 2: Security functional components, version 3.1, revision 5, April 2017, ref. CCMB-2017-04-002*

[R11] **CCMB:** *Common Criteria for Information Technology Security Evaluation, Part 3:*

Security assurance components, version 3.1, revision 5, April 2017, ref. CCMB-2017-04-003

[R12] GlobalPlatform: *GlobalPlatform Card Technology, Secure Channel Protocol '03', Card Specification v 2.3 - Amendment D v1.2, April 2020*

[R13] TOPPAN Security S.r.l.: *Security Target for SOMA-ck022 Travel Document, ref. TS-IT_25016, version 1.2.*

[R14] TOPPAN Security S.r.l.: *Initialization Guidance for SOMA-ck022 Travel Document, ref. TS-IT_25017, version 1.1.*

[R15] TOPPAN Security S.r.l.: *Pre-personalization Guidance for SOMA-c016 Machine Readable Electronic Document, ref. TS-IT_25018, version 1.1.*

[R16] TOPPAN Security S.r.l.: *Personalization Guidance for SOMA-ck022 Travel Document, ref. TS-IT_25019, version 1.1.*

[R17] TOPPAN Security S.r.l.: *Operational User Guidance for SOMA-ck022 Travel Document, ref. TS-IT_25020, version 1.1.*

[R18] ICAO: *Doc 9303, Machine Readable Travel Documents, Part 10: Logical Data Structure (LDS) for Storage of Biometrics and Other Data in the Contactless Integrated Circuit (IC), Eighth Edition, 2021*

[R19] ICAO: *Doc 9303, Machine Readable Travel Documents, Part 11: Security Mechanisms for MRTDs, Eighth Edition, 2021*

[R20] ICAO: *Doc 9303, Machine Readable Travel Documents, Part 12: Public Key Infrastructure for MRTDs, Eighth Edition, 2021*

[R21] IETF Network Working Group: *Request For Comments 2119, Key words for use in RFCs to Indicate Requirement Levels, March 1997*

[R22] IETF Network Working Group: *Request For Comments 3369, Cryptographic Message Syntax (CMS), August 2002*

[R23] INFINEON: *IFX_CCI_00002Dh, IFX_CCI_000039h, IFX_CCI_00003Ah, IFX_CCI_000044h, IFX_CCI_000045h, IFX_CCI_000046h, IFX_CCI_000047h, IFX_CCI_000048h, IFX_CCI_000049h, IFX_CCI_00004Ah, IFX_CCI_00004Bh, IFX_CCI_00004Ch, IFX_CCI_00004Dh, IFX_CCI_00004Eh T11 Security Target Lite, Revision: v6.5, 20 August 2024*

[R24] INFINEON: *32-bit Security Controller – V11, Security Guidelines, Revision 1.00-*

2976, 2023-06-19

[R25] ISO/IEC: *International Standard 7816-4:2020. Identification cards - Integrated circuit(s) cards with contacts – Part 4: Interindustry commands for interchange*

[R26] ISO/IEC: *International Standard 9796-2:2010 Information Technology – Security Techniques – Digital signature schemes giving message recovery – Part 2: Integer factorization based mechanism*

[R27] ISO/IEC: *International Standard 9797-1:2011. Information Technology – Security Techniques – Message Authentication Codes – Part 1: Mechanisms using a block cipher*

[R28] ISO/IEC: *International Standard 11770-2:2018. IT Security techniques – Key management – Part 2: Mechanisms using symmetric techniques*

[R29] ISO/IEC: *International Standard 14443-3:2018 Cards and security devices for personal identification — Contactless proximity objects — Part 3: Initialization and anticollision*

[R30] ISO/IEC: *International Standard 14443-4:2018 Cards and security devices for personal identification — Contactless proximity objects — Part 4: Transmission protocol*

[R31] JIWG: *Joint Interpretation Library, Composite product evaluation for Smart Cards and similar devices, version 1.5.1, May 2018*

[R32] NIST: *Special Publication 800-38A, Recommendation for Block Cipher Modes of Operation, December 2001*

[R33] NIST: *Special Publication 800-67 Revision 2, Recommendation for the Triple Data Encryption Standard (TDEA) Block Cipher, November 2017*

[R34] NIST: *FIPS PUB 180-4, Federal Information Processing Standards Publication, Secure Hash Standard (SHS), August 2015*

[R35] NIST: *FIPS PUB 186-5, Federal Information Processing Standards Publication, Digital Signature Standard (DSS), February 2023*

[R36] NIST: *FIPS PUB 197, Federal Information Processing Standards Publication, Advanced Encryption Standard (AES), November 2001*

[R37] RSA Laboratories: *PKCS #1: RSA Cryptography Standard, version 2.2, October*

2012

[R38] **RSA Laboratories:** *PKCS #3: Diffie-Hellman Key Agreement Standard, version 1.4, November 1993*

[R39] **SOG-IS:** *SOG-IS Crypto Evaluation Scheme Agreed Cryptographic Mechanism, version 1.3 February 2023*

Appendix A Platform identification

The IC on which the TOE is based, constituting the platform for its composite evaluation (cf. [R31]), is the Infineon Security Controller IFX_CCI_000039h.

The IC components used are listed in table below:

Table 10-1 IC Components

Type	Identifier	Release
Hardware		
	IFX_CCI_000039h	T11 (design step)
Firmware		
	BOS & POWS & RFAPI (ROM)	80.306.16.0, 80.306.16.1, 80.312.02.0
Software		
	HSL	3.52.9708
	UMSLC	01.30.0564
	SCL	2.15.000
	ACL	3.35.001
	RCL	1.10.007
	HCL	1.13.002

The IC has obtained a Common Criteria certification at Evaluation Assurance Level EAL6 augmented by ASE_TSS.2 and ALC_FLR.1:

- Certification ID: BSI-DSZ-CC-1107-V5-2024
- Security Target: [R23]
- Certification Report: [R1]