Bundesamt
für Sicherheit in der
Informationstechnik

Common Criteria Protection Profile

Machine Readable Travel Document with „ICAO Application", Basic Access Control

Common Criteria

BSI-PP-0017

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Bundesamt für Sicherheit in der Informationstechnik

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Foreword

This ‘Protection Profile — Machine Readable Travel Document with ICAO Application (MRTD-PP)’ is issued by Bundesamt für Sicherheit in der Informationstechnik, Germany.

The document has been prepared as a Protection Profile (PP) following the rules and formats of Common Criteria version 2.2 [1], [2], [3] with final interpretations of the CCIMB.

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1 PP Introduction

1.1 PP reference

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Title:	Protection Profile — Machine Readable Travel Document with ICAO Application and Basic Access Control (MRTD-PP)
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1.2 PP Overview

2 The protection profile defines the security objectives and requirements for the contactless chip of machine readable travel documents (MRTD) based on the requirements and recommendations of the International Civil Aviation Organization (ICAO). It addresses the advanced security methods Basic Access Control in the Technical reports of the ICAO New Technology Working Group.

1.3 Conformance Claim

3 This protection profile claims conformance to

4 Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and general model, August 1999, version 2.1, CCIMB-99-031

- Common Criteria for Information Technology Security Evaluation, Part 2: Introduction and general model, August 1999, version 2.1, CCIMB-99-032
- Common Criteria for Information Technology Security Evaluation, Part 3: Security Assurance Requirements, August 1999, version 2.1, CCIMB-99-033

including the

- Final Interpretation of CCIMB as of 04.04.2005

as follows

- Part 2 extended,
- Part 3 conformant,
- Package conformant to EAL4 augmented with ADV_IMP.2 and ALC_DVS.2.

2 TOE Description

TOE definition

5 The Target of Evaluation (TOE) is the contactless integrated circuit chip of machine readable travel documents (MRTD's chip) programmed according to the Logical Data Structure (LDS) [6] and providing the Basic Access Control according to the ICAO document [7].

6 The TOE comprises of

- the circuitry of the MRTD's chip (the integrated circuit, IC) with hardware for the contactless interface, e.g. antennae, capacitors,
- the IC Dedicated Software with the parts IC Dedicated Test Software and IC Dedicated Support Software,
- the IC Embedded Software (operating system),
- the MRTD application and
- the associated guidance documentation.

TOE usage and security features for operational use

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

8 For this protection profile the MRTD is viewed as unit of

(a) the **physical MRTD** as travel document in form of paper, plastic and chip. It presents visual readable data including (but not limited to) personal data of the MRTD holder

(1) the biographical data on the biographical data page of the passport book,

(2) the printed data in the Machine-Readable Zone (MRZ) and

(3) the printed portrait.

(b) the **logical MRTD** as data of the MRTD holder stored according to the Logical Data Structure [6] as specified by ICAO on the contactless integrated circuit. It presents contactless readable data including (but not limited to) personal data of the MRTD holder

(1) the digital Machine Readable Zone Data (digital MRZ data, DG1),

(2) the digitized portraits (DG2),

(3) the optional biometric reference data of finger(s) (DG3) or iris image(s) (DG4) or both[1]

(4) the other data according to LDS (DG5 to DG16) and

(5) the Document security object.

[1] These additional biometric reference data are optional.

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

10 The physical MRTD is protected by physical security measures (e.g. watermark on paper, security printing), logical (e.g. authentication keys of the MRTD's chip) and organisational security measures (e.g. control of materials, personalization procedures) [8]. These security measures include the binding of the MRTD's chip to the passport book.

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

12 The ICAO defines the baseline security methods Passive Authentication and the optional advanced security methods Basic Access Control to the logical MRTD, Active Authentication of the MRTD's chip, Extended Access Control to and the Data Encryption of additional biometrics as optional security measure in the ICAO Technical report [7]. The Passive Authentication Mechanism and the Data Encryption are performed completely and independently on the TOE by the TOE environment.

13 This protection profile addresses the protection of the logical MRTD (i) in integrity by write-only-once access control and by physical means, and (ii) in confidentiality by the Basic Access Control Mechanism. This protection profile does not address the Active Authentication and the Extended Access Control as optional security mechanisms.

14 The Basic Access Control is a security feature which shall be mandatory supported by the TOE but may be disabled by the Issuing State or Organization. The inspection system (i) reads the printed data in the MRZ, (ii) authenticates themselves as inspection system by means of keys derived from MRZ data. 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 [7], Annex E, and [6].

TOE life cycle

15 The TOE life cycle is described in terms of the four life cycle phases.

<u>Phase 1 "Development"</u>

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

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

18 The manufacturing documentation of the IC including the IC Dedicated Software and the Embedded Software in the non-volatile non-programmable memories (ROM) is securely delivered to the IC manufacturer. The IC Embedded Software in the non-volatile programmable memories, the MRTD application and the guidance documentation is securely delivered to the MRTD manufacturer.

<u>Phase 2 "Manufacturing"</u>

19 In a first step the TOE integrated circuit is produced containing the MRTD's chip Dedicated Software and the parts of the MRTD's chip Embedded Software in the non-volatile non-programmable memories (ROM). The IC manufacturer writes the IC Identification Data onto the

chip to control the IC as MRTD material during the IC manufacturing and the delivery process to the MRTD manufacturer. The IC is securely delivered from the IC manufacture to the MRTD manufacturer.

20 The MRTD manufacturer (i) add the parts of the IC Embedded Software in the non-volatile programmable memories (for instance EEPROM) if necessary, (ii) creates the MRTD application, and (iii) equips MRTD's chip with Pre-personalization Data and (iv) packs the IC with hardware for the contactless interface in the passport book.

21 The pre-personalized MRTD together with the IC Identifier is securely delivered from the MRTD manufacturer to the Personalization Agent. The MRTD manufacturer also provides the relevant parts of the guidance documentation to the Personalization Agent.

Phase 3 "Personalization of the MRTD"

22 The personalization of the MRTD includes (i) the survey of the MRTD holder biographical data, (ii) the enrolment of the MRTD holder biometric reference data (i.e. the digitized portraits and the optional biometric reference data), (iii) the printing of the visual readable data onto the physical MRTD, (iv) the writing the TOE User Data and TSF Data into the logical MRTD and (v) the writing the TSF Data into the logical MRTD and configuration of the TSF if necessary. The step (iv) is performed by the Personalization Agent and includes but is not limited to the creation of (i) the digital MRZ data (DG1), (ii) the digitised portrait (DG2), and (iii) the Document security object.

23 The signing of the Document security object by the Document signer [7] finalizes the personalization of the genuine MRTD for the MRTD holder. The personalized MRTD (together with appropriate guidance for TOE use if necessary) is handed over to the MRTD holder for operational use.

24 **Application note 1:** This protection profile distinguishes between the Personalization Agent as entity known to the TOE and the Document Signer as entity in the TOE IT environment signing the Document security object as described in [7]. This approach allows but does not enforce the separation of these roles. The selection of the authentication keys should consider the organisation, the productivity and the security of the personalization process. Asymmetric authentication keys provide comfortable security for distributed personalization but their use may be more time consuming than authentication using symmetric cryptographic primitives. Authentication using symmetric cryptographic primitives allows for fast authentication protocols appropriate for centralised personalization schemes but relies on stronger security protection in the personalization environment (cf. section 5.3.3 Personalization Terminals for further details).

Phase 4 "Operational Use"

25 The TOE is used as MRTD's chip by the traveller and the inspection systems in the "Operational Use" phase. The user data can be read according to the security policy of the Issuing State or Organization and used according to the security policy of the Issuing State but they can never be modified.

26 **Application note 2:** The authorized Personalization Agents might be allowed to add (not to modify) data in the other data groups of the MRTD application (e.g. person(s) to notify DG16) in the Phase 4 Operational Use. This will imply an update of the Document Security Object including the re-signing by the Document Signer.

27 **Application note 3:** The intention of the PP is to consider at least the phases 1 and 2 as part of the evaluation and therefore define TOE delivery according to CC after phase 2 or later. The personalization process and its environment may depend on specific security needs of an issuing state or organisation. The Security Target shall describe the instantiation of the life cycle defined in this PP relevant for the product evaluation process. It is of importance to define the point of TOE delivery in the life cycle required for the evaluation according to CC requirements

ADO_DEL. All development and production steps before TOE delivery have to be part of the evaluation under ACM, ALC and ADO assurance classes as specifically relevant before TOE delivery. 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 ADO and AGD assurance classes. Therefore, the Security Target has to outline the split up of P.Manufact, P.Personalization and the related security objectives into aspects relevant before vs. after TOE delivery. Note: In many cases security aspects for phase 3 are defined and controlled by the issuing state or organisation.

3 Security Problem Definition

3.1 Introduction

Assets

28 The assets to be protected by the TOE include the User Data on the MRTD's chip.

29 **Logical MRTD Data**
The logical MRTD data consists of the data groups DG1 to DG16 and the Document security object according to LDS [6]. These data are user data of the TOE. The data groups DG1 to DG14 and DG 16 contain personal data of the MRTD holder. The Active Authentication Public Key Info in DG 15 is used by the inspection system for Active Authentication of the chip. The Document security object is used by the inspection system for Passive Authentication of the logical MRTD.

30 An additional asset is the following more general one.

31 **Authenticity of the MRTD's chip**
The authenticity of the MRTD's chip personalized by the issuing State or Organization for the MRTD's holder is used by the traveller to authenticate himself as possessing a genuine MRTD.

Subjects

32 This protection profile considers the following subjects:

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

34 **MRTD Holder**
The rightful holder of the MRTD for whom the issuing State or Organization personalised the MRTD.

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

36 **Personalization Agent**
The agent is acting on the behalf of the issuing State or Organisation to personalize the MRTD for the holder by some or all of the following activities (i) establishing the identity the holder for the biographic data in the MRTD, (ii) enrolling the biometric reference data of the MRTD holder i.e. the portrait, the encoded finger image(s) and/or the encoded iris image(s) (iii) writing these data on the physical and logical MRTD for the holder as defined for global, international and national interoperability and (iv) signing the Document Security Object defined in [6].

37 **Inspection system**
A technical system used by the border control officer of the receiving State (i) examining an MRTD presented by the traveller and verifying its authenticity and (ii) verifying the traveller as MRTD holder. The **Primary Inspection System** (PIS) (i) contains a terminal for the contactless communication with the MRTD's chip and (ii) does not implement the terminals part of the Basic Access Control Mechanism. The Primary Inspection System can read the logical MRTD only if the Basic Access Control is disabled. The **Basic Inspection System** (BIS) (i) contains a terminal for the contactless communication with the MRTD's chip, (ii) implements the terminals part of the Basic Access Control Mechanism and (iii) gets the authorization to read the logical MRTD under the Basic Access Control by optical reading the printed data in the MRZ or other parts of the passport book providing this information. The **Extended Inspection System** (EIS) in addition to the Basic Inspection System (i) implements the Active Authentication Mechanism, (ii) supports the terminals part of the Extended Access Control Authentication Mechanism and (iii) is authorized by the issuing State or Organization to read the optional biometric reference data.

38 **Application note 4**: This protection profile does not distinguish between the BIS and EIS because the Active Authentication and the Extended Access Control is outside the scope.

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

40 **Attacker**
A threat agent trying (i) to identify and to trace the movement the MRTD's chip remotely (i.e. without knowing or reading the printed MRZ data), (ii) to read or to manipulate the logical MRTD without authorization, or (iii) to forge a genuine MRTD.

41 **Application note 5**: An impostor is attacking the inspection system as TOE IT environment independent on using a genuine, counterfeit or forged MRTD. Therefore the impostor may use results of successful attacks against the TOE but his or her attack itself is not relevant for the TOE.

3.2 Assumptions

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

43 **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 Active Authentication Public Key Info (DG15) 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.

44 **A.Insp_Sys** **Inspection Systems for global interoperability**

The Inspection System is used by the border control officer of the receiving State (i) examining an MRTD presented by the traveller and verifying its authenticity and (ii) verifying the traveller as MRTD holder. The Primary Inspection System for global interoperability contains the Country

Signing Public Key and the Document Signer Public Key of each issuing State or Organization [7]. The Primary Inspection System performs the Passive Authentication to verify the logical MRTD if the logical MRTD is not protected by Basic Access Control. The Basic Inspection System in addition to the Primary Inspection System implements the terminal part of the Basic Access Control and reads the logical MRTD being under Basic access Control.

45 **Application note 6**: According to [7] the support of (i) the Passive Authentication mechanism is mandatory, and (ii) the Basic Access Control is optional. In the context of this protection profile the Primary Inspection System does not implement the terminal part of the Basic Access Control. It is therefore not able to read the logical MRTD if the logical MRTD is protected by Basic Access Control. The TOE allows the Personalization agent to disable the Basic Access Control for use with Primary Inspection Systems.

3.3 Threats

46 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.

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

48 **T.Chip_ID** **Identification of MRTD's chip**

An attacker trying to trace the movement of the MRTD by identifying remotely the MRTD's chip by establishing or listening a communication through the contactless communication interface. The attacker can not read and does not know in advance the MRZ data printed on the MRTD data page.

49 **T.Skimming** **Skimming the logical MRTD**

An attacker imitates the inspection system to read the logical MRTD or parts of it via the contactless communication channel of the TOE. The attacker can not read and does not know in advance the MRZ data printed on the MRTD data page.

50 **T.Eavesdropping** **Eavesdropping to the communication between TOE and inspection system**

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

Note in case of T.Skimming the attacker is establishing a communication with the MRTD's chip not knowing the MRZ data printed on the MRTD data page and without a help of the inspection system which knows these data. In case of T.Eavesdropping the attacker uses the communication of the inspection system.

51 **T.Forgery** **Forgery of data on MRTD's chip**

An attacker alters fraudulently the complete stored logical MRTD or any part of it including its security related data in order to impose on an inspection system by means of the changed MRTD holders identity or biometric reference data.

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

52 The TOE shall avert the threat as specified below.

53 **T.Abuse-Func** **Abuse of Functionality**

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

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

54 **T.Information_Leakage** **Information Leakage from MRTD's chip**

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

55 Leakage may occur through emanations, variations in power consumption, I/O characteristics, clock frequency, or by changes in processing time requirements. This leakage may be interpreted as a covert channel transmission but is more closely related to measurement of operating parameters, which may be derived either from measurements of the contactless interface (emanation) or direct measurements (by contact to the chip still available even for a contactless chip) and can then be related to the specific operation being performed. Examples are the Differential Electromagnetic Analysis (DEMA) and the Differential Power Analysis (DPA). Moreover the attacker may try actively to enforce information leakage by fault injection (e.g. Differential Fault Analysis).

56 **T.Phys-Tamper** **Physical Tampering**

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

The physical tampering may be focused directly on the discloser or manipulation of TOE User Data (e.g. the biometric reference data for the inspection system) or TSF Data (e.g. authentication key of the MRTD's chip) or indirectly by preparation of the TOE to following attack methods by modification of security features (e.g. to enable information leakage through power analysis). Physical tampering requires direct interaction with the MRTD's chip internals. Techniques commonly employed in IC failure analysis and IC reverse engineering efforts may be used.

Before that hardware security mechanisms and layout characteristics need to be identified. Determination of software design including treatment of User Data and TSF Data may also be a pre-requisite. The modification may result in the deactivation of a security function. Changes of circuitry or data can be permanent or temporary.

57 **T.Malfunction** **Malfunction due to Environmental Stress**

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

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

3.4 Organisational Security Policies

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

59 **P.Manufact** **Manufacturing of the MRTD's chip**

The IC Manufacturer and MRTD Manufacturer ensure the quality and the security of the manufacturing process and control the MRTD's material in the Phase 2 Manufacturing. The Initialization Data are written by the IC Manufacturer to identify the IC uniquely. The MRTD Manufacturer writes the Pre-personalization Data which contains at least the Personalization Agent Key.

60 **P.Personalization** **Personalization of the MRTD by issuing State or Organization only**

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

61 **P.Personal_Data** **Personal data protection policy**

The biographical data and their summary printed in the MRZ and stored on the MRTD's chip (DG1), the printed portrait and the digitised portrait (DG2), the biometric reference data of finger(s) (DG3), the biometric reference data of iris image(s) (DG4) and data according to LDS (DG5 to DG14, 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 [7]. The issuing State or Organization decides (i) to enable the Basic Access Control for the protection of the MRTD holder personal data or (ii) to disable the Basic Access Control to allow Primary Inspection Systems of the receiving States and all other terminals to read the logical MRTD.

62 **Application note 7:** The organisational security policy P.Personal_Data is drawn from the ICAO Technical Report [7]. Note that the Document Basic Access Key is defined by the TOE environment and loaded to the TOE by the Personalization Agent.

3.5 Security Objectives

63 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.

3.5.1 Security Objectives for the TOE

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

65 **OT.AC_Pers** **Access Control for Personalization of logical MRTD**

The TOE must ensure that the logical MRTD data groups DG1 to DG16, the Document security object according to LDS [6] and the TSF data can be written by authorized Personalization Agents. The logical MRTD data groups DG1 to DG16 and the TSF data can be written only once and can not be changed after personalization. The Document security object can be updated by authorized Personalization Agents if data in the data groups DG 3 to DG16 are added. Only the Personalization Agent shall be allowed to enable or to disable the TSF Basic Access Control.

66 **Application note 8**:The OT.AC_Pers implies that

(1) the data of the LDS groups written during personalization for MRTD holder (at least DG1 and DG2) can not be changed by write access after personalization,

(2) the Personalization Agents may (i) add (fill) data into the LDS data groups not written yet, and (ii) update and sign the Document Security Object accordantly.

67 **OT.Data_Int** **Integrity of personal data**

The TOE must ensure the integrity of the logical MRTD stored on the MRTD's chip against physical manipulation and unauthorized writing. If the TOE is configured for the use with Basic Inspection Terminals only the TOE must ensure that the inspection system is able to detect any modification of the transmitted logical MRTD data.

68 **OT.Data_Conf** **Confidentiality of personal data**

If the TOE is configured for the use with Basic Inspection Systems the TOE must ensure the confidentiality of the logical MRTD data groups DG1 to DG16 by granting read access to terminals successfully authenticated by (i) as Personalization Agent or as (ii) Basic Inspection System. The Basic Inspection System shall authenticate themselves by means of the Basic Access Control based on knowledge of the Document Basic Access Key. The TOE must ensure the confidentiality of the logical MRTD data during their transmission to the Basic Inspection System.

If the TOE is configured for the use with Primary Inspection Systems no protection in confidentiality of the logical MRTD is required.

69 **Application note 9**:The traveler grants the authorization for reading the personal data in DG1 to DG16 to the inspection system by presenting the MRTD. The MRTD's chip shall provide read access to these data for terminals successfully authenticated by means of the Basic Access Control based on knowledge of the Document Basic Access Keys. The security objective OT.Data_Conf requires the TOE to ensure the strength of the security function Basic Access Control Authentication independent on the quality of the Document Basic Access Keys which is defined by the TOE environment and loaded into the TOE by the Personalization Agent. Any attack based on decision of the ICAO Technical Report [7] that the inspection system derives Document Basic Access Keys from the printed MRZ data does not violate the security objective OT.Data_Conf.[2]

70 **OT.Identification Identification and Authentication of the TOE**

The TOE must provide means to store IC Identification Data in its non-volatile memory. The IC Identification Data must provide an unique identification of the IC during Phase 2 "Manufacturing" and Phase 3 "Personalization of the MRTD". If the TOE is configured for use with Basic Inspection Terminals only in Phase 4 "Operational Use" the TOE shall identify themselves only to a successful authenticated Basic Inspection System or Personalization Agent.

71 **Application note 10:** The TOE security objective OT.Identification addresses security features of the TOE to support the life cycle security in the manufacturing and personalization phases. The IC Identification Data are used for TOE identification in Phase 2 "Manufacturing" and for traceability and/or to secure shipment of the TOE from Phase 2 "Manufacturing" into the Phase 3 "Personalization of the MRTD". The OT.Identification addresses security features of the TOE to be used by the TOE manufacturing environment as described in its security objective OD.Material. In the Phase 4 "Operational Use" the TOE is identified by the passport number as part of the printed and digital MRZ. If the TOE allows a Primary Inspection System (i.e. every terminal) to read these data every terminal may identify the TOE. If the TOE is configured to allow a Basic Inspection System only to read these data the OT.Identification forbids the output of any other IC (e.g. integrated circuit serial number ICCSN) or a MRTD identifier through the contactless interface before successful authentication as Basic Inspection System or as Personalization Agent.

72 **OT.Prot_Abuse-Func Protection against Abuse of Functionality**

The TOE must prevent that functions of the TOE which may not be used after TOE Delivery can be abused in order (i) to disclose critical User Data, (ii) to manipulate critical User Data of the Smartcard Embedded Software, (iii) to manipulate Soft-coded Smartcard Embedded Software or (iv) bypass, deactivate, change or explore security features or functions of the TOE.

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

[2] Cf. CEM [4], section 8.10.3.4, para. 1625

73 The following TOE security objectives address the protection provided by the MRTD's chip independent on the TOE environment.

74 **OT.Prot_Inf_Leak Protection against Information Leakage**

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

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

75 **Application note 11:** This objective pertains to measurements with subsequent complex signal processing due to normal operation of the TOE or operations enforced by an attacker. Details correspond to an analysis of attack scenarios which is not given here.

76 **OT.Prot_Phys-Tamper Protection against Physical Tampering**

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

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

with a prior

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

77 **Application note 12:** In order to meet the security objectives OT.Prot_Phys-Tamper the TOE must be designed and fabricated so that it requires a high combination of complex equipment, knowledge, skill, and time to be able to derive detailed design information or other information which could be used to compromise security through such a physical attack. This is addressed by the security objective OD.Assurance.

78 **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 has not been proven or tested. This is to prevent errors. The environmental conditions may include external energy (esp. electromagnetic) fields, voltage (on any contacts), clock frequency, or temperature.

79 **Application note 13:** 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 objective OT.Prot_Phys-Tamper) provided that detailed knowledge about the TOE´s internals.

3.5.2 Security Objectives for the Development and Manufacturing Environment

80 **OD.Assurance Assurance Security Measures in Development and Manufacturing Environment**

The developer and manufacturer ensure that the TOE is designed and fabricated so that it requires a combination of complex equipment, knowledge, skill, and time to be able to derive detailed design information or other information which could be used to compromise security through attack. This includes the use of the Initialization Data for unique identification of the TOE and the pre-personalization of the TOE including the writing of the Personalization Agent Authentication key(s). The developer provides necessary evaluation evidence that the TOE fulfils its security objectives and is resistant against obvious penetration attacks with low attack potential and against direct attacks with high attack potential against security function that uses probabilistic or permutational mechanisms.

81 **OD.Material Control over MRTD Material**

The IC Manufacturer, the MRTD Manufacturer and the Personalization Agent must control all materials, equipment and information to produce, to initialise, to pre-personalize genuine MRTD materials and to personalize authentic MRTD in order to prevent counterfeit of MRTD using MRTD materials.

3.5.3 Security Objectives for the Operational Environment

Issuing State or Organization

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

83 **OE.Personalization Personalization of logical MRTD**

The issuing State or Organization must ensure that the Personalization Agents acting on the behalf of the issuing State or Organisation (i) establish the correct identity of the holder and create biographic data for the MRTD, (ii) enrol the biometric reference data of the MRTD holder i.e. the portrait, the encoded finger image(s) and/or the encoded iris image(s) and (iii) personalize the MRTD for the holder together with the defined physical and logical security measures (including the digital signature in the Document Security Object). The Personalization Agents enable or disable the Basic Access Control function of the TOE according to the decision of the issuing State or Organization. If the Basic Access Control function is enabled the Personalization Agents generate the Document Basic Access Keys and store them in the MRTD's chip.

84 **OE.Pass_Auth_Sign Authentication of logical MRTD by Signature**

The Issuing State or Organization must (i) generate a cryptographic secure Country Signing Key Pair, (ii) ensure the secrecy of the Country Signing Private Key and sign Document Signer Certificates in a secure operational environment, and (iii) distribute the Certificate of the Country Signing Public Key to receiving States and organizations maintaining its authenticity and integrity. The Issuing State or organization must (i) generate a cryptographic secure Document Signing Key Pair and ensure the secrecy of the Document Signer Private Keys, (ii) sign Document Security Objects of genuine MRTD in a secure operational environment only and (iii) distribute the Certificate of the Document Signing Public Key to receiving States and organizations. The digital signature in the Document Security Object include all data in the data groups DG1 to DG16 if stored in the LDS according to [6].

Receiving State or organization

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

86 **OE.Exam_MRTD Examination of the MRTD passport book**

The inspection system of the Receiving State must examine the MRTD presented by the traveller to verify its authenticity by means of the physical security measures and to detect any manipulation of the physical MRTD.

87 **OE.Passive_Auth_Verif Verification by Passive Authentication**

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

88 **OE.Prot_Logical_MRTD Protection of data of the logical MRTD**

The inspection system of the receiving State ensures the confidentiality and integrity of the data read from the logical MRTD. The receiving State examining the logical MRTD being under Basic Access Control will use inspection systems which implement the terminal part of the Basic Access Control and use the secure messaging with fresh generated keys for the protection of the transmitted data (i.e. Basic Inspection Systems). The receiving State examining the logical MRTD with Primary Inspection Systems will prevent eavesdropping to the communication between TOE and inspection system.

89 **Application note 14:** The Primary Inspection System may prevent unauthorized listening to or manipulation of the communication with the MRTD's chip e.g. by a Faraday cage.

MRTD Holder

90 **OE.Secure_Handling Secure handling of the MRTD by MRTD holder**

The holder of a MRTD configured for use with Primary Inspection Systems (i.e. MTRD with disabled Basic Access Control) will prevent unauthorized communication of the MRTD's chip with terminals through the contactless interface.

91 **Application note 15:** The MRTD holder may prevent unauthorized communication of the MRTD's chip with terminals e.g. by carrying the MRTD in a metal box working as Faraday cage.

4 Extended Components Definition

92 This protection profile uses components defined as extensions to CC part 2. Some of these components are defined in [20], other components are defined in this protection profile.

4.1 Definition of the Family FAU_SAS

93 To define the security functional requirements of the TOE an additional 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.

94 The family "Audit data storage (FAU_SAS)" is specified as follows.

FAU_SAS Audit data storage

Family behaviour

This family defines functional requirements for the storage of audit data.

Component leveling

FAU_SAS.1 Requires the TOE to provide the possibility to store audit data.

Management: FAU_SAS.1

There are no management activities foreseen.

Audit: FAU_SAS.1

There are no actions defined to be auditable.

FAU_SAS.1 Audit storage

Hierarchical to: No other components.

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

Dependencies: No dependencies.

4.2 Definition of the Family FCS_RND

95 To define the IT security functional requirements of the TOE an additional 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 is not limited to generation of cryptographic keys as the component FCS_CKM.1 is. The similar component FIA_SOS.2 is intended for non-cryptographic use.

96 The family “Generation of random numbers (FCS_RND)” is specified as follows.

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 leveling:

FCS_RND.1 Generation of random numbers requires that random numbers meet a defined quality metric.

Management: FCS_RND.1

There are no management activities foreseen.

Audit: FCS_RND.1

There are no actions defined to be auditable.

FCS_RND.1 Quality metric for random numbers

Hierarchical to: No other components.

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

Dependencies: No dependencies.

4.3 Definition of the Family FIA_API

97 To describe the IT security functional requirements of the TOE an additional family (FIA_API) of the Class FIA (Identification and authentication) is defined here. This family describes the functional requirements for the proof of a 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.

98 **Application note 16**: The other families of the Class FIA describe only the authentication verification of users’ identity performed by the TOE and do not describe the functionality of the user to prove their identity. The following paragraph defines the family FIA_API in the style of the Common Criteria part 2 (cf. [3], chapter Explicitly stated IT security requirements (APE_SRE)) form a TOE point of view. Note that this protection profile uses this explicit stated

SFR for the personalization terminal in the IT environment only. Therefore the word “TSF” is substituted by the word “Personalization terminal”.

99 **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 leveling:

FIA_API.1 Authentication Proof of Identity.

Management: FIA_API.1

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.

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

Dependencies: No dependencies.

4.4 Definition of the Family FMT_LIM

100 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 the abuse of functions by limiting the capabilities of the functions and by limiting their availability.

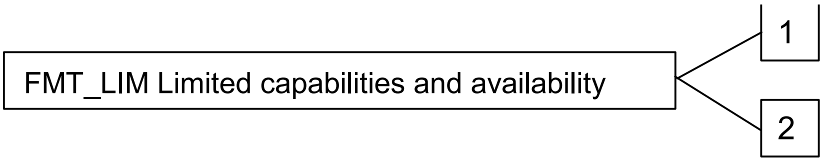
101 The family “Limited capabilities and availability (FMT_LIM)” is specified as follows.

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 leveling:



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.

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: FMT_LIM.1, FMT_LIM.2

There are no management activities foreseen.

Audit: FMT_LIM.1, FMT_LIM.2

There are no actions defined to be auditable.

102 To define the IT security functional requirements of the TOE an additional family (FMT_LIM) of the Class FMT (Security Management) is defined here. This family 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 the abuse of functions by limiting the capabilities of the functions and by limiting their availability.

103 The TOE Functional Requirement "Limited capabilities (FMT_LIM.1)" is specified as follows.

FMT_LIM.1 Limited capabilities

Hierarchical to: No other components.

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

Dependencies: FMT_LIM.2 Limited availability.

104 The TOE Functional Requirement "Limited availability (FMT_LIM.2)" is specified as follows.

FMT_LIM.2 **Limited availability**

Hierarchical to: No other components.

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

Dependencies: FMT_LIM.1 Limited capabilities.

105 Application note 17: 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

(i) 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

(ii) the TSF is designed with high functionality but is removed or disabled in the product in its user environment.

The combination of both requirements shall enforce the policy.

4.5 Definition of the Family FPT_EMSEC

106 The additional family FPT_EMSEC (TOE Emanation) of the Class FPT (Protection of the TSF) is defined here to describe the IT security functional requirements of the TOE. The TOE shall prevent attacks against the SCD and other secret data where the attack is based on external observable physical phenomena of the TOE. Examples of such attacks are evaluation of TOE's electromagnetic radiation, simple power analysis (SPA), differential power analysis (DPA), timing attacks, etc. This family describes the functional requirements for the limitation of intelligible emanations which are not directly addressed by any other component of CC part 2 [2].

107 The family "TOE Emanation (FPT_EMSEC)" is specified as follows.

Family behaviour

This family defines requirements to mitigate intelligible emanations.

Component levelling:

FPT_EMSEC TOE emanation
1

FPT_EMSEC.1 TOE emanation has two constituents:

FPT_EMSEC.1.1 Limit of Emissions requires to not emit intelligible emissions enabling access to TSF data or user data.

FPT_EMSEC.1.2 Interface Emanation requires not emit interface emanation enabling access to TSF data or user data.

Management: FPT_EMSEC.1

There are no management activities foreseen.

Audit: FPT_EMSEC.1

There are no actions defined to be auditable.

FPT_EMSEC.1 TOE Emanation

Hierarchical to: No other components.

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

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

Dependencies: No other components.

5 Security Requirements

108 The CC allows several operations to be performed on functional requirements; *refinement*, *selection*, *assignment*, and *iteration* are defined in paragraph 2.1.4 of Part 2 of the CC. Each of these operations is used in this PP.

109 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.

110 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 unlined text and the original text of the component is given by a footnote. Selections to be filled in by the ST author appear in square brackets with an indication that a selection is to be made, [selection:], and are *italicized*.

111 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 by showing as underlined text and the original text of the component is given by a footnote. Assignments to be filled in by the ST author appear in square brackets with an indication that an assignment is to be made [assignment:], and are *italicized*.

112 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.

5.1 Security Functional Requirements for the TOE

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

5.1.1 Class FAU Security Audit

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

115 **FAU_SAS.1 Audit storage**

Hierarchical to: No other components.

FAU_SAS.1.1 The TSF shall provide the Manufacturer[3] with the capability to store the IC Identification Data [4] in the audit records.

Dependencies: No dependencies.

[3] [assignment: *authorised users*]

[4] [assignment: *list of audit information*]

116 **Application note 18:** The Manufacturer role is the default user identity assumed by the TOE in the Phase 2 Manufacturing. The IC manufacturer and the MRTD manufacturer in the Manufacturer role write the Initialization Data and/or Pre-personalization Data as TSF Data of the TOE. The audit records are write-only-once data of the MRTD's chip (see FMT_MTD.1/INI_DIS). The security measures in the manufacturing environment assessed under ADO_IGS and ADO_DEL ensure that the audit records will be used to fulfil the security objective OD.Assurance.

5.1.2 Class Cryptographic Support (FCS)

117 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.

118 **FCS_CKM.1/BAC_MRTD Cryptographic key generation – Generation of Document Basic Access Keys by the TOE**

Hierarchical to: No other components.

FCS_CKM.1.1/ BAC_MRTD The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm Document Basic Access Key Derivation Algorithm [5] and specified cryptographic key sizes 112 bit[6] that meet the following: [7], Annex E [7].

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

119 **Application note 19:** 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 [7], Annex E.2, produces agreed parameters to generate the Triple-DES key and the Retail-MAC message authentication keys for secure messaging by the algorithm in [7], Annex E.1. The algorithm uses the random number RND.ICC generated by TSF as required by FCS_RND.1/MRTD.

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

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

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

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

121 **FCS_CKM.4 Cryptographic key destruction - MRTD**

Hierarchical to: No other components.

FCS_CKM.4.1/ MRTD The TSF shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method [*assignment: cryptographic key destruction method*] that meets the following: [*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]
FMT_MSA.2 Secure security attributes

122 **Application note 20:** The TOE shall destroy the Triple-DES encryption key and the Retail-MAC message authentication keys for secure messaging.

5.1.2.1 Cryptographic operation (FCS_COP.1)

123 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.

124 **FCS_COP.1/SHA_MRTD Cryptographic operation – Hash for Key Derivation by MRTD**

Hierarchical to: No other components.

FCS_COP.1.1/ SHA_MRTD The TSF shall perform hashing [8] in accordance with a specified cryptographic algorithm SHA-1 [9] and cryptographic key sizes none [10] that meet the following: FIPS 180-2 [11].

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
FMT_MSA.2 Secure security attributes

125 **Application note 21:** This SFR requires the TOE to implement the hash function SHA-1 for the cryptographic primitive of the Basic Access Control Authentication Mechanism (see also FIA_UAU.4/BAC_MRTD) according to [7].

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

[9] [assignment: *cryptographic algorithm*]

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

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

126 **FCS_COP.1/TDES_MRTD Cryptographic operation – Encryption / Decryption Triple DES**

Hierarchical to: No other components.

FCS_COP.1.1/ TDES_MRTD	The TSF shall perform secure messaging – encryption and decryption [12] in accordance with a specified cryptographic algorithm Triple-DES in CBC mode [13] and cryptographic key sizes 112 bit [14] that meet the following: FIPS 46-3 [14] and [7]; Annex E [15].

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
FMT_MSA.2 Secure security attributes

127 **Application note 22:** This SFR requires the TOE to implement the cryptographic primitive 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 Authentication Mechanism according to the FCS_CKM.1/BAC_MRTD and FIA_UAU.4/BAC_BT. Note the Triple-DES in CBC mode with zero initial vector include also the Triple-DES in ECB mode for blocks of 8 byte used to check the authentication attempt of a terminal as Personalization Agent by means of the symmetric authentication mechanism.

128 **FCS_COP.1/MAC_MRTD Cryptographic operation – Retail MAC**

Hierarchical to: No other components.

FCS_COP.1.1/ MAC_MRTD	The TSF shall perform secure messaging – message authentication code [16] in accordance with a specified cryptographic algorithm Retail MAC [17] and cryptographic key sizes 112 bit [18] that meet the following: ISO 9797 (MAC algorithm 3, block cipher DES, Sequence Message Counter, padding mode 2) [19].

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

[13] [assignment: *cryptographic algorithm*]

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

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

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

[17] [assignment: *cryptographic algorithm*]

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

[19] [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
FMT_MSA.2 Secure security attributes

129 **Application note 23:** 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/BAC_MRTD and FIA_UAU.4/BAC_MRTD.

5.1.2.2 Random Number Generation (FCS_RND.1)

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

131 **FCS_RND.1/MRTD Quality metric for random numbers**

Hierarchical to: No other components.

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

Dependencies: No dependencies.

132 **Application note 24:** This SFR requires the TOE to generate random numbers used for the authentication protocols as required by FIA_UAU.4/BAC_MRTD.

5.1.3 Class FIA Identification and Authentication

133 **Application note 25:** The Table 1 provides an overview on the authentication mechanisms used.

Name	SFR for the TOE	SFR for the TOE environment (terminal)	Algorithms and key sizes according to [7], Annex E, and [22]
Basic Access Control Authentication Mechanism	FIA_UAU.4/MRTD and FIA_UAU.6/MRTD	FIA_UAU.4/BAC_T and FIA_UAU.6/T	Triple-DES, 112 bit keys and Retail-MAC, 112 bit keys
Symmetric Authentication Mechanism for Personalization Agents	FIA_UAU.4/MRTD	FIA_API.1/PT	Triple-DES with 112 bit keys

Table 1: Overview on authentication SFR

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

135 **FIA_UID.1 Timing of identification**

Hierarchical to: No other components.

FIA_UID.1.1 The TSF shall allow

(1) to read the Initialization Data in Phase 2 “Manufacturing”,
(2) to read the ATS in Phase 3 “Personalization of the MRTD”,
(3) to read the ATS if the TOE is configured for use with Basic Inspection Systems only in Phase 4 “Operational Use”,
(4) to read the logical MRTD if the TOE is configured for use with Primary Inspection System in Phase 4 “Operational Use” [20]

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

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

Dependencies: No dependencies.

136 **Application note 26:** The IC manufacturer and the MRTD manufacturer write the Initialization Data and/or Pre-personalization Data in the audit records of the IC during the Phase 2 “Manufacturing”. The audit records can be written only in the Phase 2 Manufacturing of the TOE. At this time the Manufacturer is the only user role available for the TOE. The MRTD manufacturer 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 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. If the TOE is configured for use with Primary Inspection System s any terminal is assumed as Primary Inspection System and is allowed to read the logical MRTD. If the TOE is configured for use with Basic Inspection Systems only 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 according to the SFR FIA_UAU.4/T.

137 **Application note 27:** In the operation phase the MRTD must not allow anybody to read the ICCSN 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’s chip use an identifier for the communication channel to allow the terminal for communication with more then one RFID. If this identifier is randomly selected it will not violate the OT.Identification. If this identifier is fixed the ST writer should consider the possibility to misuse this identifier to perform attacks addressed by T.Chip_ID.

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

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

139 **FIA_UAU.1 Timing of authentication**

Hierarchical to: No other components.

FIA_UAU.1.1 The TSF shall allow

(1) to read the Initialization Data in Phase 2 "Manufacturing",
(2) to read the ATS in Phase 3 "Personalization of the MRTD",
(3) to read the ATS if the TOE is configured for use with Basic Inspection Systems only in Phase 4 "Operational Use",
(4) to read the logical MRTD if the TOE is configured for use with Primary Inspection System in Phase 4 "Operational Use" [21]

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

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

Dependencies: FIA_UID.1 Timing of identification.

140 **Application note 28:** The Primary Inspection System does not authenticate themselves. Only the Basic Inspection System and the Personalization Agent authenticate themselves.

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

142 **FIA_UAU.4/MRTD Single-use authentication mechanisms - Single-use authentication of the Terminal by the TOE**

Hierarchical to: No other components.

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

1. Basic Access Control Authentication Mechanism,
2. Authentication Mechanism based on Triple-DES [22].

Dependencies: No dependencies.

143 **Application note 29:** All listed authentication mechanisms uses a challenge of 8 Bytes freshly and randomly generated by the TOE to prevent reuse of a response generated by a terminal in a successful authentication attempt: the Basic Access Control Authentication Mechanism uses RND.ICC [7], and the Authentication Mechanism based on Triple-DES shall use a Challenge as well.

144 **Application note 30:** The Basic Access Control Mechanism is a mutual device authentication mechanism defined in [7]. In the first step the terminal authenticates themselves to the MRTD's chip and the MRTD's chip authenticates to the terminal in the second step. In this second step the

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

[22] [assignment: *identified authentication mechanism(*s)]

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 the communication with the terminal not successfully authenticated in the first step of the protocol to fulfil the security objective OT.Identification and to prevent T.Chip_ID.

145 The TOE shall meet the requirement "Multiple authentication mechanisms (FIA_UAU.5)" as specified below (Common Criteria Part 2).

146 **FIA_UAU.5 Multiple authentication mechanisms**

Hierarchical to: No other components.

FIA_UAU.5.1 The TSF shall provide

1. Basic Access Control Authentication Mechanism
2. Symmetric Authentication Mechanism based on Triple-DES [23]

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 one of the following mechanisms
   (a) the Basic Access Control Authentication Mechanism with the Personalization Agent Keys,
   (b) the Symmetric Authentication Mechanism with the Personalization Agent Key
2. the TOE accepts the authentication attempt as Basic Inspection System only by means of the Basic Access Control Authentication Mechanism with the Document Basic Access Keys [24].

Dependencies: No dependencies.

147 **Application note 31:** Depending on the authentication methods used the Personalization Agent holds (i) a pair of a Triple-DES encryption key and a retail-MAC key for the Basic Access Control Mechanism specified in [7], or (ii) a Triple-DES key for the Symmetric Authentication Mechanism. The Basic Access Control Mechanism includes the secure messaging for all commands exchanged after successful authentication of the inspection system. The Personalization Agent may use Symmetric Authentication Mechanism without secure messaging mechanism as well if the personalization environment prevents eavesdropping to the communication between TOE and personalization terminal. The Basic Inspection System may use the Basic Access Control Authentication Mechanism with the Document Basic Access Keys. Note, the successful authenticated Personalization Agent may disable the Basic Access Control Mechanism.

[23] [assignment: *list of multiple authentication mechanisms*]

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

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

149 **FIA_UAU.6/MRTD Re-authenticating – Re-authenticating of Terminal by the TOE**

Hierarchical to: No other components.

FIA_UAU.6.1/ MRTD	The TSF shall re-authenticate the user under the conditions each command sent to TOE after successful authentication of the terminal with Basic Access Control Authentication Mechanism [25].

Dependencies: No dependencies.

150 **Application note 32:** The Basic Access Control Mechanism specified in [7] 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_MRTD for further details). The TOE does not execute any command with incorrect message authentication code. Therefore the TOE re-authenticate the user for each received command and accept only those commands received from the initially authenticated by means of BAC user.

5.1.4 Class FDP User Data Protection

5.1.4.1 Subset access control (FDP_ACC.1)

151 The TOE shall meet the requirement “Subset access control (FDP_ACC.1)” as specified below (Common Criteria Part 2). The instantiations of FDP_ACC.1 are caused by the TSF management according to FMT_MOF.1.

152 **FDP_ACC.1 Subset access control – Primary Access Control**

Hierarchical to: No other components.

FDP_ACC.1.1/ PRIM	The TSF shall enforce the Primary Access Control SFP [26] on terminals gaining write, read and modification access to data groups DG1 to DG16 of the logical MRTD [27].

Dependencies: FDP_ACF.1 Security attribute based access control

153 **Application note 33:** The data groups DG1 to DG16 of the logical MRTD as defined in [6] are the only TOE User data. The Primary Access Control SFP address the TOE usage with Primary Inspection Systems and Basic Inspection Systems independent on the configuration of the TOE.

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

[26] [assignment: *access control SFP*]

[27] [assignment: *list of subjects, objects, and operations among subjects and objects covered by the SFP*]

154 **FDP_ACC.1 Subset access control – Basic Access control**

Hierarchical to: No other components.

FDP_ACC.1.1/ BASIC	The TSF shall enforce the Basic Access Control SFP [28] on terminals gaining write, read and modification access to data groups DG1 to DG16 of the logical MRTD [29].

Dependencies: FDP_ACF.1 Security attribute based access control

155 **Application note 34:** The Basic Access Control SFP address the configuration of the TOE for usage with Basic Inspection Systems only.

5.1.4.2 Security attribute based access control (FDP_ACF.1)

156 The TOE shall meet the requirement "Security attribute based access control (FDP_ACF.1)" as specified below (Common Criteria Part 2). The instantiations of FDP_ACC.1 address different SFP.

157 **FDP_ACF.1 Security attribute based access control – Primary Access Control**

Hierarchical to: No other components.

FDP_ACF.1.1/ PRIM	The TSF shall enforce the Primary Access Control SFP[30] to objects based on the following: 1. Subjects: a. Personalization Agent, b. Terminals, 2. Objects: data in the data groups DG1 to DG16 of the logical MRTD, 3. security attributes a. configuration of the TOE according to FMT_MOF.1, b. authentication status of terminals [31].
FDP_ACF.1.2/ PRIM	The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: in the TOE configuration for use with Primary Inspection Systems 1. the successfully authenticated Personalization Agent is allowed to write the data of the data groups DG1 to DG16 of the logical MRTD, 2. the Terminals are allowed to read the data of the groups DG1 to DG16 of the logical MRTD [32].
FDP_ACF.1.3/ PRIM	The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: none[33].

[28] [assignment: *access control SFP*]

[29] [assignment: *list of subjects*, *objects, and operations among subjects and objects covered by the SFP*]

[30] [assignment: *access control SFP*]

[31] [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*]

[32] [assignment: *rules governing access among controlled subjects and controlled objects using controlled operations on controlled objects*]

FDP_ACF.1.4/ PRIM The TSF shall explicitly deny access of subjects to objects based on the rule: the Terminals are not allowed to modify any of the data groups DG1 to DG16 of the logical MRTD [34].

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

158 **Application note 35:** The MRTD access control prevents changes of data groups by write access to the logical MRTD after their creation by the Personalization Agent (i.e. no update of successful written data in the data groups DG1 to DG16). The Passive Authentication Mechanism detects any unauthorised changes.

159 **FDP_ACF.1/Basic Security attribute based access control – Basic Access Control**

Hierarchical to: No other components.

FDP_ACF.1.1/ BASIC The TSF shall enforce the Basic Access Control SFP[35] to objects based on the following:

1. Subjects:
   a. Personalization Agent,
   b. Basic Inspection System,
   c. Terminal,
2. Objects: data in the data groups DG1 to DG16 of the logical MRTD
3. Security attributes
   a. configuration of the TOE according to FMT_MOF.1,
   b. authentication status of terminals [36].

FDP_ACF.1.2/ BASIC The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: in the TOE configuration for use with Basic Inspection Systems only

1. the successfully authenticated Personalization Agent is allowed to write and to read the data of the data groups DG1 to DG16 of the logical MRTD,
2. the successfully authenticated Basic Inspection System is allowed to read data of the groups DG1 to DG16 of the logical MRTD [37].

FDP_ACF.1.3/ BASIC The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: none[38].

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

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

[35] [assignment: *access control SFP*]

[36] [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*]

[37] [assignment: *rules governing access among controlled subjects and controlled objects using controlled operations on controlled objects*]

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

FDP_ACF.1.4/ BASIC The TSF shall explicitly deny access of subjects to objects based on the rule: the Terminals are not allowed to modify any of the data groups DG1 to DG16 of the logical MRTD [39].

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

5.1.4.3 Inter-TSF-Transfer

160 **Application note 36:** FDP_UCT.1/MRTD and FDP_UIT.1/MRTD require the protection of the User Data transmitted from the TOE to the terminal by secure messaging with encryption and message authentication codes after successful authentication of the terminal. The authentication mechanisms as part of Basic Access Control Mechanism include the key agreement for the encryption and the message authentication key to be used for secure messaging.

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

162 **FDP_UCT.1/MRTD Basic data exchange confidentiality - MRTD**

Hierarchical to: No other components.

FDP_UCT.1.1/ MRTD The TSF shall enforce the Basic Access Control SFP[40] to be able to transmit and receive[41] objects in a manner protected from unauthorised disclosure.

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]

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

164 **FDP_UIT.1/MRTD Data exchange integrity - MRTD**

Hierarchical to: No other components.

FDP_UIT.1.1/ MRTD The TSF shall enforce the Basic Access Control SFP [42] to be able to transmit and receive [43] user data in a manner protected from modification, deletion, insertion and replay [44] errors.

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

[40] [assignment: *access control SFP(s) and/or information flow control SFP(s)*]

[41] [selection*: transmit, receive*]

[42] [assignment: *access control SFP(s) and/or* i*nformation flow control SFP(s)*]

[43] [selection*: transmit, receive*]

[44] [selection: *modification, deletion, insertion, replay*]

FDP_UIT.1.2/ MRTD The TSF shall be able to determine on receipt of user data, whether modification, deletion, insertion and replay [45] has occurred.

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

5.1.5 Class FMT Security Management

165 The TOE shall meet the requirement "Management of functions in TSF (FMT_MOF.1)" as specified below (Common Criteria Part 2).

166 **FMT_MOF.1 Management of functions in TSF**

Hierarchical to: No other components.

FMT_MOF.1.1 The TSF shall restrict the ability to enable and disable [46] the functions TSF Basic Access Control [47] to Personalization Agent [48].

Dependencies: No Dependencies

167 **Application note 37**: The enabling and disabling the TSF Basic Access Control defines the configuration of the TOE in Phase 3 "Personalization of the MRTD" before use in the phase 4 "Operational Use":

1. The TOE is configured with Primary Inspection systems when the TSF Basic Access Control is disabled. In this configuration the TOE enforces the Primary Access Control SFP according to FDP_ACC.1/PRIM and FDP_ACF.1/PRIM. In this case the logical MRTD may be read without successful authentication as Basic Inspection System or Personalization Agent.

2. The TOE is configured with Basic Inspection Systems only when the TSF Basic Access Control is enabled. In this configuration the TOE enforces the Basic Access Control SFP according to FDP_ACC.1/BASIC and FDP_ACF.1/BASIC. In this case the reading of the logical MRTD requires successful authentication as Basic Inspection System or Personalization Agent.

It is up to the security target writer to decide whether the disabling of the TSF Basic Access Control is accompanied with the disabling of the Basic Access Control Authentication Mechanism. Even if the TOE will be configured for use in the phase 4 "Operational Use" with Primary Inspection systems the Personalization Agent may use this mechanism with the Personalization Agent Authentication Keys or a Basic Inspection System may use this mechanisms together with secure messaging to protect the logical MRTD against eavesdropping to the communication between TOE and inspection system.

[45] [selection: *modification*, *deletion, insertion, replay*]

[46] [selection: *determine the behaviour of, disable, enable, modify the behaviour of*]

[47] [assignment: *list of functions*]

[48] [assignment: *the authorised identified roles*]

168 **Application note 38**: The SFR FMT_SMF.1 and FMT_SMR.1 provide basic requirements to the management of the TSF data.

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

170 **FMT_SMF.1 Specification of Management Functions**

Hierarchical to: No other components.

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

1. Initialization,
2. Personalization,
3. Configuration [49].

Dependencies: No Dependencies

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

172 **FMT_SMR.1 Security roles**

Hierarchical to: No other components.

FMT_SMR.1.1 The TSF shall maintain the roles

1. Manufacturer,
2. Personalization Agent,
3. Primary Inspection System,
4. Basic Inspection System [50].

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

Hierarchical to: : FIA_UID.1 Timing of identification.

173 **Application note 39**: 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.

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

175 **FMT_LIM.1 Limited capabilities**

Hierarchical to: No other components.

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

[50] [assignment: *the authorised identified roles*]

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 and
4. substantial information about construction of TSF to be gathered which may enable other attacks

Dependencies: FMT_LIM.2 Limited availability.

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

177 **FMT_LIM.2 Limited availability**

Hierarchical to: No other components.

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
3. software to be reconstructed and
4. substantial information about construction of TSF to be gathered which may enable other attacks.

Dependencies: FMT_LIM.1 Limited capabilities.

178 **Application note 40:** The following SFR are iterations of the component Management of TSF data (FMT_MTD.1). The TSF data include but are not limited to those identified below.

179 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.

180 **FMT_MTD.1/INI_ENA Management of TSF data – Writing of Initialization Data and Pre-personalization Data**

Hierarchical to: No other components.

FMT_MTD.1.1/ INI_ENA The TSF shall restrict the ability to write [51] the Initialization Data and Pre-personalization Data [52] to the Manufacturer [53].

[51] [selection: *change_default, query, modify, delete, clear*, [assignment: *other operations*]]

[52] [assignment: *list of TSF data*]

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

181 **Application note 41:** The pre-personalization Data includes but is not limited to the authentication reference data for the Personalization Agent which is the symmetric cryptographic Personalization Agent Authentication Key.

182 **FMT_MTD.1/INI_DIS Management of TSF data – Disabling of Read Access to Initialization Data and Pre-personalization Data**

Hierarchical to: No other components.

FMT_MTD.1.1/ INI_DIS	The TSF shall restrict the ability to disable read access for users to [54] the Initialization Data [55] to the Personalization Agent [56].

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

183 **Application note 42:** According to P.Manufact the IC Manufacturer and the MRTD Manufacturer are the default users assumed by the TOE in the role Manufacturer during the Phase 2 "Manufacturing" but the TOE is not requested to distinguish between these users within the role Manufacturer. The TOE may restrict the ability to write the Initialization Data and the Pre-personalization Data by (i) allowing to write these data only once and (ii) blocking the role Manufacturer at the end of the Phase 2. The IC Manufacturer may write the Initialization Data which includes but are not limited to the IC Identifier as required by FAU_SAS.1. The Initialization Data provides an unique identification of the IC which is used to trace the IC in the Phase 2 and 3 "personalization" but is not needed and may be misused in the Phase 4 "Operational Use". Therefore the external read access shall be blocked. The MRTD Manufacturer will write the Pre-personalization Data.

184 **FMT_MTD.1/KEY_WRITE Management of TSF data – Key Write**

Hierarchical to: No other components.

FMT_MTD.1.1/ KEY_WRITE	The TSF shall restrict the ability to write [57] the Document Basic Access Keys [58] to the Personalization Agent [59].

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

185 **FMT_MTD.1/KEY_READ Management of TSF data – Key Read**

[53] [assignment: *the authorised identified roles*]

[54] [selection: *change_default, query, modify, delete, clear*, [assignment: *other operations*]]

[55] [assignment: *list of TSF data*]

[56] [assignment: *the authorised identified roles*]

[57] [selection: *change_default, query, modify, delete, clear*, [assignment: *other operations*]]

[58] [assignment: *list of TSF data*]

[59] [assignment: *the authorised identified roles*]

Hierarchical to: No other components.

FMT_MTD.1.1/ KEY_READ The TSF shall restrict the ability to read [60] the Document Basic Access Keys and Personalization Agent Keys [61] to none [62].

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

186 **Application note 43**: The Personalization Agent generates, stores and ensures the correctness of the Document Basic Access Keys if the Basic Access Control is enabled. Note the Document Basic Access Keys may be used for the Basic Access Control Authentication Mechanism and secure messaging even if the Basic Access Control is disabled (cf. Application note 37).

5.1.6 Class FPT Protection of the Security Functions

187 The TOE shall prevent inherent and forced illicit information leakage for User Data and TSF Data. The security functional requirement FPT_EMSEC.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 SFR "Non-bypassability of the TSP (FPT_RVM.1)" and "TSF domain separation (FPT_SEP.1)" together with "Limited capabilities (FMT_LIM.1)", "Limited availability (FMT_LIM.2)" and "Resistance to physical attack (FPT_PHP.3)" prevent bypassing, deactivation and manipulation of the security features or misuse of TOE functions.

188 The TOE shall meet the requirement "Subset information flow control (FDP_IFC.1)" as specified below:

189 **FPT_EMSEC.1 TOE Emanation**

Hierarchical to: No other components.

FPT_EMSEC.1.1 The TOE shall not emit [*assignment: types of emissions*] in excess of [assignment: *specified limits*] enabling access to Personalization Agent Authentication Key [63] and [assignment: *list of types of user data*].

FPT_EMSEC.1.2 The TSF shall ensure any unauthorized users [64] are unable to use the following interface smart card circuit contacts [65] to gain access to Personalization Agent Authentication Key [66] and [assignment: *list of types of user data*].

[60] [selection: *change_default, query, modify, delete, clear*, [assignment: *other operations*]]

[61] [assignment: *list of TSF data*]

[62] [assignment: *the authorised identified roles*]

[63] [assignment: *list of types of TSF data*]

[64] [assignment: *type of users*]

[65] [assignment: *type of connection*]

[66] [assignment: *list of types of TSF data*]

Dependencies: No other components.

190 **Application note 44**: The ST writer shall perform the operation in FPT_EMSEC.1.1 and FPT_EMSEC.1.2. 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 origin from internal operation of the TOE or may origin 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 MRTD's chip has to provide a smart card contactless interface but may have also (not used by the terminal but maybe by an attacker) additional contacts according to ISO/IEC 7816-2 as well. 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.

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

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

193 **FPT_FLS.1 Failure with preservation of secure state**

Hierarchical to: No other components.

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

(1) Exposure to operating conditions where therefore a malfunction could occur,

(2) failure detected by TSF according to FPT_TST.1 [67].

Dependencies: ADV_SPM.1 Informal TOE security policy model

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

195 **FPT_TST.1 TSF testing**

Hierarchical to: No other components.

FPT_TST.1.1 The TSF shall run a suite of self tests [*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*] to demonstrate the correct operation of the TSF.

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

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

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

Dependencies: FPT_AMT.1 Abstract machine testing.

196 **Application note 45**: The ST writer shall perform the operation in FPR_TST.1.1. If the MRTD's chip uses state of the art smart card technology it will run the some self tests at the request of the authorised user and some self tests automatically. E.g. a self test for the verification of the integrity of stored TSF executable code required by FPT_TST.1.3 may be executed during initial start-up by the "authorised user" Manufacturer in the Phase 2 Manufactoring. Other self tests may run automatically to detect failure and to preserve of secure state according to FPT_FLS.1 in the Phase 4 Operational Use, e.g. to check a calculation with a private key by the reverse calculation with the corresponding public key as countermeasure against Differential Failure Attacks. The security target writer shall perform the operation claimed by the concrete product under evaluation.

197 The TOE shall meet the requirement "Resistance to physical attack (FPT_PHP.3)" as specified below (Common Criteria Part 2).

198 **FPT_PHP.3 Resistance to physical attack**

Hierarchical to: No other components.

FPT_PHP.3.1 The TSF shall resist physical manipulation and physical probing [68] to the TSF [69] by responding automatically such that the TSP is not violated.

Dependencies: No dependencies.

199 **Application note 46**: 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.

200 The following security functional requirements protect the TSF against bypassing. and support the separation of TOE parts.

201 The TOE shall meet the requirement "Non-bypassability of the TSP (FPT_RVM.1)" as specified below (Common Criteria Part 2).

202 **FPT_RVM.1 Non-bypassability of the TSP**

Hierarchical to: No other components.

[68] [assignment: *physical tampering scenarios*]

[69] [assignment: *list of TSF devices/elements*]

FPT_RVM.1.1 The TSF shall ensure that TSP enforcement functions are invoked and succeed before each function within the TSC is allowed to proceed.

Dependencies: No dependencies.

203 The TOE shall meet the requirement “TSF domain separation (FPT_SEP.1)” as specified below (Common Criteria Part 2).

204 **FPT_SEP.1 TSF domain separation**

Hierarchical to: No other components.

FPT_SEP.1.1 The TSF shall maintain a security domain for its own execution that protects it from interference and tampering by untrusted subjects.

FPT_SEP.1.2 The TSF shall enforce separation between the security domains of subjects in the TSC

Dependencies: No dependencies.

205 **Application note 47**: The parts of the TOE which support the security functional requirements “Failure with preservation of secure state (FPT_FLS.1)” and “TSF testing (FPT_TST.1)” should be protected from interference of the other security enforcing parts of the MRTD’s chip Embedded Software.

5.2 Security Assurance Requirements for the TOE

206 The for the evaluation of the TOE and its development and operating environment are those taken from the

Evaluation Assurance Level 4 (EAL4)

and augmented by taking the following components:

ADV_IMP.2 and ALC_DVS.2.

207 The minimum strength of function is SOF-high.

208 **Application note 48:** The high minimum strength of function covers but is not limited to the TSF required by the SFR FIA_UAU.4, FCS_RND.1 and FPT_FLS.1 as far as probabilistic or permutational mechanisms are involved, e.g. due to challenges generated by the TOE and sent to the terminal or probabilistic self tests.

209 This protection profile does not contain any security functional requirement for which an explicit stated strength of function claim is required.

5.3 Security Requirements for the IT environment

210 This section describes the security functional requirements for the IT environment using the CC part 2 components.

211 Due to CCIMB Final Interpretation #58 these components are editorial changed to express the security requirements for the components in the IT environment where the original components are directed for TOE security functions. The editorial changes are indicated in **bold**.

5.3.1 Passive Authentication

212 The ICAO, the Issuing States or Organizations and the Receiving States or Organization run a public key infrastructure for the Passive Authentication. This public key infrastructure distributes and protects the Country Signing CA Keys and the Document Signing Keys to support the signing of the User Data (DG1 to DG16) by means of the Document Security Object. The Technical Report [7] describes the requirements to the public key infrastructure for the Passive Authentication.

213 The Document Signer of the Issuing State or Organization shall meet the requirement “Basic data authentication (FDP_DAU.1)” as specified below (Common Criteria Part 2).

214 **FDP_DAU.1/DS Basic data authentication – Passive Authentication**

Hierarchical to: No other components.

FDP_DAU.1.1/DS The **Document Signer** shall provide a capability to generate evidence that can be used as a guarantee of the validity of logical the MRTD (DG1 to DG16) and the Document Security Object[70].

FDP_DAU.1.2/DS The **Document Signer** shall provide Inspection Systems of Receiving States or Organization[71] with the ability to verify evidence of the validity of the indicated information.

Dependencies: No dependencies

5.3.2 Basic Inspection Systems

215 This section describes common security functional requirements to the Basic Inspection Systems and the Personalization Agent if it uses the Basic Access Control Mechanism with the Personalization Agent Authentication Keys. Both are called “Basic Terminals” (BT) in this section.

216 The Basic Terminal shall meet the requirement “Cryptographic key generation (FCS_CKM.1)” as specified below (Common Criteria Part 2).

217 **FCS_CKM.1/BAC_BT Cryptographic key generation – Generation of Document Basic Access Keys by the Basic Terminal**

[70] [assignment: *list of objects or information types*]

[71] [assignment: *list of subjects*]

Hierarchical to: No other components.

FCS_CKM.1.1/ BAC_BT The **Basic Terminal** shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm Document Basic Access Key Derivation Algorithm [72] and specified cryptographic key sizes 112 bit [73] that meet the following: [7], Annex E [74].

Dependencies: [FCS_CKM.2 Cryptographic key distribution, or
FDP_ITC.2 Import of user data with security attributes, or
FCS_COP.1 Cryptographic operation]
FCS_CKM.4 Cryptographic key destruction
FMT_MSA.2 Secure security attributes

218 **Application note 49:** The terminals derive the Document Basic Access Keys from the second line of the printed MRZ data by the algorithm described in [7], 3.2.2 and Annex E.1, use them to generate the Document Basic Access Keys. The Personalization Agent downloads these keys to the MRTD's chip as TSF data for FIA_UAU.4/BAC_MRTD.

219 **FCS_CKM.4/BT Cryptographic key destruction - BT**

Hierarchical to: No other components.

FCS_CKM.4.1/BT The **Basic Terminal** shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method [*assignment: cryptographic key destruction method*] that meets the following: [*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]
FMT_MSA.2 Secure security attributes

220 **Application note 50:** The ST writer shall perform the operation in FCS_CKM.4.1/BT. The basic terminal shall destroy the Document Basic Access Keys of the MRTD and the Triple-DES encryption key and the Retail-MAC message authentication keys for secure messaging after inspection of the MRTD.

221 The Basic Terminal 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 Basic Terminal.

222 **FCS_COP.1/SHA_BT Cryptographic operation – Hash Function by the Basic Terminal**

Hierarchical to: No other components.

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

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

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

FCS_COP.1.1/
SHA_BT

The **Basic Terminal** shall perform hashing[75] in accordance with a specified cryptographic algorithms SHA-1 [76] and cryptographic key sizes none [77] that meet the following: FIPS 180-2 [78].

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
FMT_MSA.2 Secure security attributes

223 **Application note 51:** This SFR requires the terminal to implement the hash function SHA-1 for the cryptographic primitive to generate the Document Basic Access Keys according to FCS_CKM.1/BAC_BT.

224 **FCS_COP.1/ENC_BT Cryptographic operation – Secure Messaging Encryption / Decryption by the Basic Terminal**

Hierarchical to: No other components.

FCS_COP.1.1/
ENC_BT

The **Basic Terminal** shall perform secure messaging – encryption and decryption[79] in accordance with a specified cryptographic algorithm Triple-DES in CBC mode[80] and cryptographic key sizes 112 bit[81] that meet the following: FIPS 46-3, ISO 11568-2, ISO 9797-1 (padding mode 2)[82].

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
FMT_MSA.2 Secure security attributes

225 **Application note 52:** This SFR requires the Basic Terminal to implement the cryptographic primitive for secure messaging with encryption of the transmitted data. The key is agreed between the TOE and the terminal during the execution of the Basic Access Control Authentication Mechanism. The key size of 112 bit is chosen to resist attacks with high attack potential.

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

[76] [assignment: *cryptographic algorithm*]

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

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

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

[80] [assignment: *cryptographic algorithm*]

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

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

226 **FCS_COP.1/MAC_BT Cryptographic operation – Secure messaging Message Authentication Code by the Basic Terminal**

Hierarchical to: No other components.

FCS_COP.1.1/ MAC_BT The **Basic Terminal** shall perform secure messaging – message authentication code[83] in accordance with a specified cryptographic algorithm Retail-MAC[84] and cryptographic key sizes 112 bit[85] that meet the following: FIPS 46-3, ISO 9797 (MAC algorithm 3, block cipher DES, zero IV 8 bytes, padding mode 2)[86].

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
FMT_MSA.2 Secure security attributes

227 **Application note 53:** This SFR requires the terminal to implement the cryptographic primitive for secure messaging with message authentication code over the transmitted data. The key is agreed or defined as the key for secure messaging encryption. The key size of 112 bit is chosen to resist attacks with high attack potential.

228 The Basic Terminal shall meet the requirement "Quality metric for random numbers (FCS_RND.1)" as specified below (Common Criteria Part 2 extended).

229 **FCS_RND.1/BT Quality metric for random numbers - Basic Terminal**

Hierarchical to: No other components.

FCS_RND.1.1/BT The **Basic Terminal** shall provide a mechanism to generate random numbers that meets [assignment: *a defined quality metric*].

Dependencies: No dependencies.

230 **Application note 54:** The ST writer shall perform the operation in FCS_RND.1.1/BT. This SFR requires the terminal to generate random numbers used in the authentication protocols as required by FCS_CKM.1/BAC_BT and FIA_UAU.4 The quality metric shall be chosen to ensure at least the strength of function Basic Access Control Authentication for the challenges.

231 The Basic Terminal shall meet the requirements of "Single-use authentication mechanisms (FIA_UAU.4)" as specified below (Common Criteria Part 2).

232 **FIA_UAU.4/BT Single-use authentication mechanisms – Basic Terminal**

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

[84] [assignment: *cryptographic algorithm*]

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

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

Hierarchical to: No other components.

FIA_UAU.4.1/BT The **Basic Terminal** shall prevent reuse of authentication data related to Basic Access Control Authentication Mechanism [87].

Dependencies: No dependencies.

233 **Application note 55:** The Basic Access Control Authentication Mechanism [7] uses a challenge RND.IFD freshly and randomly generated by the terminal to prevent reuse of a response generated by a MRTD's chip and of the session keys from a successful run of authentication protocol.

234 The Basic Terminal shall meet the requirement "Re-authentication (FIA_UAU.6)" as specified below (Common Criteria Part 2).

235 **FIA_UAU.6/BT Re-authentication - Basic Terminal**

Hierarchical to: No other components.

FIA_UAU.6.1/BT The **Basic Terminal** shall re-authenticate the user under the conditions each command sent to TOE after successful authentication of the terminal with Basic Access Control Authentication Mechanism [88].

Dependencies: No dependencies.

236 **Application note 56:** The Basic Access Control Mechanism specified in [7] includes the secure messaging for all commands exchanged after successful authentication of the Inspection System. The terminal checks by secure messaging in MAC_ENC mode each MRTD's chip response to a command based on Retail-MAC whether it was sent by the successfully authenticated MRTD's chip. The authentication fails if any response is received with incorrect message authentication code.

237 **Application note 57:** The Basic Access Control SFP of the TOE requires to protect the User Data by access control (cf. FDP_ACC.1/BASIC and FDP_ACF.1/BASIC) and by secure messaging (cf. FDP_UCT.1/MRTD and FDP_UIT.1/MRTD) for the communication between the TOE and the Basic Terminal. This secure messaging requires the Basic Terminal to support the protection of the TOE data by decryption and checking MAC and to protect its own data by secure messaging as well. The SFP of the Basic Terminal drawn from the TOE "Basic Access Control SFP" is named "BT part of Basic Access Control SFP" and the related SFR is described by FDP_UCT.1/BT and FDP_UIT.1/BT corresponding to FDP_UCT.1/MRTD and FDP_UIT.1/MRTD of the communication partner (i.e. the TOE). Note the Basic Terminal does not enforce any named access control policy or information control policy to be defined by FDP_ACC and FDP_ACF or FDP_IFC and FDP_IFF families (respectively). The authentication mechanisms as part of Basic Access Control Mechanism include the key agreement for the encryption and the message authentication key to be used for secure messaging.

[87] [assignment: *identified authentication mechanism(*s)]

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

238 The Basic Terminal shall meet the requirement "Basic data exchange confidentiality (FDP_UCT.1)" as specified below (Common Criteria Part 2).

239 **FDP_UCT.1/BT Basic data exchange confidentiality - Basic Terminal**

Hierarchical to: No other components.

FDP_UCT.1.1/BT The **Basic Terminal** shall enforce the BT part of Basic Access Control SFP [89] to be able to transmit and receive[90] objects in a manner protected from unauthorised disclosure.

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]

240 The Basic Terminal shall meet the requirement "Basic data exchange confidentiality (FDP_UCT.1)" as specified below (Common Criteria Part 2).

241 **FDP_UIT.1/BT Data exchange integrity - Basic Terminal**

Hierarchical to: No other components.

FDP_UIT.1.1/BT The **Basic Terminal** shall enforce the BT part of Basic Access Control SFP [91] to be able to transmit and receive [92] user data in a manner protected from modification, deletion, insertion and replay [93] errors.

FDP_UIT.1.2/BT The **Basic Terminal** shall be able to determine on receipt of user data, whether modification, deletion, insertion and replay [94] has occurred.

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

5.3.3 Personalization Terminals

242 The TOE supports different authentication and access control mechanisms which may be used for the Personalization Agent depending on the personalization scheme of the Issuing State or Organization:

(1) The Basic Access Control Mechanism which may be used by the Personalization Agent with a Personalization Agent Secret Key Pair. The Basic Access Control Mechanism establishes strong cryptographic keys for the secure messaging to ensure the confidentiality by Triple-DES and integrity by Retail-MAC of the transmitted data. This approach may be

[89] [assignment: *access control SFP(s) and/or information flow control SFP(s)*]

[90] [selection*: transmit, receive*]

[91] [assignment: *access control SFP(s) and/or* i*nformation flow control SFP(s)*]

[92] [selection*: transmit, receive*]

[93] [selection: *modification, deletion, insertion, replay*]

[94] [selection: *modification*, *deletion, insertion, replay*]

used in a personalization environment where the communication between the MRTD's chip and the personalization terminal may be listen or manipulated.

(2) In a centralized personalization scheme the major issue is high productivity of personalization in a high secure environment. In this case the personalization agent may wish to reduce the protocol to symmetric authentication of the terminal without secure messaging. Therefore the TOE and the Personalization Terminal support a simple protocol as requested by the SFR FIA_UAU.4/MRTD and FIA_API.1/SYM_PT.

243 The Personalization Terminal shall meet the requirement "Authentication Prove of Identity (FIA_API)" as specified below (Common Criteria Part 2 extended).

244 **FIA_API.1/SYM_PT Authentication Proof of Identity - Personalization Terminal Authentication with Symmetric Key**

Hierarchical to: No other components.

FIA_API.1.1/ SYM_PT	The **Personalization Terminal** shall provide a Authentication Mechanism based on Triple-DES [95] to prove the identity of the Personalization Agent [96].

Dependencies: No dependencies.

245 **Application note 58:** The Symmetric Authentication Mechanism for Personalization Agents is intended to be used in a high secure personalization environment only. It uses the symmetric cryptographic Personalization Agent Authentication Secret key of 112 bits to encrypt a challenge of 8 Bytes with Triple-DES which the terminal receives from the MRTD's chip e.g. as response of a GET CHALLENGE. The answer may be sent by means of the EXTERNAL AUTHENTICATE command according to ISO 7816-4 [23] command. In this case the communication may be performed without secure messaging (note that FIA_UAU.5.2 requires secure messaging only after run of Basic Access Control Authentication).

[95] [assignment: *authentication mechanism*]

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

6 PP Application Notes

246 There are no additional application notes for the protection profile.

7 Rationales

7.1 Security Objectives Rationale

247 The following table provides an overview for security objectives coverage.

	OT.AC_Pers	OT.Data_Int	OT.Data_Conf	OT.Identification	OT.Prot_Abuse-Func	OT.Prot_Inf_Leak	OT.Prot_Phys-Tamper	OT.Malfuntion	OD.Assurance	OD.Material	OE.Personalization	OE.Pass_Auth_Sign	OE.Exam_MRTD	OE.pass_Auth_verif	OE.Prot_Logical_MRT	OE.Secure_Handling
T.Chip-ID				x												x
T.Skimming			x													x
T.Eavesdropping			x													
T.Forgery	x	x					x					x	x	x		
T.Abuse-Func					x											
T.Information_Leakage						x										
T.Phys-tamper							x									
T.Malfunction								x								
P.Manufact									x	x						
P.Personalization	x								x		x					
P.Personal_Data		x	x													
A.Pers_Agent											x					
A.Insp_Sys													x		x	

Table 2: Security Objective Rationale

248 The OSP **P.Manufact** “Manufacturing of the MRTD’s chip” requires the quality and integrity of the manufacturing process and control the MRTD’s material in the Phase 2 Manufacturing including unique identification of the IC by means of the Initialization Data and the writing of the Pre-personalization Data. The security objective for the TOE environment **OD.Assurance** “Assurance Security Measures in Development and Manufacturing Environment” address these obligations of the IC Manufacturer and MRTD Manufacturer.

249 The OSP **P.Personalization** “Personalization of the MRTD by issuing State or Organization only” addresses the (i) the enrolment of the logical MRTD by the Personalization Agent as described in the security objective for the TOE environment **OE.Personalization** “Personalization of logical MRTD”, and (ii) the access control for the user data and TSF data as described by the security objective **OT.AC_Pers** “Access Control for Personalization of logical MRTD”. Note, the manufacturer equips the TOE with the Personalization Agent Authentication key(s) according to **OD.Assurance** “Assurance Security Measures in Development and Manufacturing Environment”. The security objective OT.AC_Pers limits the management of TSF

data and the management of TSF (enabling and disabling of the TSF Basic Access Control) to the Personalization Agent.

250 The OSP **P.Personal_Data** “Personal data protection policy” requires the TOE (i) to support the protection of the confidentiality of the logical MRTD by means of the Basic Access Control and (ii) enforce the access control for reading as decided by the issuing State or Organization. This policy is implemented by the security objectives OT.Data_Int “Integrity of personal data“ which describes the unconditional protection of the integrity of the stored data and the configurable integrity protection during the transmission. The security objective OT.Data_Conf “Confidentiality of personal data” describes the protection of the confidentiality as configured by the Personalization Agent acting in charge of the issuing State or Organization.

251 The threat **T.Chip_ID** “Identification of MRTD’s chip” addresses the trace of the MRTD movement by identifying remotely the MRTD’s chip through the contactless communication interface. In case of TOE configuration for use with Basic Inspection Terminals only this threat is countered as described by the security objective OT.Identification by Basic Access Control. If the TOE is configured for use with Primary Inspection Systems this threat shall be adverted by the TOE environment as described by OE.Secure_Handling.

252 The threat **T.Skimming** “Skimming digital MRZ data or the digital portrait” and **T.Eavesdropping “**Eavesdropping to the communication between TOE and inspection system” address the reading of the logical MRTD trough the contactless interface or listening the communication between the MRTD’s chip and a terminal. In case of TOE configuration for use with Basic Inspection Terminals only this threat is countered by the security objective OT.Identification through Basic Access Control. If the TOE is configured for use with Primary Inspection Systems the threat T.Skimming shall be adverted by the TOE environment according to **OE.Secure_Handling** “Secure handling of the MRTD by MRTD holder” and the threat T.Eavesdropping shall be adverted by **OE.Prot_Logical_MRTD** “Protection of data of the logical MRTD”.

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

254 The threat **T.Abuse-Func** “Abuse of Functionality” addresses attacks using the MRTD’s chip as production material for the MRTD and misuse of the functions for personalization in the operational state after delivery to MRTD holder to disclose or to manipulate the logical MRTD. The security objectives for the TOE environment **OD.Material** “Control over MRTD Material” ensures the control of the MRTD material. The security objective for the TOE environment **OD.Assurance** “Assurance Security Measures in Development and Manufacturing Environment” and **OE.Personalization** “Personalization of logical MRTD” ensure that the TOE security functions for the initialization and the personalization are disabled and the security functions for

the operational state after delivery to MRTD holder are enabled according to the intended use of the TOE.

255 The threats **T.Information_Leakage** “Information Leakage from MRTD’s chip”, **T.Phys-Tamper** “Physical Tampering” and **T.Malfunction** “Malfunction due to Environmental Stress” are typical for integrated circuits like smart cards under direct attack with high attack potential. The protection of the TOE against these threats are addressed by the directly related security objectives **OT.Prot_Inf_Leak** “Protection against Information Leakage”, **OT.Prot_Phys-Tamper** “Protection against Physical Tampering” and **OT.Prot_Malfunction** “Protection against Malfunctions”.

256 The assumption **A.Pers_Agent** “Personalization of the MRTD’s chip” is covered by the security objective for the TOE environment **OE.Personalization** “Personalization of logical MRTD” including the enrolment, the protection with digital signature and the storage of the MRTD holder personal data and the enabling of security features of the TOE according to the decision of the Issuing State or Organization concerning the Basic Access Control.

257 The examination of the MRTD passport book addressed by the assumption **A.Insp_Sys** “Inspection Systems for global interoperability” is covered by the security objectives for the TOE environment **OE.Exam_MRTD** “Examination of the MRTD passport book”. If the Issuing State of Organization decides to protect confidentiality of the logical MRTD than the the security objectives for the TOE environment **OE.Prot_Logical_MRTD** “Protection of data of the logical MRTD” will require the Basic Inspection System to implement the Basic Access Control and to protect the logical MRTD data during the transmission and the internal handling. If the Issuing State of Organization decides to configure the TOE for use with Primary Inspection Systems than no protection of the logical MRTD data is required by the inspection system.

7.2 Security Requirements Rationale

7.2.1 Security Functional Requirements Rationale

258 The following table provides an overview for security functional requirements coverage.

	OT.AC_Pers	OT.Data_Int	OT.Data_Conf	OT.Identification	OT:Prot_Inf_Leak	OT.Prot_Phys-Tamper	OT.Malfuntion	OT.Prot_Abuse-Func
FAU_SAS.1				x				
FCS_CKM.1/BAC_MRTD	(x)	x	(x)					
FCS_CKM.4	(x)		x					
FCS_COP.1/SHA_MRTD	x	x	(x)					
FCS_COP.1/TDES_MRTD	x	x	x					
FCS_COP.1/MAC_MRTD	x	x	x					
FCS_RND.1/MRTD	(x)	x	x					

	OT.AC_Pers	OT.Data_Int	OT.Data_Conf	OT.Identification	OT:Prot_Inf_Leak	OT.Prot_Phys-Tamper	OT.Malfuntion	OT.Prot_Abuse-Func
FIA_UID.1			x	x				
FIA_UAU.1			x					
FIA_UAU.4/MRTD	x	x	x					
FIA_UAU.5/MRTD	x	x	x					
FIA_UAU.6/MRTD	x	x	x					
FDP_ACC.1/PRIM	x	x						
FDP_ACF.1/PRIM	x	x						
FDP_ACC.1/BASIC	x	x	x					
FDP_ACF.1/BASIC	x	x	x					
FDP_UCT.1/MRTD	x	x	x					
FDP_UIT.1/MRTD	x	x	x					
FMT_MOF.1	x	x	x					
FMT_SMF.1	x	x	x					
FMT_SMR.1	x	x	x					
FMT_LIM.1								x
FMT_LIM.2								x
FMT_MTD.1/INI_ENA				x				
FMT_MTD.1/INI_DIS				x				
FMT_MTD.1/KEY_WRITE	x	x	x					
FMT_MTD.1/KEY_READ	x	x	x					
FPT_EMSEC.1	x				x			
FPT_TST.1					x		x	
FPT_RVM.1								x
FPT_FLS.1					x		x	
FPT_PHP.3					x	x		
FPT_SEP.1							x	x

Table 3: Coverage of Security Objective for the TOE by SFR

259 The security objective **OT.AC_Pers** “Access Control for Personalization of logical MRTD” addresses the access control of the writing the logical MRTD and the management of the TSF for Basic Access Control. The write access to the logical MRTD data are defined by the SFR FDP_ACC.1/PRIM, FDP_ACC.1/BASIC, FDP_ACF.1/PRIM and FDP_ACF.1/BASIC in the same way: only the successfully authenticated Personalization Agent is allowed to write the data of the groups DG1 to DG16 of the logical MRTD only once.

The authentication of the terminal as Personalization Agent shall be performed by TSF according to SRF FIA_UAU.4/MRTD and FIA_UAU.5/MRTD. In case the Basic Access Control

Authentication Mechanism was used the SFR FIA_UAU.6/MRTD describes the re-authentication and FDP_UCT.1 and FDP_UIT.1 the protection of the transmitted data by means of secure messaging implemented by the cryptographic functions according to FCS_CKM.1/BAC_MRTD, FCS_COP.1/SHA_MRTD, FCS_RND.1 (for key generation), and FCS_COP.1/TDES_MRTD and FCS_COP.1/MAC_MRTD for the ENC_MAC_Mode.

The SFR FMT_SMR.1 lists the roles (including Personalization Agent) and the SFR FMT_SMF.1 lists the TSF management functions (including Personalization) because the Personalization Agent handles the configuration of the TSF Basic Access Control according to the SFR FMT_MOF.1 and the Document Basic Access Keys according to the SFR FMT_MTD.1/KEY_WRITE as authentication reference data if Basic Access Control is enabled. The SFR FMT_MTD.1/KEY_READ prevents read access to the secret key of the Personalization Agent Keys and ensure together with the SFR FPT_EMSEC.1, FPT_FLS.1 and FPT_PHP.3 the confidentially of these keys.

260 The security objective **OT.Data_Int** “Integrity of personal data” requires the TOE to protect the integrity of the logical MRTD stored on the MRTD’s chip against physical manipulation and unauthorized writing. The write access to the logical MRTD data is defined by the SFR FDP_ACC.1/PRIM, FDP_ACC.1/BASIC, FDP_ACF.1/PRIM and FDP_ACF.1/BASIC in the same way: only the Personalization Agent is allowed to write the data of the groups DG1 to DG16 of the logical MRTD (FDP_ACF.1.2, rule 1) and terminals are not allowed to modify any of the data groups DG1 to DG16 of the logical MRTD (cf. FDP_ACF.1.4). The SFR FMT_SMR.1 lists the roles (including Personalization Agent) and the SFR FMT_SMF.1 lists the TSF management functions (including Personalization)

If the TOE is configured for the use with Basic Inspection Terminals only by means of FMT_MOF.1 the security objective **OT.Data_Int** “Integrity of personal data” requires the TOE to ensure that the inspection system is able to detect any modification of the transmitted logical MRTD data. The authentication of the terminal as Personalization Agent shall be performed by TSF according to SRF FIA_UAU.4/MRTD, FIA_UAU.5/MRTD and FIA_UAU.6/MRTD. The SFR FIA_UAU.6/MRTD, FDP_UCT.1 and FDP_UIT.1 requires the protection of the transmitted data by means of secure messaging implemented by the cryptographic functions according to FCS_CKM.1/BAC_MRTD, FCS_COP.1/SHA_MRD, FCS_RND.1 (for key generation), and FCS_COP.1/TDES_MRTD and FCS_COP.1/MAC_MRTD for the ENC_MAC_Mode. The SFR FMT_MTD.1/KEY requires the Personalization Agent to establish the Document Basic Access Keys.

261 The security objective **OT.Data_Conf** “Confidentiality of personal data” requires the TOE to ensure the confidentiality of the logical MRTD data groups DG1 to DG16 if the TOE is configured for the use with Basic Inspection Systems by means of FMT_MOF.1. The SFR FIA_UID.1 and FIA_UAU.1 allow only those actions before identification respective authentication which do not violate OT.Data_Conf. The read access to the logical MRTD data is defined by the FDP_ACC.1/BASIC and FDP_ACF.1.2/BASIC: only the successful authenticated Personalization Agent and the successful authenticated Basic Inspection System are allowed to read the data of the logical MRTD. The SFR FMT_SMR.1 lists the roles (including Personalization Agent and Basic Inspection System) and the SFR FMT_SMF.1 lists the TSF management functions (including Personalization for the key management for the Document Basic Access Keys).

The SFR FIA_UAU.4/MRTD prevents reuse of authentication data to strengthen the authentication of the user. The SFR FIA_UAU.5 enforce the TOE to accept the authentication attempt as Basic Inspection System only by means of the Basic Access Control Authentication Mechanism with the Document Basic Access Keys. Moreover, the SFR FIA_UAU.6 request secure messaging after successful authentication of the terminal with Basic Access Control Authentication Mechanism which includes the protection of the transmitted data in ENC_MAC_Mode by means of the cryptographic functions according to FCS_COP.1/TDES_MRTD and FCS_COP.1/MAC_MRTD (cf. the SFR FDP_UCT.1 and FDP_UIT.1). (for key generation), and FCS_COP.1/TDES_MRTD and FCS_COP.1/MAC_MRTD for the ENC_MAC_Mode. The SFR FCS_CKM.1/BAC_MRTD, FCS_CKM.4, FCS_COP.1/SHA_MRTD 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.

Note, neither the security objective OT.Data_Conf nor the SFR FIA_UAU.5 requires the Personalization Agent to use the Basic Access Control Authentication Mechanism or secure messaging. If the TOE is configured for the use with Primary Inspection Systems, no protection in confidentiality of the logical MRTD is needed to ensure.

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

Furthermore, if the TOE is configured for use with Basic Inspection Terminals the TOE shall identify themselves only to a successful authenticated Basic Inspection System in Phase 4 "Operational Use". The SFR FMT_MTD.1/INI_ENA allows only the Manufacturer to write Initialization Data and Pre-personalization Data. The SFR FMT_MTD.1/INI_DIS allow the Personalization Agent to disable Initialization Data if their use in the phase 4 "Operational Use" violate the security objective OT.Identification. The SFR FIA_UID.1 and FIA_UAU.1 do not allow reading of any data uniquely identifying the MRTD's chip before successful authentication of the Basic Inspection Terminal and will stop communication after unsuccessful authentication attempt (cf. Application note 30).

263 The security objective **OT.Prot_Abuse-Func** "Protection against Abuse of Functionality" is ensured by (i) the SFR FMT_LIM.1 and FMT_LIM.2 which prevent misuse of test functionality of the TOE or other which may not be used after TOE Delivery, (ii) the SFR FPT_RVM.1 which prevents by monitoring the bypass and deactivation of security features or functions of the TOE, and (iii) the SFR FPT_SEP.1 which prevents change or explore security features or functions of the TOE by means of separation the other TOE functions.

264 The security objective **OT.Prot_Inf_Leak** "Protection against Information Leakage" requires the TOE to protect confidential TSF data stored and/or processed in the MRTD's chip against disclosure

- by measurement and analysis of the shape and amplitude of signals or the time between events found by measuring signals on the electromagnetic field, power consumption, clock, or I/O lines, which is addressed by the SFR FPT_EMSEC.1,
- by forcing a malfunction of the TOE, which is addressed by the SFR 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.

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

266 The security objective **OT.Prot_Malfunction** “Protection against Malfunctions” is covered by (i) the SFR FPT_TST.1 which requires self tests to demonstare the correct operation and tests of authorized users to verify the integrity of TSF data and TSF code, (ii) the SFR FPT_FLS.1 which requires a secure state in case of detected failure or operating conditions possibly causing a malfunction, and (iii) the SFR FPT_SEP.1 limiting the effects of malfunctions due to TSF domain separation.

267 The following table provides an overview how security functional requirements for the IT environment cover security objectives for the TOE environment. The protection profile describes only those SFR of the IT environment directly related to the SFR for the TOE. It does not state any SFR for the IT environment supporting the security objectives OD.Assurance and OD.Material. The OE.Exam_MRTD uses only security function of the IT environment, i.e. the passive authentication. The security objective OE.Prot_Logical_MRTD is directed to Basic Inspection Systems only which cooperate with the TOE in protection of the logical MRTD.

	OE.Personalization	OE.Exam_MRTD	OE.Prot_Logical_MRTD
Document Signer			
FDP_DAU.1/DS		x	
Terminal			
FCS_CKM.1/BAC_BT	x		x
FCS_CKM.4/BT			x
FCS_COP.1/SHA_BT	x		x
FCS_COP.1/ENC_BT	x		x
FCS_COP.1/MAC_BT	x		x
FCS_RND.1/BT	x		x
FIA_UAU.4/BT	x		x
FIA_UAU.6/BT	x		x
FDP_UCT.1/BT	x		x
FDP_UIT.1/BT	x		x
Personalization Agent			
FIA_API.1/SYM_PT	x		

Table 4: Coverage of Security Objectives for the IT environment by SFR

268 The document signer provides the security function Passive Authentication according to FDP_DAU.1(DS to support the inspection system to verify the logical MRTD.

269 The security objective **OE.Prot_Logical_MRTD** "Protection of data of the logical MRTD" address the protection of the logical MRTD during the transmission and internal handling. The SFR FIA_UAU.4/BT and FIA_UAU.6/BT address the terminal part of the Basic Access Control Authentication Mechanism and FDP_UCT.1/BT and FDP_UIT.1/BT the secure messaging established by this mechanism. The SFR FCS_CKM.1/BAC_BT, FCS_COP.1/SHA_BT, FCS_COP.1/ENC_BT, FCS_COP.1/MAC_BT and FCS_RND.1/BT are necessary to implement this mechanism. The BIS shall destroy the Document Access Control Key and the secure messaging key after inspection of the MRTD because they are not needed any more.

270 The **OE.Personalization** "Personalization of logical MRTD" requires the personalization terminal to authenticate themselves to the MRTD's chip to get the write authorization. This implies to implement the Basic Access Control Authentication Mechanism with the Personalization Agent Authentication Keys or support the symmetric authentication protocol according to the SFR FIA_API.1/SYM_PT.

7.2.2 Dependency Rationale

271 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 analyzed, and non-dissolved dependencies are appropriately explained.

272 The table 5 shows the dependencies between the SFR and of the SFR to the SAR of the TOE.

SFR	Dependencies	Support of the Dependencies
FAU_SAS.1	No dependencies	n.a.
FCS_CKM.1/BAC_MRTD	[FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation], FCS_CKM.4 Cryptographic key destruction, FMT_MSA.2 Secure security attributes	FCS_CKM.4, FCS_COP.1/TDES_MRTD, FCS_COP.1/MAC_MRTD justification 1 for non-satisfied dependencies
FCS_CKM.4/MRTD	[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], FMT_MSA.2 Secure security attributes	FCS_CKM.1, justification 1 for non-satisfied dependencies
FCS_COP.1/SHA_MRTD	[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, FMT_MSA.2 Secure security attributes	FCS_CKM.1, FCS_CKM.4, justification 2 for non-satisfied dependencies

SFR	Dependencies	Support of the Dependencies
FCS_COP.1/TDES_MRTD	[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, FMT_MSA.2 Secure security attributes	FCS_CKM.1, FCS_CKM.4, justification 3 for non-satisfied dependencies
FCS_COP.1/MAC_MRTD	[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, FMT_MSA.2 Secure security attributes	FCS_CKM.1, FCS_CKM.4, justification 3 for non-satisfied dependencies
FCS_RND.1/MRTD	No dependencies	n.a.
FIA_UID.1	No dependencies	n.a.
FIA_UAU.1	FIA_UAU.1 Timing of authentication	Fulfilled
FIA_UAU.4/MRTD	No dependencies	n.a.
FIA_UAU.5/MRTD	No dependencies	n.a.
FIA_UAU.6/MRTD	No dependencies	n.a.
FDP_ACC.1/PRIM	FDP_ACF.1 Security attribute based access control	Fulfilled by FDP_ACF.1/PRIM
FDP_ACC.1/BASIC	FDP_ACF.1 Security attribute based access control	Fulfilled by FDP_ACF.1/BASIC
FDP_ACF.1/PRIM	FDP_ACC.1 Subset access control, FMT_MSA.3 Static attribute initialization	FDP_ACC.1/PRIM, justification 4 for non-satisfied dependencies
FDP_ACF.1/BASIC	FDP_ACC.1 Subset access control, FMT_MSA.3 Static attribute initialization	FDP_ACC.1/BASIC, justification 4 for non-satisfied dependencies
FDP_UCT.1/MRTD	[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_ACC.1/BASIC, justification 5 for non-satisfied dependencies
FDP_UIT.1/MRTD	[FTP_ITC.1 Inter-TSF trusted channel, or FTP_TRP.1 Trusted path], [FDP_ACC.1 Subset access control, or FDP_IFC.1 Subset	FDP_ACC.1/BASIC, justification 5 for non-satisfied dependencies

SFR	Dependencies	Support of the Dependencies
	information flow control]	
FMT_MOF.1	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled
FMT_SMF.1	No dependencies	n.a.
FMT_SMR.1	FIA_UID.1 Timing of identification	Fulfilled
FMT_LIM.1	FMT_LIM.2	Fulfilled
FMT_LIM.2	FMT_LIM.1	Fulfilled
FMT_MTD.1/INI_ENA	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled
FMT_MTD.1/INI_DIS	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled
FMT_MTD.1/KEY_READ	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled
FMT_MTD.1/KEY_WRITE	FMT_SMF.1 Specification of management functions, FMT_SMR.1 Security roles	Fulfilled
FPT_EMSEC.1	No dependencies	n.a.
FPT_FLS.1	ADV_SPM.1	Fulfilled by EAL4
FPT_PHP.3	No dependencies	n.a.
FPT_RVM.1	No dependencies	n.a.
FPT_SEP.1	No dependencies	n.a.
FPT_TST.1	FPT_AMT.1 Abstract machine testing	See justification 6 for non-satisfied dependencies

Table 5: Dependencies between the SFR for the TOE

273 Justification for non-satisfied dependencies between the SFR for TOE:

No. 1: The SFR FCS_CKM.1/BAC_MRTD uses only the Document Basic Access Keys to generate the secure messaging keys used for FCS_COP.1/TDES and FCS_COP.1/MAC. The SFR FCS_CKM.4/MRTD destroys these keys automatically. These simple processes do not need any special security attributes for the secure messaging keys.

No. 2: The cryptographic algorithm SHA-1 does not use any cryptographic key. Therefore none of the listed SFR are needed to be defined for this specific instantiation of FCS_COP.1.

No. 3: The SFR FCS_COP.1/TDES_MRTD and FCS_COP.1/MAC_MRTD use the automatically generated secure messaging keys assigned to the session with the successfully authenticated BIS only. There is no need for any special security attributes for the secure messaging keys.

No. 4: The access control TSF according to FDP_ACF.1 uses security attributes which are defined during the personalization and are fixed over the whole life time of the TOE. No management of these security attribute (i.e. SFR FMT_MSA.1 and FMT_MSA.2) is necessary here.

No. 5: The SFR FDP_UCT.1/MRTD and FDP_UIT.1/MRTD require the use secure messaging between the MRTD and the BIS. There is no need for additional SFR FTP_ITC.1, e.g. to require this communication channel to be logically distinct from other communication channels it is the only one.

No. 6: The TOE consists of the software and its underlying hardware on which it is running. Thus there is no abstract machine to be tested.

274 The following table shows the dependencies between the SFR for the IT environment and of the SFR to the SAR of the TOE.

SFR	Dependencies	Support of the Dependencies
FDP_DAU.1	No dependencies	n.a.
FCS_CKM.1/BAC_BT	[FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation], FCS_CKM.4 Cryptographic key destruction, FMT_MSA.2 Secure security attributes	FCS_CKM.4, FCS_COP.1/TDES_BT, FCS_COP.1/MAC_BT justification 7 for non-satisfied dependencies
FCS_CKM.4/BT	[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], FMT_MSA.2 Secure security attributes	FCS_CKM.1, justification 7 for non-satisfied dependencies
FCS_COP.1/SHA_BT	[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, FMT_MSA.2 Secure security attributes	FCS_CKM.1, FCS_CKM.4, justification 8 for non-satisfied dependencies
FCS_COP.1/ENC_BT	[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.1, FCS_CKM.4, justification 9 for non-satisfied dependencies

SFR	Dependencies	Support of the Dependencies
	FCS_CKM.4 Cryptographic key destruction, FMT_MSA.2 Secure security attributes	
FCS_COP.1/MAC_BT	[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, FMT_MSA.2 Secure security attributes	FCS_CKM.1, FCS_CKM.4, justification 9 for non-satisfied dependencies
FCS_RND.1/BT	No dependencies	n.a.
FIA_UAU.4/BT	No dependencies	n.a.
FIA_UAU.6/BT	No dependencies	n.a.
FDP_UCT.1/BT	[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_ACC.1/BASIC, justification 10 for non-satisfied dependencies
FDP_UIT.1/BT	[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_ACC.1/BASIC, justification 10 for non-satisfied dependencies
FIA_API.1/SYM_PT	No dependencies	n.a.

Table 6: Dependencies between the SFR for the IT environment

275 Justification for non-satisfied dependencies between the SFR for the IT environment.

No. 7: The SFR FCS_CKM.1/BT derives the Document Basic Access Keys and uses this key to generate the secure messaging keys used for FCS_COP.1/TDES and FCS_COP.1/MAC. The SFR FCS_CKM.4/BT destroys these keys. These processes do not need any special security attributes for the secure messaging keys.

No. 8: The cryptographic algorithm SHA-1 does not use any cryptographic key. Therefore none of the listed SFR are needed to be defined for this specific instantiation of FCS_COP.1.

No. 9: The SFR FCS_COP.1/TDES_BT and FCS_COP.1/MAC_BT use the automatically generated secure messaging keys assigned to the session with the successfully authenticated MRTD only. There is no need for any special security attributes for the secure messaging keys.

No. 10: The SFR FDP_UCT.1/MRTD and FDP_UIT.1/MRTD require the use secure messaging between the MRTD and the BIS. There is no need to provide further description of this communication.

7.2.3 Security Assurance Requirements Rationale

276 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 additional security specific engineering costs.

277 The selection of component ADV_IMP.2 provides a higher assurance for the implementation of the MRTD's chip especially for the absence of unintended functionality.

278 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.

279 The minimal strength of function "high" was selected to ensure resistance against direct attacks on functions based on probabilistic or permutational mechanisms. The SOF requirement applies to the identification and authentication functionality within the TOE to fulfil OT.AC_PERS and OT.Data_Conf if the TOE is configured for the use with Basic Inspection Systems. This is consistent with the security objective OD.Assurance.

280 The components ADV_IMP.2 and ALC_DVS.2 augmented to EAL4 have dependencies to other security requirements fulfilled within EAL4

Dependencies ADV_IMP.2

ADV_LLD.1 Descriptive low-level design

ALC_TAT.1 Well-defined development tools

Dependencies ALC_DVS.2: no.

7.2.4 Security Requirements – Mutual Support and Internal Consistency

281 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.

282 The analysis of the TOE´s security requirements with regard to their mutual support and internal consistency demonstrates:

The dependency analysis in section 7.2.2 Dependency Rationale 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 analyzed, and non-satisfied dependencies are appropriately explained.

The assurance class EAL4 is an established set of mutually supportive and internally consistent assurance requirements. The dependency analysis for the additional assurance components in section 7.2.3 Security Assurance Requirements Rationale shows that the assurance requirements are mutually supportive and internally consistent as all (additional) dependencies are satisfied and no inconsistency appears.

283 The Personalization Agent may configure the TOE according to the organisational security policy (i) for use with Primary Inspection Systems or (ii) for use with Basic Inspection Systems. According to the security objective OT.Data_Conf the TOE enforces different security functional policies for the chosen (by means of the SFr FMT_MOF.1) configurations (i.e. the Primary Access Control SFP for the use with Primary Inspection Systems and the Basic Access Control SFP for the use with Basic Inspection Systems). These SFP are implemented by two internally consistent sets of SFR for the cryptographic functions, the user identification, the user authentication, the access control and - in case of the Basic Access Control SFP - for the data export protection. All TSF are protected by a common set of SFR of the FPT against any attempt to bypass, to deactivate, to manipulate or to misuse the TOE security features or TSF.

284 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 sections 7.2.2 Dependency Rationale and 7.2.3 Security Assurance Requirements Rationale. Furthermore, as also discussed in section 7.2.3 Security Assurance Requirements Rationale, the chosen assurance components are adequate for the functionality of the TOE. So 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.

8 Glossary and Acronyms

Term	Definition
Active Authentication	Security mechanism defined in [7] option by which means the MTRD’s chip proves and the inspection system verifies the identity and authenticity of the MTRD’s chip as part of a genuine MRTD issued by a known State of organization.
Application note	Optional informative part of the PP containing additional supporting information that is considered relevant or useful for the construction, evaluation, or use of the TOE (cf. CC part 1, section B.2.7).
Audit records	Write-only-once non-volatile memory area of the MRTDs chip to store the Initialization Data and Pre-personalization Data.
Authenticity	Ability to confirm the MRTD and its data elements on the MRTD’s chip were created by the issuing State or Organization
Basic Access Control	Security mechanism defined in [7] by which means the MTRD’s chip proves and the inspection system protect their communication by means of secure messaging with Basic Access Keys (see there).
Basic Inspection System (BIS)	An inspection system which implements the terminals part of the Basic Access Control Mechanism and authenticates themselves to the MRTD’s chip using the Document Basic Access Keys drawn form printed MRZ data for reading the logical MRTD.
Biographical data (biodata).	The personalized details of the bearer of the document appearing as text in the visual and machine readable zones on the biographical data page of a passport book or on a travel card or visa. [8]
biometric reference data	Data stored for biometric authentication of the MRTD holder in the MRTD’s chip as (i) digital portrait and (ii) optional biometric reference data.
Counterfeit	An unauthorized copy or reproduction of a genuine security document made by whatever means. [8]
Country Signing CA Certificate (C_{CSCA})	Self-signed certificate of the Country Signing CA Public Key (K_{PuCSCA}) issued by CSCA stored in the inspection system.
Document Basic Access Keys	Pair of symmetric Triple-DES keys used for secure messaging with encryption (key K_{ENC}) and message authentication (key K_{MAC}) of data transmitted between the MRTD’s chip and the inspection system [7]. It is drawn from the printed MRZ of the passport book to authenticate an entity able to read the printed MRZ of the passport book.
Document Security Object (SO_D)	A RFC3369 CMS Signed Data Structure, signed by the Document Signer (DS). Carries the hash values of the LDS Data Groups. It is stored in the MRTD’s chip. It may carry the Document Signer Certificate (C_{DS}). [7]
Eavesdropper	A threat agent with low attack potential reading the communication between the MRTD’s chip and the inspection system to gain the data on the MRTD’s chip.
Enrolment	The process of collecting biometric samples from a person and the subsequent preparation and storage of biometric reference templates representing that person's identity. [9]
Extended Access Control	Security mechanism identified in [7] by which means the MTRD’s chip (i) verifies the authentication of the inspection systems authorized to read the

Term	Definition
	optional biometric reference data, (ii) controls the access to the optional biometric reference data and (iii) protects the confidentiality and integrity of the optional biometric reference data during their transmission to the inspection system by secure messaging. The Personalization Agent may use the same mechanism to authenticate themselves with Personalization Agent Authentication Private Key and to get write and read access to the logical MRTD and TSF data.
Extended Inspection System (EIS)	A role of a terminal as part of an inspection system which is in addition to Basic Inspection System authorized by the issuing State or Organization to read the optional biometric reference data and supports the terminals part of the Extended Access Control Authentication Mechanism.
Forgery	Fraudulent alteration of any part of the genuine document, e.g. changes to the biographical data or the portrait. [8]
Global Interoperability	The capability of inspection systems (either manual or automated) in different States throughout the world to exchange data, to process data received from systems in other States, and to utilize that data in inspection operations in their respective States. Global interoperability is a major objective of the standardized specifications for placement of both eye-readable and machine readable data in all MRTDs. [9]
IC Dedicated Support Software	That part of the IC Dedicated Software (refer to above) which provides functions after TOE Delivery. The usage of parts of the IC Dedicated Software might be restricted to certain phases.
IC Dedicated Test Software	That part of the IC Dedicated Software (refer to above) which is used to test the TOE before TOE Delivery but which does not provide any functionality thereafter.
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. [8]
Improperly documented person	A person who travels, or attempts to travel with: (a) an expired travel document or an invalid visa; (b) a counterfeit, forged or altered travel document or visa; (c) someone else's travel document or visa; or (d) no travel document or visa, if required. [9]
Initialisation Data	Any data defined by the TOE Manufacturer and injected into the non-volatile memory by the Integrated Circuits manufacturer (Phase 2). These data are for instance used for traceability and for IC identification as MRTD's material (IC identification data).
Inspection	The act of a State examining an MRTD presented to it by a traveller (the MRTD holder) and verifying its authenticity. [9]
Inspection system (IS)	A technical system used by the border control officer of the receiving State (i) examining an MRTD presented by the traveller and verifying its authenticity and (ii) verifying the traveller as MRTD holder.
Integrated circuit (IC)	Electronic component(s) designed to perform processing and/or memory functions. The MRTD's chip is a integrated circuit.
Integrity	Ability to confirm the MRTD and its data elements on the MRTD's chip have not been altered from that created by the issuing State or Organization
Issuing Organization	Organization authorized to issue an official travel document (e.g. the United Nations Organization, issuer of the Laissez-passer). [6]

Term	Definition
Issuing State	The Country issuing the MRTD. [6]
Logical Data Structure (LDS)	The collection of groupings of Data Elements stored in the optional capacity expansion technology [6]. The capacity expansion technology used is the MRTD's chip.
Logical MRTD	Data of the MRTD holder stored according to the Logical Data Structure [6] as specified by ICAO on the contactless integrated circuit. It presents contactless readable data including (but not limited to) (1) personal data of the MRTD holder (2) the digital Machine Readable Zone Data (digital MRZ data, DG1), (3) the digitized portraits (DG2), (4) the biometric reference data of finger(s) (DG3) or iris image(s) (DG4) or both and (5) the other data according to LDS (DG5 to DG16).
Logical travel document	Data stored according to the Logical Data Structure as specified by ICAO in the contactless integrated circuit including (but not limited to) (1) data contained in the machine-readable zone (mandatory), (2) digitized photographic image (mandatory) and (3) fingerprint image(s) and/or iris image(s) (optional).
Machine readable travel document (MRTD)	Official document issued by a State or Organization which is used by the holder for international travel (e.g. passport, visa, official document of identity) and which contains mandatory visual (eye readable) data and a separate mandatory data summary, intended for global use, reflecting essential data elements capable of being machine read. [6]
Machine readable visa (MRV):	A visa or, where appropriate, an entry clearance (hereinafter collectively referred to as visas) conforming to the specifications contained herein, formulated to improve facilitation and enhance security for the visa holder. Contains mandatory visual (eye readable) data and a separate mandatory data summary capable of being machine read. The MRV is normally a label which is attached to a visa page in a passport. [6]
Machine readable zone (MRZ)	Fixed dimensional area located on the front of the MRTD or MRP Data Page or, in the case of the TD1, the back of the MRTD, containing mandatory and optional data for machine reading using OCR methods. [6]
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. [8]
MRTD application	Non-executable data defining the functionality of the operating system on the IC as the MRTD's chip. It includes - the file structure implementing the LDS [6], - the definition of the User Data, but does not include the User Data itself (i.e. content of DG1 to DG14 and DG 16) and - the TSF Data including the definition the authentication data but except the authentication data itself.
MRTD Basic Access Control	Mutual authentication protocol followed by secure messaging between the inspection system and the MRTD's chip based on MRZ information as key seed and access condition to data stored on MRTD's chip according to LDS.

Term	Definition
MRTD holder	The rightful holder of the MRTD for whom the issuing State or Organization personalized the MRTD.
MRTD's Chip	A contactless integrated circuit chip complying with ISO/IEC 14443 and programmed according to the Logical Data Structure as specified by ICAOT, [10], p. 14.
MRTD's chip Embedded Software	Software embedded in a MRTD's chip and not being developed by the IC Designer. The MRTD's chip Embedded Software is designed in Phase 1 and embedded into the MRTD's chip in Phase 2 of the TOE life-cycle.
Optional biometric reference data	Data stored for biometric authentication of the MRTD holder in the MRTD's chip as (i) encoded finger image(s) (DG3) or (ii) encoded iris image(s) (DG4) or (iii) both. Note that the European commission decided to use only finger print and not to use iris images as optional biometric reference data.
Passive authentication	(i) verification of the digital signature of the Document Security Object and (ii) comparing the hash values of the read LDS data fields with the hash values contained in the Document Security Object.
Personalization	The process by which the portrait, signature and biographical data are applied to the document. [8]
Personalization Agent	The agent acting on the behalf of the issuing State or organisation to personalize the MRTD for the holder by (i) establishing the identity the holder for the biographic data in the MRTD, (ii) enrolling the biometric reference data of the MRTD holder i.e. the portrait, the encoded finger image(s) or (ii) the encoded iris image(s) and (iii) writing these data on the physical and logical MRTD for the holder.
Personalization Agent Authentication Information	TSF data used for authentication proof and verification of the Personalization Agent.
Personalization Agent Authentication Key	Symmetric cryptographic key used (i) by the Personalization Agent to prove their identity and get access to the logical MRTD according to the SFR FIA_UAU.4/BT FIA_UAU.6/BT and FIA_API.1/SYM_PT and (ii) by the MRTD's chip to verify the authentication attempt of a terminal as Personalization Agent according to the SFR FIA_UAU.4/MRTD, FIA_UAU.5/MRTD and FIA_UAU.6/MRTD.
Physical travel document	Travel document in form of paper, plastic and chip using secure printing to present data including (but not limited to) (1) biographical data, (2) data of the machine-readable zone, (3) photographic image and (4) other data.
Pre-personalization Data	Any data that is injected into the non-volatile memory of the TOE by the MRTD Manufacturer (Phase 2) for traceability of non-personalized MRTD's and/or to secure shipment within or between life cycle phases 2 and 3. It contains (but is not limited to) the Active Authentication Key Pair and the Personalization Agent Key Pair.
Pre-personalized MRTD's chip	MRTD's chip equipped with an unique identifier and an unique asymmetric Active Authentication Key Pair of the chip.

Term	Definition
Primary Inspection System (PIS)	A inspection system that contains a terminal for the contactless communication with the MRTD's chip and does not implement the terminals part of the Basic Access Control Mechanism.
Receiving State	The Country to which the MRTD holder is applying for entry. [6]
reference data	Data enrolled for a known identity and used by the verifier to check the verification data provided by an entity to prove this identity in an authentication attempt.
secondary image	A repeat image of the holder's portrait reproduced elsewhere in the document by whatever means. [8]
secure messaging in encrypted mode	Secure messaging using encryption and message authentication code according to ISO/IEC 7816-4
Skimming	Imitation of the inspection system to read the logical MRTD or parts of it via the contactless communication channel of the TOE without knowledge of the printed MRZ data.
Travel document	A passport or other official document of identity issued by a State or organization, which may be used by the rightful holder for international travel. [9]
Traveller	Person presenting the MRTD to the inspection system and claiming the identity of the MRTD holder.
TSF data	Data created by and for the TOE, that might affect the operation of the TOE (CC part 1 [1]).
Unpersonalized MRTD	MRTD material prepared to produce an personalized MRTD containing an initialised and pre-personalized MRTD's chip.
User data	Data created by and for the user, that does not affect the operation of the TSF (CC part 1 [1]).
Verification	The process of comparing a submitted biometric sample against the biometric reference template of a single enrolee whose identity is being claimed, to determine whether it matches the enrolee's template. [9]
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.

Acronyms

Acronym	Term
SFR	Security functional requirement
TOE	Target of Evaluation
SAR	Security assurance requirements
TSF	TOE security functions
CC	Common Criteria
OSP	Organisational security policy
PIS	Primary Inspection System
BIS	Basic Inspection System
PT	Personalization Terminal
n.a.	Not applicable

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