



MultiApp v2

BAC

**Common Criteria / ISO 15408
Security Target – Public version
EAL4+**

CONTENT

1. ST INTRODUCTION	4
1.1 ST IDENTIFICATION	4
1.2 ST OVERVIEW	5
1.3 REFERENCES	6
1.3.1 External References.....	6
1.3.2 Internal References	8
1.4 ACRONYMS AND GLOSSARY	8
1.5 TOE OVERVIEW.....	13
1.5.1 TOE definition.....	13
1.5.2 TOE usage and security features for operational use	13
1.5.3 Non-TOE hardware/software/firmware required by the TOE.....	14
1.6 TOE BOUNDARIES.....	14
1.7 TOE INTENDED USAGE.....	16
1.8 TOE LIFE-CYCLE	17
1.8.1 Four phases.....	17
1.8.2 Actors	18
1.8.3 Init on module at Gemalto site	19
1.8.4 Init on module at Founder site	20
1.8.5 Init on inlay at Gemalto site.....	21
2. CONFORMANCE CLAIMS	22
2.1 CC CONFORMANCE CLAIM	22
2.2 PP CLAIM,.....	22
2.3 PACKAGE CLAIM.....	22
2.4 CONFORMANCE STATEMENT	22
3. SECURITY PROBLEM DEFINITION	24
3.1 INTRODUCTION	24
3.1.1 Assets.....	24
3.1.2 Subjects	24
3.2 ASSUMPTIONS	25
3.3 THREATS	26
3.4 ORGANIZATIONAL SECURITY POLICIES.....	29
4. SECURITY OBJECTIVES	30
4.1 SECURITY OBJECTIVES FOR THE TOE	30
4.2 SECURITY OBJECTIVES FOR THE OPERATIONAL ENVIRONMENT	31
5. EXTENDED COMPONENTS DEFINITION	34
5.1 DEFINITION OF THE FAMILY FAU_SAS	34
5.1.1 Definition of the Family FCS_RND	35
5.1.2 Definition of the Family FMT_LIM.....	35
5.1.3 Definition of the Family FPT_EMSEC.....	37
6. SECURITY REQUIREMENTS	39
6.1 SECURITY FUNCTIONAL REQUIREMENTS FOR THE TOE.....	39
6.1.1 Class FAU Security Audit.....	39
6.1.2 Class Cryptographic Support (FCS)	39
6.1.3 Class FIA Identification and Authentication	42
6.1.4 Class FDP User Data Protection.....	45
6.1.5 Class FMT Security Management	47
6.1.6 Class FPT Protection of the Security Functions	49
6.2 SECURITY ASSURANCE REQUIREMENTS FOR THE TOE	51
7. TOE SUMMARY SPECIFICATION	52
7.1 TOE SECURITY FUNCTIONS	52
7.1.1 TSFs provided by the MultiApp v2 Software	52
7.1.1.1 SF.REL: Reliability	52
7.1.1.2 SF.AC: Access Control.....	53
7.1.1.3 SF.SYM_AUT: Symmetric Authentication Mechanisms	54
7.1.1.4 SF.SM: Secure Messaging.....	55
7.1.2 TSFs provided by the Infineon chip.....	56

7.2 ASSURANCE MEASURES..... 57

FIGURES

Figure 1: TOE Boundaries 15
Figure 2: LC1: Init on module at Gemalto site 19
Figure 3: LC2 Init on module at Founder site 20
Figure 4: LC3: Init on inlay at Gemalto site 21
Figure 5: Manufacturer key 55

TABLES

Table 1: Card Production Life Cycle Data 5
Table 2: Identification of the actors 18
Table 3: Overview on authentication SFR..... 42
Table 4: FIA_AFL.1 refinement..... 45
Table 5: Security Functions provided by the MultiApp v2 Software. 52
Table 6: Correspondence between TOE ES life cycle states and life cycle phases. 54
Table 7: SF provided by the IFX chips..... 56
Table 8: Assurance Measures. 57

1. ST INTRODUCTION

1.1 ST IDENTIFICATION

Title:	MultiApp v2 eTravel BAC Security Target
Version:	v1.1 issued 16 May 2011
ST reference:	ST_D1201110
Origin:	Gemalto
Author:	Antoine DE LAVERNETTE
Product identification:	MultiApp v2
Security Controllers:	IFX SLE66CLX360PEM m1588 k11/a15 IFX SLE66CLX360PE m1587 k11/a15 IFX SLE66CLX800PEM m1580 k11/a15 IFX SLE66CLX800PE m1581 k11/a15 IFX SLE66CLX1440PEM m2090 a13 IFX SLE66CLX1440PE m2091 a13
TOE identification:	eTravel BAC on MultiApp v2
TOE documentation:	Operational User Guidance [OPE_MRTD] Preparative procedures [PRE_MRTD]

The TOE identification is provided by the Card Production Life Cycle Data (CPLCD) of the TOE, located in OTP and in EEPROM. These data are available by executing a dedicated command.

The TOE and the product differ, as further explained in §1.6 TOE boundaries:

- The TOE is the eTravel BAC application on MultiApp V2.
- The MultiApp ID product also includes 2 applets in ROM.

CPLC field	Length	Value
IC Fabricator	2	IFX
IC Type	2	SLE66CLX360PEM SLE66CLX360PE SLE66CLX800PEM SLE66CLX800PE SLE66CLX1440PEM SLE66CLX1440PE
Operating System Identifier	2	n.a.
Operating System release date	2	n.a.
Operating System release level	2	n.a.
IC Fabrication Date	2	n.a.
IC Serial Number	4	Unique identification of the chip written by the ICC Manufacturer

CPLC field	Length	Value
IC Batch Identifier	2	n.a.
IC Module Fabricator	2	n.a.
IC Module Packaging Date	2	n.a.
ICC Manufacturer	2	'Gemalto'
IC Embedding Date	2	n.a.
IC Pre-personalizer	2	'Gemalto'
IC Pre-personalization Date	2	n.a.
IC Pre-personalization Equipment Identifier	4	n.a.
IC Personalizer	2	n.a.
IC Personalization Date	2	n.a.
IC Personalization Equipment Identifier	4	n.a.

Table 1: Card Production Life Cycle Data

IT Security Evaluation scheme Serma Technologies
 IT Security Certification scheme Agence Nationale de la Sécurité des Systèmes d'Information (ANSSI)

1.2 ST OVERVIEW

The ST is based on Protection Profile *Machine Readable Travel Document with "ICAO Application", Basic Access Control* [PP-MRTD-BAC].

The Target of Evaluation (TOE) is the contactless integrated circuit chip of machine readable travel documents (MRTD's chip) based on the requirements of the International Civil Aviation Organization (ICAO). More specifically the TOE consists of operating system of MRTD's chip with ICAO application. The TOE is programmed according to Logical Data Structure as defined in [ICAO-9303].

This Security Target defines the security requirements for the TOE. The main security objective is to provide the secure enforcing functions and mechanisms to maintain the integrity and confidentiality of the MRTD application and data during its life cycle.

The main objectives of this ST are:

- To introduce TOE and the MRTD application,
- To define the scope of the TOE and its security features,
- To describe the security environment of the TOE, including the assets to be protected and the threats to be countered by the TOE and its environment during the product development, production and usage.
- To describe the security objectives of the TOE and its environment supporting in terms of integrity and confidentiality of application data and programs and of protection of the TOE.
- To specify the security requirements which includes the TOE security functional requirements, the TOE assurance requirements and TOE security functions.

1.3 REFERENCES

1.3.1 External References

[ASM-EAC]	<i>Technical Guideline – Advanced Security Mechanisms for Machine Readable Travel Documents – Extended Access Control (EAC),</i> Version 1.0, TR-03110
[BIO]	<i>BIOMETRICS DEPLOYMENT OF MACHINE READABLE TRAVEL DOCUMENTS,</i> Technical Report, Development and Specification of Globally Interoperable Biometric Standards for Machine Assisted Identity Confirmation using Machine Readable Travel Documents, Version 2.0, ICAO TAG MRTD/NTWG, 21 May 2004
[CC-1]	Common Criteria for Information Technology Security Evaluation Part 1: Introduction and general model, CCMB-2006-09-001, version 3.1 rev 3, July 2009
[CC-2]	Common Criteria for Information Technology Security Evaluation Part 2: Security functional components, CCMB-2007-09-002, version 3.1 rev 3, July 2009
[CC-3]	Common Criteria for Information Technology Security Evaluation Part 3: Security assurance components, CCMB-2007-09-003, version 3.1 rev 3, July 2009
[CEM]	Common Methodology for Information Technology Security Evaluation Methodology CCMB-2007-09-004, version 3.1 rev 3, July 2009
[CR-IC]	Either [CR-IC-800] or [CR-IC-1440]
[CR-IC-800]	Certification Report, BSI-DSZ-CC-0626-2009 (15-04-2009) SLE66CLX800PEM / m1580 - k11/a15 SLE66CLX800PE / m1581 –k11/a15 SLE66CX800PE / m1599 –k11/a15 SLE66CLX360PEM / m1588 – k11/a15 SLE66CLX360PE / m1587 – k11/a15
[CR-IC-1440]	Certification Report, BSI-DSZ-CC-0630-2010-MA-01 (09-06-2009) SLE66CLX1440PEM / m2090 - a12 SLE66CLX1440PE / m2091 - a12 SLE66CX1440PE / m2093 - a12
[FIPS180-2]	<i>Federal Information Processing Standards Publication 180-2 SECURE HASH STANDARD (+Change Notice to include SHA-224),</i> U.S. DEPARTMENT OF COMMERCE/National Institute of Standards and Technology, 2002 August 1
[FIPS46-3]	<i>Federal Information Processing Standards Publication FIPS PUB 46-3, DATA ENCRYPTION STANDARD (DES),</i> U.S. DEPARTMENT OF COMMERCE/National Institute of Standards and Technology, Reaffirmed 1999 October 25
[ISO15946-1]	<i>ISO/IEC 15946: Information technology – Security techniques – Cryptographic techniques based on elliptic curves – Part 1: General,</i> 2002

MULTIAPP V2 – ETRAVEL BAC SECURITY TARGET

[ISO15946-2]	<i>ISO/IEC 15946: Information technology – Security techniques – Cryptographic techniques based on elliptic curves – Part 2: Digital Signatures, 2002</i>
[ISO15946-3]	<i>ISO/IEC 15946: Information technology – Security techniques – Cryptographic techniques based on elliptic curves – Part 3: Key establishment, 2002</i>
[ISO7816]	<i>ISO 7816, Identification cards – Integrated circuit(s) cards with contacts, Part 4: Organization, security and commands for interchange, FDIS2004</i>
[ISO9796-2]	<i>ISO/IEC 9797: Information technology – Security techniques – Digital Signature Schemes giving message recovery – Part 2: Integer factorisation based mechanisms, 2002</i>
[ISO9797-1]	<i>ISO/IEC 9797: Information technology – Security techniques – Message Authentication Codes (MACs) – Part 1: Mechanisms using a block cipher, 1999</i>
[ICAO-9303]	9303 Part 3 Vol 2 – ICAO Machine Readable Travel Document Third edition 2008
[PKCS#3]	<i>PKCS #3: Diffie-Hellman Key-Agreement Standard, An RSA Laboratories Technical Note, Version 1.4, Revised November 1, 1993</i>
[PKI]	<i>MRTD Technical Report, PKI for Machine Readable Travel Documents Offering ICC Read-Only Access</i> International Civil Aviation Organization Version 1.1, October 01 2004
[PP-IC-0002]	<i>Smartcard IC Platform protection Profile</i> BSI-PP-0002, version 1.0, July 2001
[PP-IC-0035]	<i>Smartcard IC Platform protection Profile</i> BSI-PP-0035
[PP-SSCD-T2]	<i>Protection Profile – Secure Signature-Creation Device Type2</i> BSI-PP-0005, Version 1.04, 25 th July 2001
[PP-SSCD-T3]	<i>Protection Profile – Secure Signature-Creation Device Type3</i> BSI-PP-0006, Version 1.05, 25 th July 2001
[PP-MRTD-BAC]	<i>Common Criteria Protection Profile - Machine Readable Travel Document with ICAO Application, Basic Access Control</i> Bundesamt für Sicherheit in der Informationstechnik BSI-PP-0055, version 1.10, 25 th March 2009
[PP-MRTD-EAC]	<i>Common Criteria Protection Profile – Machine Readable Travel Document with “ICAO Application”, Extended Access Control</i> Bundesamt für Sicherheit in der Informationstechnik BSI-PP-0056, Version 1.10, 25 th March 2009
[PP-JCS-Open]	Java Card System Protection Profile – Open Configuration ANSSI-PP-2010-03, Version 2.6, April, 19 th 2010
[SS]	<i>ANNEX to Section III SECURITY STANDARDS FOR MACHINE READABLE TRAVEL DOCUMENTS, Excerpts from ICAO Doc 9303, Part 1</i> Machine Readable Passports, Fifth Edition – 2003
[ST-IC]	Either [ST-IC-800] or [ST-IC-1440]
[ST-IC-800]	ST of IFX SLE66CLX360PE(M), SLE66CLX800PE(M) and derivatives - Version 1.3 – 2009–03-18
[ST-IC-1440]	ST of IFX SLE66CLX1440PE(M) and derivatives - Version 1.2 – 2008–09-19

1.3.2 Internal References

[IGS]	Installation, Generation and Start Up Procedures
[PRE_MRTD]	D1144772 Preparative procedures - MultiApp V2 MRTD
[OPE_MRTD]	D1144771 Operational User Guidance - MultiApp V2 MRTD

1.4 ACRONYMS AND GLOSSARY

Acr.	Term	Definition
AA	Active Authentication	Security mechanism defined in [PKI] 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 [PP-MRTD-EAC]	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
BAC	Basic Access Control	Security mechanism defined in [PKI] 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).
BIS	Basic Inspection System	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 from 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. [SS]
	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. [SS]
CSCA	Country Signing Certification	Self-signed certificate of the Country Signing CA Public Key (KPU_CSCA) issued by CSCA stored in the inspection system.
CPLCD	Card Production Life Cycle Data	The TOE identification is provided by the Card Production Life Cycle Data (CPLCD) of the TOE, located in OTP and in EEPROM. These data are available by executing a dedicated command
CVCA	Country Verifying Certification	The Country Verifying Certification Authority enforces the privacy policy of the issuing Country or Organization with respect to the protection of sensitive biometric reference data stored in the MRTD. The CVCA
DH	Diffie-Hellman Key Agreement Algorithm	Algorithm for Chip Authentication protocol

MULTIAPP V2 – ETRAVEL BAC SECURITY TARGET

DV	Document Verifier	The Document Verifier enforces the privacy policy of the receiving Country with respect to the protection of sensitive biometric reference data to be handled by the Extended Inspection Systems. The DV manages the authorization of the Extended Inspection Systems for the sensitive data of the MRTD in the limits provided by the Issuing State or Organization in form
EC-DH	Elliptic Curve Diffie-Hellman Key Agreement Algorithm	Algorithm for Chip Authentication protocol
	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 [PKI]. 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.
SOD	Document Security Object	A RFC3369 CMS Signed Data Structure, signed by the Document Signer (DS). Carries the hash values of the LDS Data Groups. It is stored in the MRTD's chip. It may carry the Document Signer Certificate (CDS). [PKI]
	Eavesdropper	A threat agent with moderate 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. [BIO]
EAC	Extended Access Control	Security mechanism identified in [PKI] by which means the MTRD's chip (i) verifies the authentication of the inspection systems authorized to read the optional biometric reference data, (ii) controls the access to the optional biometric reference data and (iii) protects the confidentiality and integrity of the optional biometric reference data during their transmission to the inspection system by secure messaging. The Personalization Agent may use the same mechanism to authenticate
EIS	Extended Inspection System	The EIS in addition to the General Inspection System (GIS) (i) implements the Terminal Authentication Protocol and (ii) is authorized by the issuing State or Organization through the Document Verifier of the receiving State to read the sensitive biometric reference data.
	Forgery	Fraudulent alteration of any part of the genuine document, e.g. changes to the biographical data or the portrait. [SS]
GIS	General Inspection System	The GIS is a Basic Inspection System (BIS) which implements additional the Chip Authentication Mechanism.
	Global Interoperability	The capability of inspection systems (either manual or automated) in different States throughout the world to exchange data, to process data received from systems in other States, and to utilize that data in inspection operations in their respective States. Global interoperability is a major objective of the standardized specifications for placement of both eve-
	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. [SS]

MULTIAPP V2 – ETRAVEL BAC SECURITY TARGET

	Improperly	A person who travels, or attempts to travel with: (a) an expired travel
	Documented person	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. [BIO]
	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 traveler (the MRTD holder) and verifying its authenticity. [BIO]
IS	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.
IC	Integrated circuit	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). [ICAO-9303]
	Issuing State	The Country issuing the MRTD. [ICAO-9303]
LDS	Logical Data Structure	The collection of groupings of Data Elements stored in the optional capacity expansion technology [ICAO-9303]. The capacity expansion technology used is the MRTD's chip.
	Logical MRTD	Data of the MRTD holder stored according to the Logical Data Structure (LDS) as specified by ICAO on the contactless integrated circuit. It presents contactless readable data including (but not limited to) personal data of the MRTD holder (1) the digital Machine Readable Zone Data (digital MRZ data, EF.DG1), (2) the digitized portraits (EF.DG2), (3) the biometric reference data of finger(s) (EF.DG3) or iris image(s) (EF.DG4) or both and (4) the
	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
MRTD	Machine readable travel document	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. [ICAO-9303]
MRV	Machine readable visa	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
MRZ	Machine Readable Zone	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. [ICAO-9303]
	Machine-verifiable biometrics	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. [ISS]

MULTIAPP V2 – ETRAVEL BAC SECURITY TARGET

MRTD administrator	The Issuing State or Organization which is allowed to perform administrative commands (update data of the MRTD application, invalidation of the application) in the phase 4 Operational Use
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 [ICAO-9303], the definition of the User Data, but does not include the User Data itself (i.e. content of EF.DG1 to EF.DG14 and EF.DG16), - the TSF Data including the definition the authentication data but except the authentication data itself.
MRTD Basic Access Control	Mutual authentication protocol followed by secure messaging between the inspection system and the MRTD's chip based on MRZ information as key seed and access condition to data stored on MRTD's chip according to LDS.
MRTD holder	The rightful holder of the MRTD for whom the issuing State or Organization personalized the MRTD.
MRTD's Chip	A contactless integrated circuit chip complying with ISO/IEC 14443 and ICAOT, [10], p. 14. 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) (EF.DG3) or (ii) encoded iris image(s) (EF.DG4) or (iii) both. Note that the European commission decided to use only finger print and not to use iris images as optional biometric reference
Passive authentication	verification of the digital signature of the Document Security Object comparison 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. [SS]
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
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
Physical travel document	Travel document in form of paper, plastic and chip using secure printing to present data including (but not limited to): biographical data, data of the machine-readable zone, photographic image and other data.

MULTIAPP V2 – ETRAVEL BAC SECURITY TARGET

	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 Personalization Agent Key Pair.
	Pre personalized MRTD's chip	MRTD's chip equipped with pre-personalization data.
PIS	Primary Inspection System	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. [ICAO-9303]
	reference data	Data enrolled for a known identity and used by the verifier to check the verification data provided by an entity to prove this identity in an authentication attempt.
	secondary image	A repeat image of the holder's portrait reproduced elsewhere in the document by whatever means. [SS]
	secure messaging in encrypted	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. [BIO1]
	traveler	Person presenting the MRTD to the inspection system and claiming the identity of the MRTD holder.
	TSF data	Data created by and for the TOE, that might affect the operation of the TOE (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 enrollee whose identity is being claimed, to determine whether it matches the enrollee's template. [BIO]
	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.

1.5 TOE OVERVIEW

This Security Target 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 'ICAO Doc 9303' [ICAO-9303].

1.5.1 TOE definition

The Target of Evaluation (TOE) is the contactless integrated circuit chip of machine readable travel documents (MRTD's chip) programmed according to the Logical Data Structure (LDS) [ICAO-9303] and providing the Basic Access Control according to the 'ICAO Doc 9303' [ICAO-9303].

The TOE comprises of at least

- the circuitry of the MRTD's chip (the integrated circuit, IC),
- 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.

1.5.2 TOE usage and security features for operational use

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

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

For this security target the MRTD is viewed as unit of

- (a) the **physical MRTD** as travel document in form of paper, plastic and chip. It presents visual readable data including (but not limited to) personal data of the MRTD holder
 - (1) the biographical data on the biographical data page of the passport book,
 - (2) the printed data in the Machine Readable Zone (MRZ) and
 - (3) the printed portrait.
- (b) the **logical MRTD** as data of the MRTD holder stored according to the Logical Data Structure [ICAO-9303] as specified by ICAO on the contactless integrated circuit. It presents contactless readable data including (but not limited to) personal data of the MRTD holder
 - (1) the digital Machine Readable Zone Data (digital MRZ data, EF.DG1),
 - (2) the digitized portraits (EF.DG2),
 - (3) the biometric reference data of finger(s) (EF.DG3) or iris image(s) (EF.DG4) or both1
 - (4) the other data according to LDS (EF.DG5 to EF.DG16) and
 - (5) the Document security object.

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

The physical MRTD is protected by physical security measures (e.g. watermark on paper, security printing), logical (e.g. authentication keys of the MRTD's chip) and organizational security measures

(e.g. control of materials, personalization procedures) [ICAO-9303]. These security measures include the binding of the MRTD's chip to the passport book.

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

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

This security target 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 security target does not address the Active Authentication and the Extended Access Control as optional security mechanisms.

The Basic Access Control is a security feature which is mandatory supported by the TOE. The inspection system (i) reads optically the MRTD, (ii) authenticates itself as inspection system by means of Document Basic Access Keys. After successful authentication of the inspection system the MRTD's chip provides read access to the logical MRTD by means of private communication (secure messaging) with this inspection system [6], normative appendix 5.

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

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

1.6 TOE BOUNDARIES

Application note: The TOE is the module designed to be the core of an MRTD passport. The TOE is a contactless integrated circuit. The TOE is connected to an antenna and capacitors and is mounted on a plastic film. This inlay is then embedded in the coversheet or datapage of the MRTD passport and provides a contactless interface for the passport holder identification.

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 [ICAO-9303] and providing:

- the Basic Access Control (BAC) according to the ICAO document [PKI]

Application note: Additionally to the [PP-MRTD-BAC], the TOE has a set of administrative commands for the management of the product during the product life.

The TOE comprises of:

- the circuitry of the MRTD's chip (the integrated circuit, IC),
- 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.

Application note: Components within the TOE boundary are refined in the following manner:

MULTIAPP V2 – ETRAVEL BAC SECURITY TARGET

- the Integrated Circuit (IC),
- the IC Dedicated Test Software,
- the IC Dedicated Support Software (Boot Rom Software, Mifare Operating System),
- the eTravel BAC on MultiApp V2 Embedded Software (ES),
- the NVM Embedded Software,
- part of the MRTD Logical Data Structure,
- the guidance documentation of the eTravel BAC on MultiApp V2 product:
 - the preparation guide (assurance family AGD-PRE),
 - the operational guide (assurance family AGD-OPE).

The eTravel BAC on MultiApp V2 Embedded Software (ES) is implemented in the ROM of the chip. This ES provides mechanisms to load executable code into the non-volatile-memory of the chip (EEPROM). These mechanisms are included in the TOE and are part of the evaluation.

The TOE is delivered to the Personalization Agent with data and guidance documentation in order to perform the personalization of the product. In addition the Personalization Key is delivered from the MRTD Manufacturer to the Personalization Agent or from the Personalization Agent to the MRTD Manufacturer.

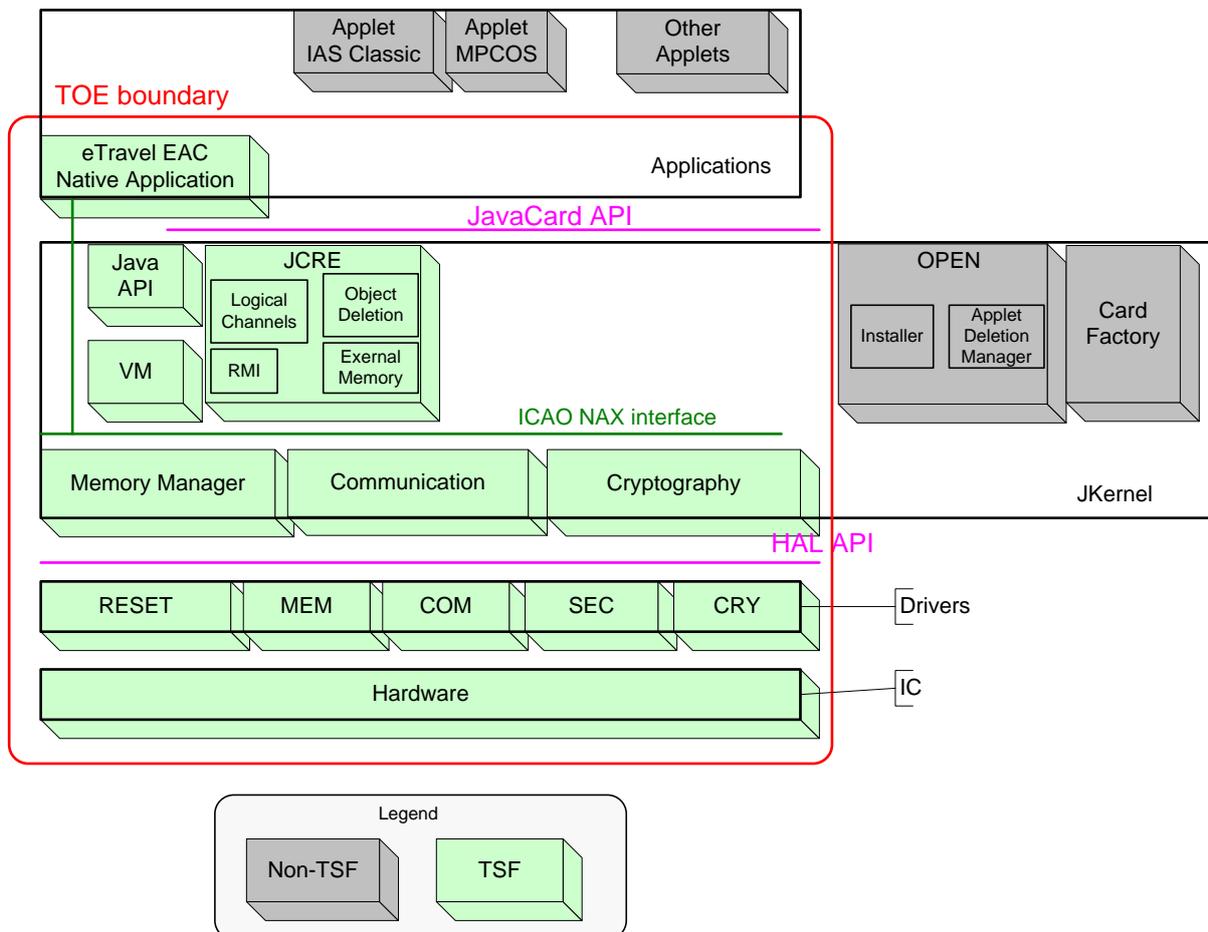


Figure 1: TOE Boundaries

1.7 TOE INTENDED USAGE

State or organization issues MRTD to be used by the holder for international travel. The traveler presents a MRTD to the inspection system to prove his or her identity.

The MRTD in context of this security target contains:

- visual (eye readable) biographical data and portrait of the holder,
- a separate data summary (MRZ data) for visual and machine reading using OCR methods in the Machine readable zone (MRZ),
- data elements on the MRTD's chip according to [ICAO-9303] for contactless machine reading.

The authentication of the traveler is based on the possession of a valid MRTD personalized for a holder with the claimed identity as given on the biographical data page and biometrics using the reference data stored in the MRTD. The issuing State or Organization ensures the authenticity of the data of genuine MRTD's. The receiving State trusts a genuine MRTD of an issuing State or Organization.

For this security target the MRTD is viewed as unit of:

- 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:
 - the biographical data on the biographical data page of the passport book,
 - the printed data in the Machine-Readable Zone (MRZ),
 - the printed portrait.
- the **logical MRTD** as data of the MRTD holder stored according to the Logical Data Structure [ICAO-9303] as specified by ICAO on the contactless integrated circuit. It presents contactless readable data including (but not limited to) personal data of the MRTD holder:
 - the digital Machine Readable Zone Data (digital MRZ data, EF.DG1),
 - the digitized portraits (EF.DG2),
 - the optional biometric reference data of finger(s) (EF.DG3) or iris image(s) (EF.DG4) or both'
 - the other data according to LDS (EF.DG5 to EF.DG16),
 - the Document Security Object (SOD).

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

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

1.8 TOE LIFE-CYCLE

1.8.1 Four phases

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

Phase 1 “Development”:

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

The Embedded 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.

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 nonvolatile programmable memories, the MRTD application and the guidance documentation is securely delivered to the MRTD manufacturer.

Phase 2 “Manufacturing”:

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 nonvolatile 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 manufacturer to the MRTD manufacturer.

The MRTD manufacturer has the following tasks:

- **Initialization:** adding the parts of the IC Embedded Software (NVM ES) to the EEPROM,
- **Pre-personalization:** creation of the MRTD application and equipping chip with Pre-personalization Data,

The following tasks are not part of the TOE manufacturing:

- **Inlay manufacturing:** packing the IC with hardware for the contactless interface.
- **Book manufacturing:** manufacturing the passport book.

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”:

The personalization of the MRTD includes:

- the survey of the MRTD holder biographical data,
- the enrolment of the MRTD holder biometric reference data (i.e. the digitized portraits and the optional biometric reference data),
- the printing of the visual readable data onto the physical MRTD,
- the writing the TOE User Data and TSF Data into the logical MRTD,
- the writing the TSF Data into the logical MRTD and configuration of the TSF if necessary.

The step “writing the TOE User Data” is performed by the Personalization Agent and includes but is not limited to the creation of:

- the digital MRZ data (EF.DG1),
- the digitized portrait (EF.DG2),
- the Document security object (SOD).

The signing of the Document security object by the Document signer [PKI] 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.

Phase 4 “Operational Use”

The TOE is used as MRTD’s chip by the traveler 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.

Application note: In this ST, the role of the Personalization Agents is strictly limited to the phase 3 Personalization. In the phase 4 Operational Use updating and addition of the data groups of the MRTD application is forbidden.

1.8.2 Actors

Actors	Identification
Integrated Circuit (IC) Developer	IFX
Embedded Software Developer	Gemalto
Integrated Circuit (IC) Manufacturer	IFX
Initializer	Gemalto or IFX
Pre-personalizer	Gemalto or IFX
Inlay manufacturer	Gemalto or another Inlay manufacturer
Book manufacturer	Gemalto or another printer
Personalization Agent	The agent who is acting on the behalf of the issuing State or Organization and personalize the MRTD for the holder by activities establishing the identity of the holder with biographic data.
MRTD Holder	The rightful holder of the MRTD for whom the issuing State or Organization personalizes the MRTD.

Table 2: Identification of the actors

1.8.3 Init on module at Gemalto site

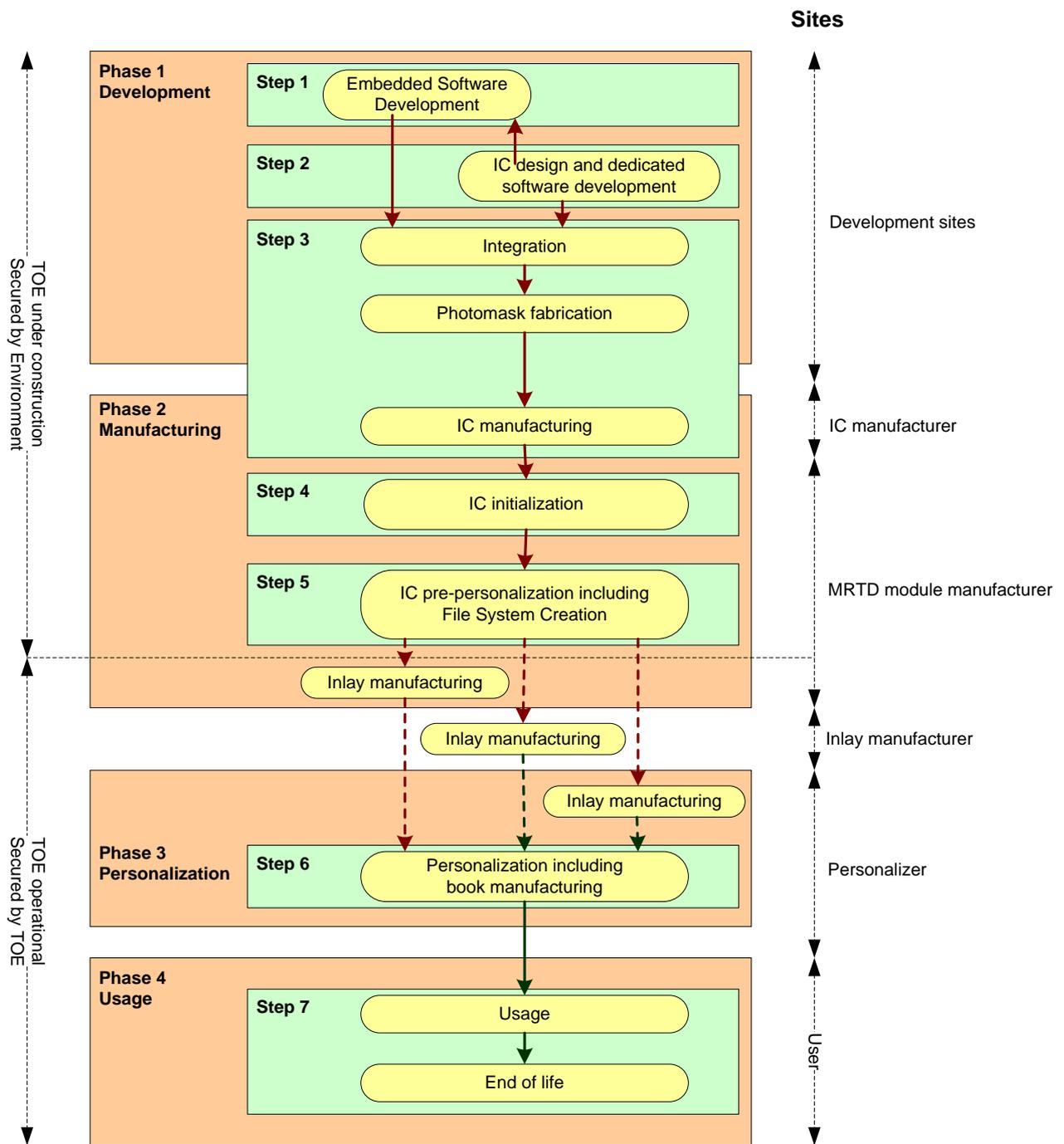


Figure 2: LC1: Init on module at Gemalto site

Figure 2: LC1: Init on module at Gemalto site describes the standard Life Cycle. The module is manufactured at the founder site. It is then shipped to Gemalto site where it is initialized and pre-personalized and then shipped to the Personalizer directly or after through the Inlay manufacturer.

During the shipment from Gemalto to the Personalizer, the module is protected by a diversified key.

1.8.4 Init on module at Founder site

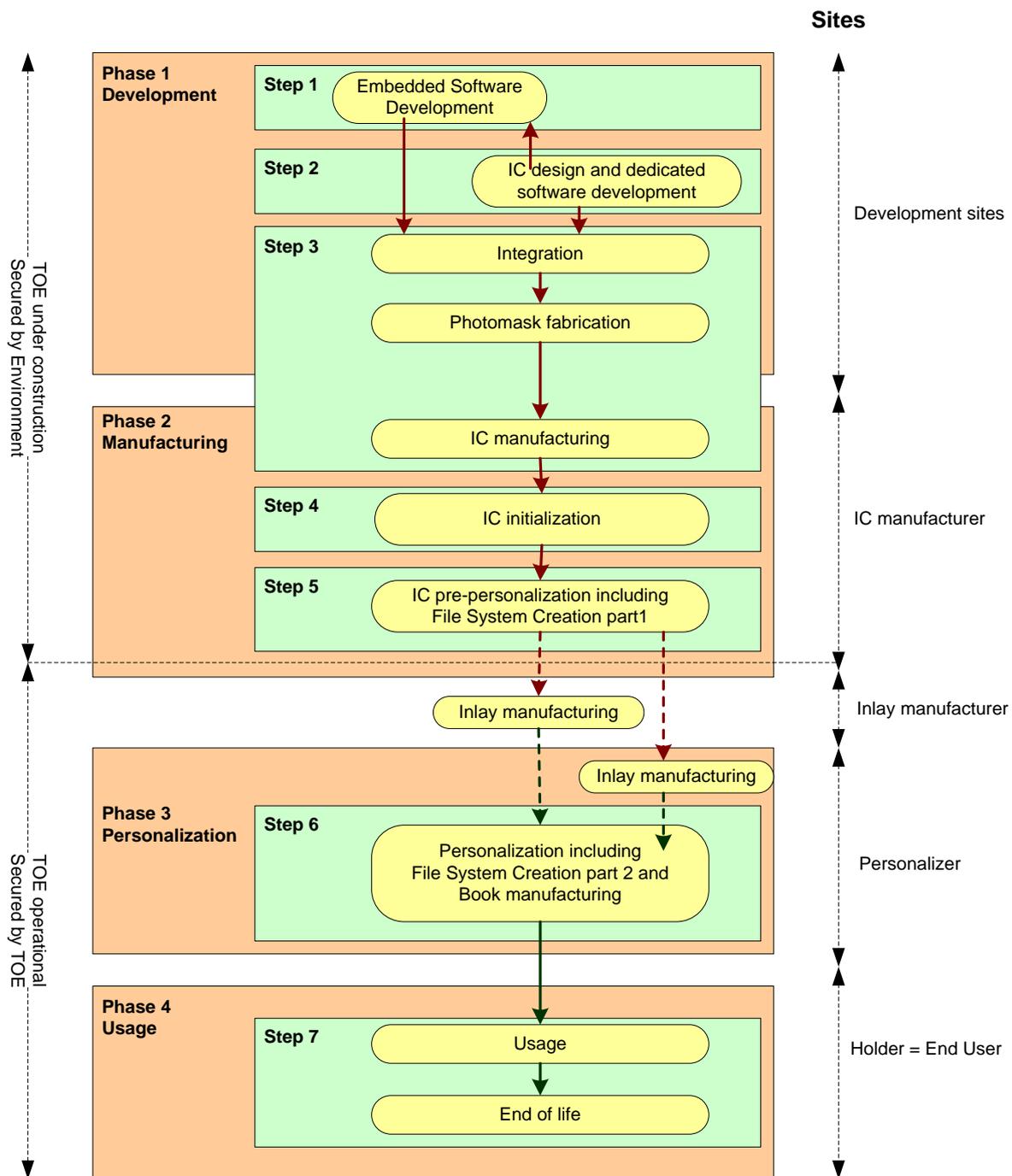


Figure 3: LC2 Init on module at Founder site

LC2 is an alternative to LC1. Figure 3: LC2 Init on module at Founder site describes the Life Cycle when the customer wishes to receive wafers directly from the founder. In this case, initialization and pre-personalization, which include sensitive operations such as the loading of patches, take place at the founder site. The creation of files is started by the founder and completed by the personalizer.

During the shipment from the founder to the Personalizer, the module is protected by a diversified key.

1.8.5 Init on inlay at Gemalto site

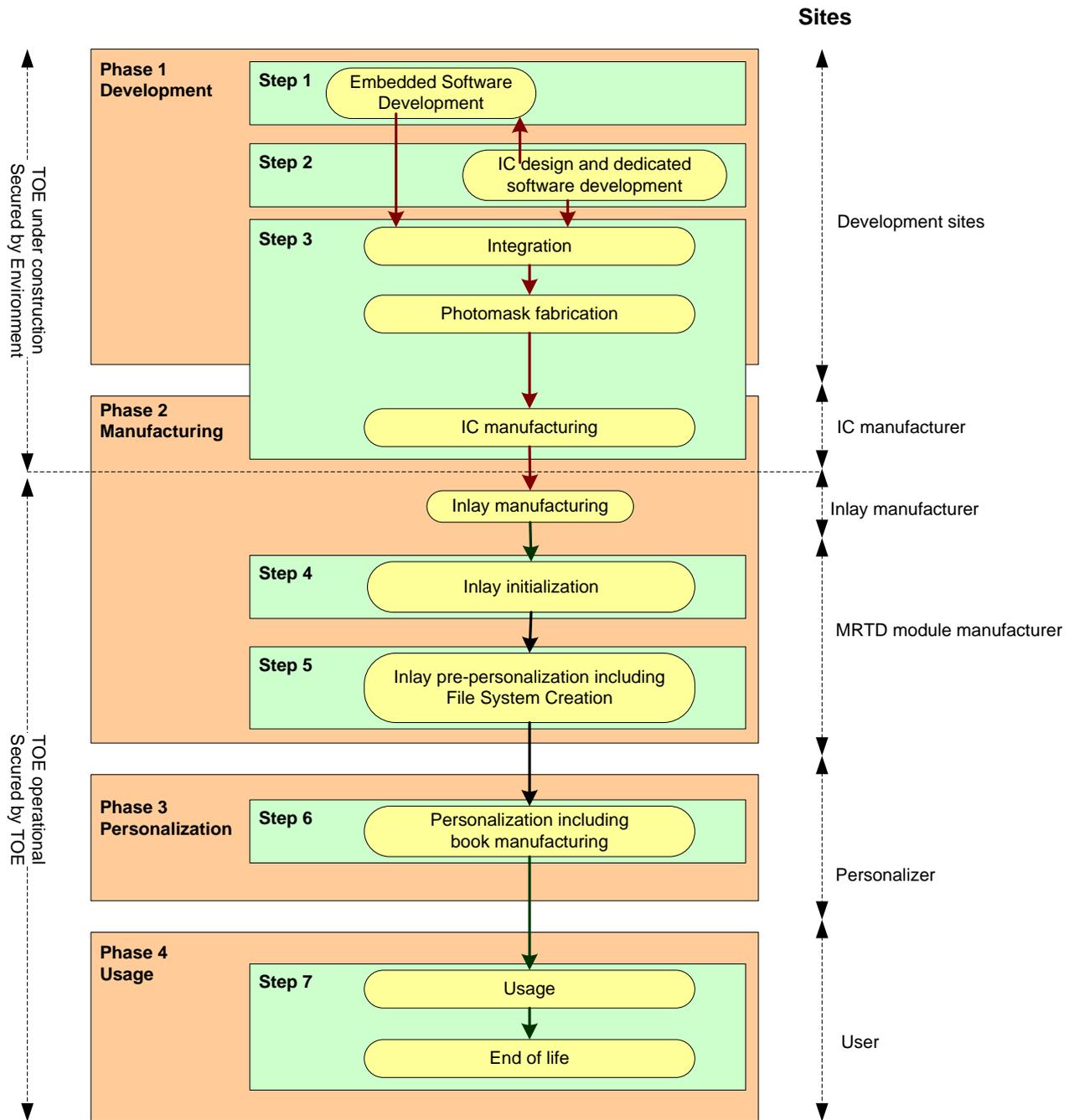


Figure 4: LC3: Init on inlay at Gemalto site

LC3 is another alternative to LC1. Figure 4: LC3: Init on inlay at Gemalto site describes the Life Cycle when the Gemalto wishes to receive inlays instead of modules from the founder. In this case, the founder ships the module to the Inlay manufacturer.

During the shipment from the founder to Gemalto, the module is protected by a diversified key.

2. CONFORMANCE CLAIMS

2.1 CC CONFORMANCE CLAIM

This security target claims conformance to

- Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and General Model; CCMB-2006-09-001, version 3.1 rev 3, July 2009 [CC-1]
- Common Criteria for Information Technology Security Evaluation, Part 2: Security Functional Components; CCMB-2007-09-002, version 3.1 rev 3, July 2009 [CC-2]
- Common Criteria for Information Technology Security Evaluation, Part 3: Security Assurance Requirements; CCMB-2007-09-003, version 3.1 rev 3, July 2009 [CC-3]

as follows

- Part 2 extended,
- Part 3 conformant.

The

- Common Methodology for Information Technology Security Evaluation, Evaluation Methodology; CCMB-2007-09-004, version 3.1 rev 3, July 2009, [CEM] has to be taken into account.

2.2 PP CLAIM,

The MultiApp v2 BAC security target claims strict conformance to the Protection Profile “Machine Readable Travel Document with ICAO Application, Basic Access Control” BSI-PP-0055 version 1.10 ([PP-MRTD-BAC]).

The TOE also claims conformance to other Protection Profiles. This is described in other Security Targets:

The MultiApp v2 EAC security target claims strict conformance to the Protection Profile “Machine Readable Travel Document with ICAO Application, Extended Access Control” BSI-PP-0056 version 1.10 ([PP-MRTD-EAC]).

The MultiApp v2 JCS security target claims demonstrable conformance to the Protection Profile “JavaCard System – Open configuration”, ANSSI-PP-2010-03, Version 2.6 ([PP-JCS-Open]).

The MultiApp v2 IAS Classic security target claims demonstrable conformance to the Protection Profiles “Secure Signature-creation Device Type 2”, PP-005 version 1.04 ([PP-SSCD-T2]) and “Secure Signature-creation Device Type 3”, PP-006 version 1.05 ([PP-SSCD-T3]).

2.3 PACKAGE CLAIM

This ST is conforming to assurance package EAL4 augmented with ALC_DVS.2 defined in CC part 3 [CC-3].

2.4 CONFORMANCE STATEMENT

This ST strictly conforms to [PP-MRTD-BAC].

3. SECURITY PROBLEM DEFINITION

3.1 INTRODUCTION

3.1.1 Assets

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

Logical MRTD Data

The logical MRTD data consists of the EF.COM, EF.DG1 to EF.DG16 (with different security needs) and the Document Security Object EF.SOD according to LDS [ICAO-9303]. These data are user data of the TOE. The EF.COM lists the existing elementary files (EF) with the user data. The EF.DG1 to EF.DG13 and EF.DG 16 contain personal data of the MRTD holder. The Chip Authentication Public Key (EF.DG 14) is used by the inspection system for the Chip Authentication. The EF.SOD is used by the inspection system for Passive Authentication of the logical MRTD.

Due to interoperability reasons as the 'ICAO Doc 9303' [9303] the TOE described in this protection profile specifies only the BAC mechanisms with resistance against enhanced basic attack potential granting access to:

- Logical MRTD standard User Data (i.e. Personal Data) of the MRTD holder (EF.DG1, EF.DG2, EF.DG5 to EF.DG13, EF.DG16),
- Chip Authentication Public Key in EF.DG14,
- Active Authentication Public Key in EF.DG15,
- Document Security Object (SOD) in EF.SOD,
- Common data in EF.COM.

The TOE prevents read access to sensitive User Data

- Sensitive biometric reference data (EF.DG3, EF.DG4)²

A sensitive asset is the following more general one.

Authenticity of the MRTD's chip

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

3.1.2 Subjects

This protection profile considers the following subjects:

Manufacturer

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

Personalization Agent

The agent is acting on behalf of the issuing State or Organization to personalize the MRTD for the holder by some or all of the following activities: (i) establishing the identity of the holder for the biographic data in the MRTD, (ii) enrolling the biometric reference data of the MRTD holder i.e. the portrait, the encoded finger image(s) and/or the encoded iris image(s), (iii) writing these data on the physical and logical MRTD for the holder as defined for global, international and national interoperability, (iv) writing the initial TSF data and (v) signing the Document Security Object defined in [ICAO-9303].

Terminal

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

Inspection system (IS)

A technical system used by the border control officer of the receiving State (i) examining an MRTD presented by the traveler and verifying its authenticity and (ii) verifying the traveler as MRTD holder. The **Basic Inspection System (BIS)** (i) contains a terminal for the contactless communication with the MRTD's chip, (ii) implements the terminals part of the Basic Access Control Mechanism and (iii) gets the authorization to read the logical MRTD under the Basic Access Control by optical reading the MRTD or other parts of the passport book providing this information. The **General Inspection System (GIS)** is a Basic Inspection System which implements additionally the Chip Authentication Mechanism. The **Extended Inspection System (EIS)** in addition to the General Inspection System (i) implements the Terminal Authentication Protocol and (ii) is authorized by the issuing State or Organization through the Document Verifier of the receiving State to read the sensitive biometric reference data. The security attributes of the EIS are defined of the Inspection System Certificates.

Application note: This Security Target does not consider the EIS because the Extended Access Control is outside the scope.

MRTD Holder

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

Traveler

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

Attacker

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

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

3.2 ASSUMPTIONS

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

A.MRTD_Manufact MRTD manufacturing on steps 4 to 6

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

A.MRTD_Delivery MRTD delivery during steps 4 to 6

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

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

A.Pers_Agent Personalization of the MRTD's chip

The Personalization Agent ensures the correctness of (i) the logical MRTD with respect to the MRTD holder, (ii) the Document Basic Access Keys, (iii) the Chip Authentication Public Key (EF.DG14) if stored on the MRTD's chip, and (iv) the Document Signer Public Key Certificate (if stored on the MRTD's chip). The Personalization Agent signs the Document Security Object. The Personalization Agent bears the Personalization Agent Authentication to authenticate himself to the TOE by symmetric cryptographic mechanisms.

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 traveler and verifying its authenticity and (ii) verifying the traveler as MRTD holder. The Basic Inspection System for global interoperability (i) includes the Country Signing Public Key and the Document Signer Public Key of each issuing State or Organization, and (ii) implements the terminal part of the Basic Access Control [ICAO-9303]. The Basic Inspection System reads the logical MRTD under Basic Access Control and performs the Passive Authentication to verify the logical MRTD.

A.BAC-Keys Cryptographic quality of Basic Access Control Keys

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

3.3 THREATS

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

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

T.Chip_ID Identification of MRTD's chip

Adverse action: An attacker trying to trace the movement of the MRTD by identifying remotely

the MRTD's chip by establishing or listening to communications through the contactless communication interface.

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

Asset: Anonymity of user,

T.Skimming Skimming the logical MRTD

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

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

Asset: confidentiality of logical MRTD data

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

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

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

Asset: confidentiality of logical MRTD data

T.Forgery Forgery of data on MRTD's chip

Adverse action: An attacker alters fraudulently the complete stored logical MRTD or any part of it including its security related data in order to deceive on an inspection system by means of the changed MRTD holder's identity or biometric reference data.

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

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

Asset: authenticity of logical MRTD data,

The TOE shall avert the threats as specified below.

T.Abuse-Func Abuse of Functionality

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

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

Threat agent: having enhanced basic attack potential, being in possession of a legitimate MRTD

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

T.Information_Leakage Information Leakage from MRTD's chip

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

Leakage may occur through emanations, variations in power consumption, I/O characteristics, clock frequency, or by changes in processing time requirements.

This leakage may be interpreted as a covert channel transmission but is more closely related to measurement of operating parameters which may be derived either from measurements of the contactless interface (emanation) or direct measurements (by contact to the chip still available even for a contactless chip) and can then be related to the specific operation being performed. Examples are the Differential Electromagnetic Analysis (DEMA) and the Differential Power Analysis (DPA). Moreover the attacker may try actively to enforce information leakage by fault injection (e.g. Differential Fault Analysis).

Threat agent: having enhanced basic attack potential, being in possession of a legitimate MRTD

Asset: confidentiality of logical MRTD and TSF data

T.Phys-Tamper Physical Tampering

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

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

Determination of software design including treatment of User Data and TSF Data may also be a pre-requisite. The modification may result in the deactivation of a security function. Changes of circuitry or data can be permanent or temporary.

Threat agent: having enhanced basic attack potential, being in possession of a legitimate MRTD

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

T.Malfunction Malfunction due to Environmental Stress

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

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

Threat agent: having enhanced basic attack potential, being in possession of a legitimate MRTD

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

3.4 ORGANIZATIONAL SECURITY POLICIES

The TOE shall comply with the following Organizational Security Policies (OSP) as security rules, procedures, practices, or guidelines imposed by an organization upon its operations (see CC part 1, sec. 3.2).

P.Manufact Manufacturing of the MRTD's chip

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

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

P.Personal_Data Personal data protection policy

The biographical data and their summary printed in the MRZ and stored on the MRTD's chip (EF.DG1), the printed portrait and the digitized portrait (EF.DG2), the biometric reference data of finger(s) (EF.DG3), the biometric reference data of iris image(s) (EF.DG4)3 and data according to LDS (EF.DG5 to EF.DG13, EF.DG16) stored on the MRTD's chip are personal data of the MRTD holder. These data groups are intended to be used only with agreement of the MRTD holder by inspection systems to which the MRTD is presented. The MRTD's chip shall provide the possibility for the Basic Access Control to allow read access to these data only for terminals successfully authenticated based on knowledge of the Document Basic Access Keys as defined in [ICAO-9303].

4. SECURITY OBJECTIVES

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

4.1 SECURITY OBJECTIVES FOR THE TOE

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

OT.AC_Pers Access Control for Personalization of logical MRTD

The TOE must ensure that the logical MRTD data in EF.DG1 to EF.DG16, the Document security object according to LDS [ICAO-9303] and the TSF data can be written by authorized Personalization Agents only. The logical MRTD data in EF.DG1 to EF.DG16 and the TSF data may be written only during and cannot be changed after its personalization. The Document security object can be updated by authorized Personalization Agents if data in the data groups EF.DG 3 to EF.DG16 are added.

Application note: The OT.AC_Pers implies that

- (1) the data of the LDS groups written during personalization for MRTD holder (at least EF.DG1 and EF.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 accordingly. The support for adding data in the “Operational Use” phase is optional.

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. The TOE must ensure that the inspection system is able to detect any modification of the transmitted logical MRTD data.

OT.Data_Conf Confidentiality of personal data

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

OT.Identification Identification and Authentication of the TOE

The TOE must provide means to store IC Identification and Pre-Personalization Data in its nonvolatile memory. The IC Identification Data must provide a unique identification of the IC during Phase 2 “Manufacturing” and Phase 3 “Personalization of the MRTD”. The storage of the Pre-Personalization data includes writing of the Personalization Agent Key(s). In Phase 4 “Operational Use” the TOE shall identify itself only to a successful authenticated Basic Inspection System or Personalization Agent.

The following TOE security objectives address the protection provided by the MRTD’s chip independent of the TOE environment.

OT.Prot_Abuse-Func Protection against Abuse of Functionality

After delivery of the TOE to the MRTD Holder, the TOE must prevent the abuse of test and support functions that may be maliciously used to (i) disclose critical User Data, (ii) manipulate critical User Data of the IC Embedded Software, (iii) manipulate Soft-coded IC Embedded Software or (iv) bypass, deactivate, change or explore security features or functions of the TOE.

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

OT.Prot_Inf_Leak 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.

OT.Prot_Phys-Tamper Protection against Physical Tampering

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

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

OT.Prot_Malfunction 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.

4.2 SECURITY OBJECTIVES FOR THE OPERATIONAL ENVIRONMENT

Issuing State or Organization

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

OE.MRTD_Manufact Protection of the MRTD Manufacturing

Appropriate functionality testing of the TOE shall be used in step 4 to 6.

During all manufacturing and test operations, security procedures shall be used through phases 4, 5 and 6 to maintain confidentiality and integrity of the TOE and its manufacturing and test data.

OE.MRTD_Delivery Protection of the MRTD delivery

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

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

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

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

OE.Personalization Personalization of logical MRTD

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

OE.Pass_Auth_Sign Authentication of logical MRTD by Signature

The issuing State or Organization must (i) generate a cryptographic secure Country Signing CA Key Pair, (ii) ensure the secrecy of the Country Signing CA Private Key and sign Document Signer Certificates in a secure operational environment, and (iii) distribute the Certificate of the Country Signing CA Public Key to receiving States and Organizations maintaining its authenticity and integrity. The issuing State or Organization must (i) generate a cryptographic secure Document Signer Key Pair and ensure the secrecy of the Document Signer Private Keys, (ii) sign Document Security Objects of genuine MRTD in a secure operational environment only and (iii) distribute the Certificate of the Document Signer Public Key to receiving States and Organizations. The digital signature in the Document Security Object relates all data in the data in EF.DG1 to EF.DG16 if stored in the LDS according to [ICAO-9303].

OE.BAC-Keys Cryptographic quality of Basic Access Control Keys

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

Receiving State or Organization

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

OE.Exam_MRTD Examination of the MRTD passport book

The inspection system of the receiving State or Organization must examine the MRTD presented by the traveler to verify its authenticity by means of the physical security measures and to detect any manipulation of the physical MRTD. The Basic Inspection System for global interoperability (i) includes the Country Signing Public Key and the Document Signer Public Key of each issuing State or Organization, and (ii) implements the terminal part of the Basic Access Control [ICAO-9303].

OE.Passive_Auth_Verif Verification by Passive Authentication

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

OE.Prot_Logical_MRTD Protection of data from the logical MRTD

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

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.

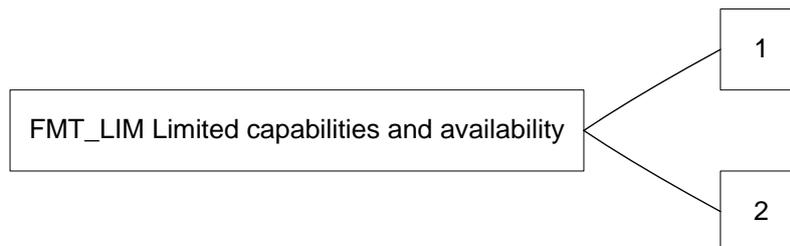
The family “Limited capabilities and availability (FMT_LIM)” is specified as follows.

FMT_LIM Limited capabilities and availability

Family behavior

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.

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.

The TOE Functional Requirement “Limited capabilities (FMT_LIM.1)” is specified as follows.

FMT_LIM.1 Limited capabilities

Hierarchical to: No other components.

Dependencies: FMT_LIM.2 Limited availability.

FMT_LIM.1.1	The TSF shall be designed in a manner that limits their capabilities so that in conjunction with “Limited availability (FMT_LIM.2)” the following policy is enforced [assignment: Limited capability and availability policy].
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The TOE Functional Requirement “Limited availability (FMT_LIM.2)” is specified as follows.

FMT_LIM.2 Limited availability

Hierarchical to: No other components.

Dependencies: FMT_LIM.1 Limited capabilities.

FMT_LIM.2.1	The TSF shall be designed in a manner that limits their availability so that in conjunction with “Limited capabilities (FMT_LIM.1)” the following policy is enforced [assignment: Limited capability and availability policy].
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Application note: 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 test and support functionality that is removed from, or disabled in, the product prior to the Operational Use Phase.

The combination of both requirements shall enforce the policy.

5.1.3 Definition of the Family FPT_EMSEC

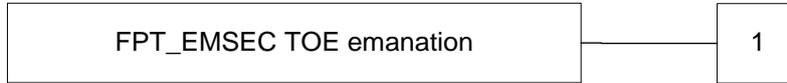
The sensitive family FPT_EMSEC (TOE Emanation) of the Class FPT (Protection of the TSF) is defined here to describe the IT security functional requirements of the TOE. The TOE shall prevent attacks against the TOE and other secret data where the attack is based on external observable physical phenomena 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 [CC-2].

The family “TOE Emanation (FPT_EMSEC)” is specified as follows.

Family behavior

This family defines requirements to mitigate intelligible emanations.

Component leveling:



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 to 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.

Dependencies: 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].

6. SECURITY REQUIREMENTS

The definition of the subjects “Manufacturer”, “Personalization Agent”, “Basic Inspection System”, and “Terminal” used in the following chapter is given in section 3.1. Note that all these subjects are acting for homonymous external entities. All used objects are defined either in section 7 or in the following table. The operations “write”, “modify”, “read” and “disable read access” are used in accordance with the general linguistic usage. The operations “store”, “create”, “transmit”, “receive”, “establish communication channel”, “authenticate” and “re-authenticate” are originally taken from [CC-2]. The operation “load” is synonymous to “import” used in [CC-2].

Definition of security attributes:

security attribute	values	meaning
terminal authentication status	none (any Terminal)	default role (i.e. without authorization after start-up)
	Basic Inspection System	Terminal is authenticated as Basic Inspection System after successful Authentication in accordance with the definition in rule 2 of FIA_UAU.5.2.
	Personalization Agent	Terminal is authenticated as Personalization Agent after successful Authentication in accordance with the definition in rule 1 of FIA_UAU.5.2.

6.1 SECURITY FUNCTIONAL REQUIREMENTS FOR THE TOE

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

6.1.1 Class FAU Security Audit

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

FAU_SAS.1 Audit storage

Hierarchical to: No other components.

Dependencies: No dependencies.

FAU_SAS.1.1	The TSF shall provide the Manufacturer with the capability to store the IC Identification Data in the audit records.
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6.1.2 Class Cryptographic Support (FCS)

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.

FCS_CKM.1 Cryptographic key generation

Hierarchical to: No other components.

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

FCS_CKM.1.1	The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm Document Basic Access Key Derivation Algorithm and specified cryptographic key sizes 112 bit that meet the following: [ICAO-9303] normative appendix 5.
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The TOE shall meet the requirement “Cryptographic key destruction (FCS_CKM.4)” as specified below (Common Criteria Part 2).

FCS_CKM.4 Cryptographic key destruction

Hierarchical to: No other components.

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

FCS_CKM.4.1	The TSF shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method Secure erasing of the value that meets the following: none .
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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.

FCS_COP.1/SHA Cryptographic operation – Hash for Key Derivation by MRTD

Hierarchical to: No other components.

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

FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/SHA	The TSF shall perform hashing in accordance with a specified cryptographic algorithm SHA-1 and cryptographic key sizes none that meet the following: FIPS 180-2 .
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FCS_COP.1/ENC Cryptographic operation –Encryption / Decryption triple DES

Hierarchical to: No other components.

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

FCS_COP.1.1/ENC	The TSF shall perform secure messaging (BAC) – encryption and decryption in accordance with a specified cryptographic algorithm Triple-DES in CBC mode and cryptographic key sizes 112 bits that meet the following: FIPS 46-3 [FIPS46-3] and [ICAO-9303] normative appendix 5, A5.3.
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FCS_COP.1/AUTH Cryptographic operation – Authentication

Hierarchical to: No other components.

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

FCS_COP.1.1/AUTH	The TSF shall perform symmetric authentication – encryption and decryption in accordance with a specified cryptographic algorithm Triple-DES and cryptographic key sizes 112 bits that meet the following: FIPS 48-3 [FIPS46-3].
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FCS_COP.1/MAC Cryptographic operation – Retail MAC

Hierarchical to: No other components.

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

FCS_COP.1.1/MAC	The TSF shall perform secure messaging – message authentication code in accordance with a specified cryptographic algorithm TDES Retail MAC and cryptographic key sizes 112 bits that meet the following: ISO 9797 (MAC algorithm 3, block cipher DES, Sequence Message Counter, padding mode 2) .
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The TOE shall meet the requirement “Quality metric for random numbers (FCS_RND.1)” as specified below (Common Criteria Part 2 extended).

FCS_RND.1 Quality metric for random numbers

Hierarchical to: No other components.

Dependencies: No dependencies.

FCS_RND.1.1	The TSF shall provide a mechanism to generate random numbers that meet K3-DRNG ([AIS20]) with seed entropy at least 112 bits and with strength of mechanism set to high .
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6.1.3 Class FIA Identification and Authentication

Application note: Table 3 provides an overview on the authentication mechanisms used.

Name	SFR for the TOE	Algorithms and key sizes according to [ICAO-9303] normative appendix 5
Basic Access Control Authentication Mechanism	FIA_UAU.4 and FIA_UAU.6	Triple-DES, 112 bit keys (cf. FCS_COP.1/ENC) and Retail-MAC, 112 bit keys (cf. FCS_COP.1/MAC)
Symmetric Authentication Mechanism for Personalization agents	FIA_UAU.5	either Triple-DES with 112 bit keys (cf. FCS_COP.1/AUTH)

Table 3: Overview on authentication SFR

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

FIA_UID.1 Timing of identification

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UID.1.1	The TSF shall allow 1. to read the Initialization Data in Phase 2 "Manufacturing",
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	2. to read the random identifier in Phase 3 "Personalization of the MRTD", 3. to read the random identifier in Phase 4 "Operational Use" on behalf of the user to be performed before the user is identified.
FIA_UID.1.2	The TSF shall require each user to be successfully identified before allowing any other TSF-mediated actions on behalf of that user.

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

FIA_UAU.1 Timing of authentication

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification.

FIA_UAU.1.1	The TSF shall allow 1. to read the Initialization Data in Phase 2 "Manufacturing", 2. to read the random identifier in Phase 3 "Personalization of the MRTD", 3. to read the random identifier in Phase 4 "Operational Use" on behalf of the user to be performed before the user is authenticated.
FIA_UAU.1.2	The TSF shall require each user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user.

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

FIA_UAU.4 Single-use authentication mechanisms - Single-use authentication of the Terminal by the TOE

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.4.1	The TSF shall prevent reuse of authentication data related to 1. Basic Access Control Authentication Mechanism, 2. Symmetric Authentication Mechanism based on Triple-DES .
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The TOE shall meet the requirement "Multiple authentication mechanisms (FIA_UAU.5)" as specified below (Common Criteria Part 2).

FIA_UAU.5 Multiple authentication mechanisms

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.5.1	The TSF shall provide <ol style="list-style-type: none"> 1. Basic Access Control Authentication Mechanism, 2. Symmetric Authentication Mechanism based on Triple-DES to support user authentication.
FIA_UAU.5.2	The TSF shall authenticate any user's claimed identity according to the following rules: <ol style="list-style-type: none"> 1. The TOE accepts the authentication attempt as Personalization Agent by the Symmetric Authentication Mechanism with 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.

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

FIA_UAU.6 Re-authenticating – Re-authenticating of Terminal by the TOE

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.6.1	The TSF shall re-authenticate the user under the conditions each command sent to the TOE during a BAC mechanism based communication after successful authentication of the terminal with Basic Access Control Authentication Mechanism.
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The TOE shall meet the requirement "Authentication failure handling (FIA_AFL.1)" as specified below (Common Criteria Part 2).

FIA_AFL.1 Authentication failure handling

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication.

FIA_AFL.1.1	The TSF shall detect when Table 4: column 1 unsuccessful authentication attempts occur related to Table 4: column 2 .
FIA_AFL.1.2	When the defined number of unsuccessful authentication attempts has been Table 4: column 1 , the TSF shall Table 4: column 3 .

Refinement:

Number of unsuccessful authentication attempts	Specified Authentication events	Actions
3	Unsuccessful Mutual Authentication Command with Initial Supplier Key	Initial Supplier Key blocked

Number of unsuccessful authentication attempts	Specified Authentication events	Actions
	K_{ISK}	
1	Unsuccessful Basic Access Control authentication attempt	Exponentially increasing time delay before new authentication attempt is possible

Table 4: FIA_AFL.1 refinement

6.1.4 Class FDP User Data Protection

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

FDP_ACC.1 Subset access control – Basic Access Control

Hierarchical to: No other components.

Dependencies: FDP_ACF.1 Security attribute based access control

FDP_ACC.1.1	The TSF shall enforce the Basic Access Control SFP on terminals gaining write, read and modification access to data in the EF.COM, EF.SOD, EF.DG1 to EF.DG16 of the logical MRTD.
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The TOE shall meet the requirement “Security attribute based access control (FDP_ACF.1)” as specified below (Common Criteria Part 2).

FDP_ACF.1 Security attribute based access control
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Hierarchical to: No other components.

Dependencies: FDP_ACC.1 Subset access control

FMT_MSA.3 Static attribute initialization

FDP_ACF.1.1	<p>The TSF shall enforce the Basic Access Control SFP to objects based on the following:</p> <ol style="list-style-type: none"> 1. Subjects: <ol style="list-style-type: none"> a. Personalization Agent, b. Basic Inspection System c. Terminal, 2. Objects: <ol style="list-style-type: none"> a. data EF.DG1 to EF.DG16 of the logical MRTD, b. data in EF.COM, c. data in EF.SOD, 3. Security attributes: <ol style="list-style-type: none"> a. authentication status of terminals.
FDP_ACF.1.2	<p>The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed:</p> <ol style="list-style-type: none"> 1. the successfully authenticated Personalization Agent is allowed to write and to read the data of the EF.COM, EF.SOD, EF.DG1 to EF.DG16 of the logical MRTD, 2. the successfully authenticated Basic Inspection System is allowed to read the data of the EF.COM, EF.SOD, EF.DG1, EF.DG2, and

	EF.DG5 to EF.DG16 of the logical MRTD.
FDP_ACF.1.3	The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: none.
FDP_ACF.1.4	The TSF shall explicitly deny access of subjects to objects based on the rule: <ol style="list-style-type: none"> 1. Any terminal is not allowed to modify any of the EF.DG1 to EF.DG16 of the logical MRTD, 2. Any terminal is not allowed to read any of the EF.DG1 to EF.DG16 of the logical MRTD, 3. The Basic Inspection System is not allowed to read the data in EF.DG3 and EF.DG4.

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

FDP_UCT.1 Basic data exchange confidentiality

Hierarchical to: No other components.

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

FDP_UCT.1.1	The TSF shall enforce the Basic Access Control SFP to be able to transmit and receive user data in a manner protected from unauthorized disclosure
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The TOE shall meet the requirement “Data exchange integrity (FDP_UIT.1)” as specified below (Common Criteria Part 2).

FDP_UIT.1 Data exchange integrity

Hierarchical to: No other components.

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]

FDP_UIT.1.1	The TSF shall enforce the Basic Access Control SFP to be able to transmit and receive user data in a manner protected from modification, deletion, insertion and replay errors .
FDP_UIT.1.2	The TSF shall be able to determine on receipt of user data, whether modification, deletion, insertion and replay has occurred.

6.1.5 Class FMT Security Management

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

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

FMT_SMF.1 Specification of Management Functions
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Hierarchical to: No other components.

Dependencies: No dependencies.

FMT_SMF.1.1	The TSF shall be capable of performing the following management functions: <ol style="list-style-type: none"> 1. Initialization , 2. Pre-personalization , 3. Personalization
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The TOE shall meet the requirement “Security roles (FMT_SMR.1)” as specified below (Common Criteria Part 2).

FMT_SMR.1 Security roles

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification.

FMT_SMR.1.1	The TSF shall maintain the roles <ol style="list-style-type: none"> 1. Manufacturer , 2. Personalization Agent , 3. Basic Inspection System.
FMT_SMR.1.2	The TSF shall be able to associate users with roles.

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

FMT_LIM.1 Limited capabilities

Hierarchical to: No other components.

Dependencies: FMT_LIM.2 Limited availability.

FMT_LIM.1.1	The TSF shall be designed in a manner that limits their capabilities so that in conjunction with “Limited availability (FMT_LIM.2)” the following policy is enforced: Deploying Test Features after TOE Delivery does not allow, <ol style="list-style-type: none"> 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
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	enable other attacks.
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The TOE shall meet the requirement “Limited availability (FMT_LIM.2)” as specified below (Common Criteria Part 2 extended).

FMT_LIM.2 Limited availability

Hierarchical to: No other components.

Dependencies: FMT_LIM.1 Limited capabilities.

FMT_LIM.2.1	<p>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:</p> <p>Deploying Test Features after TOE Delivery does not allow,</p> <ol style="list-style-type: none"> 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.
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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.

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

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions.

FMT_SMR.1 Security roles

FMT_MTD.1.1/INI_ENA	The TSF shall restrict the ability to write the Initialization Data and pre-personalization Data to the Manufacturer .
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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.

Dependencies: FMT_SMF.1 Specification of management functions.

FMT_SMR.1 Security roles

FMT_MTD.1.1/	The TSF shall restrict the ability to disable read access for users to the
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INI_DIS	Initialization Data to the Personalization Agent.
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FMT_MTD.1/KEY_WRITE Management of TSF data – Key Write

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions.

FMT_SMR.1 Security roles

FMT_MTD.1.1 /KEY_WRITE	The TSF shall restrict the ability to write the Document Basic Access Keys to the Personalization Agent .
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FMT_MTD.1/KEY_READ Management of TSF data – Key Read

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions.

FMT_SMR.1 Security roles

FMT_MTD.1.1 /KEY_READ	The TSF shall restrict the ability to read the Document Basic Access Keys and Personalization Agent Keys to none .
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6.1.6 Class FPT Protection of the Security Functions

The TOE shall prevent inherent and forced illicit information leakage for User Data and TSF Data. The security functional requirement FPT_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 SFRs “Limited capabilities (FMT_LIM.1)”, “Limited availability (FMT_LIM.2)” and “Resistance to physical attack (FPT_PHP.3)” together with the SAR “Security architecture description” (ADV_ARC.1) prevent bypassing, deactivation and manipulation of the security features or misuse of TOE functions.

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

FPT_EMSEC.1 TOE Emanation

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_EMSEC.1.1	The TOE shall not emit electromagnetic and current emissions in excess of
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MULTIAPP V2 – ETRAVEL BAC SECURITY TARGET

	intelligible threshold enabling access to Personalization Agent Key(s), Document Basic Access Keys, EF.COM, EF.SOD, EF.DG1, EF.DG2, and EF.DG6 to EF.DG16.
FPT_EMSEC.1.2	The TSF shall ensure any users are unable to use the following interface: smart card circuit contacts to gain access to Personalization Agent Key(s), Document Basic Access Keys, EF.COM, EF.SOD, EF.DG1, EF.DG2, and EF.DG6 to EF.DG16.

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

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

FPT_FLS.1 Failure with preservation of secure state
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Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_FLS.1.1	The TSF shall preserve a secure state when the following types of failures occur: <ol style="list-style-type: none"> 1. Exposure to out-of-range operating conditions where therefore a malfunction could occur, 2. failure detected by TSF according to FPT_TST.1.
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The TOE shall meet the requirement “TSF testing (FPT_TST.1)” as specified below (Common Criteria Part 2).

FPT_TST.1 TSF testing

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_TST.1.1	The TSF shall run a suite of self tests [<i>selection: during initial start-up, periodically during normal operation, at the request of the authorized user, at the conditions [assignment: conditions under which self test should occur]</i>] to demonstrate the correct operation of the TSF.
FPT_TST.1.2	The TSF shall provide authorized users with the capability to verify the integrity of TSF data.
FPT_TST.1.3	The TSF shall provide authorized users with the capability to verify the integrity of stored TSF executable code.

Conditions under which self test should occur	Description of the self test
During initial start-up	RNG live test, sensor test, FA detection, Integrity Check of NVM ES
Periodically	RNG monitoring, sensor test, FA detection

After cryptographic computation	FA detection
Before any use or update of TSF data	FA detection, Integrity Check of related TSF data

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

FPT_PHP.3 Resistance to physical attack

Hierarchical to: No other components.

Dependencies: No dependencies.

FPT_PHP.3.1	The TSF shall resist physical manipulation and physical probing to the TSF by responding automatically such that the SFR are always enforced.
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6.2 SECURITY ASSURANCE REQUIREMENTS FOR THE TOE

The SAR 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 component: ALC_DVS.2.

7. TOE SUMMARY SPECIFICATION

7.1 TOE SECURITY FUNCTIONS

TOE Security Functions are provided by the MultiApp v2 embedded software (including the optional NVM ES) and by the chip.

7.1.1 TSFs provided by the MultiApp v2 Software

SF	Description	SSF
SF.REL	Reliability	SF.REL.RNG_TEST
		SF.REL.SENSOR_TEST
		SF.REL.INTEGRITY
		SF.REL.CORR_EXEC
		SF.REL.PROT_SENS_DATA
		SF.REL.FAULT_REACTION
SF.AC	Access Control	SF.AC.LIFE_CYCLE
		SF.AC.STATE
		SF.AC.FILE_AC
SF.SYM_AUT	Symmetric Authentication Mechanisms	SF.SYM_AUT.RNG
		SF.SYM_AUT.MANUF
		SF.SYM_AUT.MANUF_PROT
		SF.SYM_AUT.MANUF_KEY_CHANGE
		SF.SYM_AUT.BAC
		SF.SYM_AUT.BAC_RESTRE
SF.SM	Secure Messaging	

Table 5: Security Functions provided by the MultiApp v2 Software.

7.1.1.1 SF.REL: Reliability

The SF.REL security function is divided to the following SSFs:

1. SF.REL.RNG_TEST
2. SF.REL.SENSOR_TEST
3. SF.REL.INTEGRITY
4. SF.REL.CORR_EXEC
5. SF.REL.PROT_SENS_DATA
6. SF.REL.FAULT_REACTION.

SSFs SF.REL.RNG_TEST and SF.REL.SENSOR_TEST executes tests to insure that the TOE is in secure state. The SF.REL.RNG_TEST SSF tests random number generator and the SF.REL.SENSOR_TEST SSF tests environment sensors.

The SF.REL.INTEGRITY SSF checks the integrity of following assets:

- Keys
- application files (EF.DG1 to EF.DG16, EF.SOD, EF.COM)
- access rights flags
- NVM ES
- anti-tearing area
- life cycle status.

The SF.REL.CORR_EXEC consists of measures to detect Fault Attacks (FA), involving:

- performing twice and checking the consistency of the certain security critical operations,
- security tests near branching to protect a sensitive conditional branch against perturbation,
- step control to ensure that critical functional steps of a command are really executed and not skipped.

The SF.REL.PROT_SENS_DATA SSF provides several mechanisms ensuring the confidentiality of sensitive data during their manipulation. These mechanisms counter the exploitation of electrical or electromagnetic emissions which are generated during the treatment of data. They are mainly based on clock de-synchronization and/or random order treatments. This security function involve: random order processing mechanism, secured DES operation, and software de-synchronization mechanism.

The SF.REL.FAULT_REACTION consists of detecting faults either by hardware reaction or by software detection based on the SF.REL.SENSOR_TEST, SF.REL.INTEGRITY and SF.REL.CORR_EXEC. When a fault is detected, the card goes to mute state, either immediately or after a delay.

This function has no strength.

7.1.1.2 SF.AC: Access Control

The SF.AC security function is divided to the following SSFs:

1. SF.AC.LIFE_CYCLE
2. SF.AC.STATE
3. SF.AC.FILE_AC

The TOE has four life cycle phases: development, manufacturing, personalization and operational. The TOE ES has the following life cycle states:

VIRGIN: the state in which chip is received from chip manufacturer

RE_INITIALIZATION: the state in which initialization can be repeated and conditionally erased all previously initialized or pre-personalized information

PRE_PERSONALIZATION: the state after (re-)initialization in which personalization commands are available, but where file access conditions do not apply

PERSONALIZATION: the state after (re-)initialization or pre-personalization in which personalization commands are available

OPERATIONAL: the state of normal usage after personalization in which the usage phase commands are available

TERMINATED: the state in which no commands are available.

The following table shows correspondence between life cycle states of the ES and lice cycle phases.

Life cycle state	Life cycle phase
VIRGIN	MANUFACTURING
RE_INITIALIZATION	MANUFACTURING
PRE_PERSONALIZATION	MANUFACTURING
PERSONALIZATION	PERSONALIZATION
OPERATIONAL	OPERATIONAL

TERMINATED	-
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Table 6: Correspondence between TOE ES life cycle states and life cycle phases.

During initial startup life cycle status is read. Each life cycle state has own set of available commands and particular command may have different behaviour depending on life cycle. The SF.AC.LIFE_CYCLE function manages the lifecycle status and ensures that the status is set in an irreversible way from the phase 2 “Manufacturing” to the phase 3 “Personalization of the MRTD” and from the phase 3 to the phase 4 “Operational Use”. The phases 2, 3 and 4 have dedicated commands. Life cycle status can be changed through END_PERSO command. This command is used to finalize the pre-personalization or the personalization process. If the current life cycle status is PRE_PERSONALIZATION, the next state will be PERSONALIZATION or OPERATIONAL after execution of this command. If the current state is PERSONALIZATION, the next state will be OPERATIONAL after execution of this command. The chip becomes mute after END_PERSO command and initial startup is needed.

The SF.AC.LIFE_CYCLE function manages the high-level life cycle steps of the chip. The SF.AC.STATE function manages the run-time volatile states. The SF.AC.STATE controls the set of available commands through a state machine and the related state transitions. For each life cycle state there exist a specific and finite set of volatile states. A volatile state is characterized by the set of available commands and the available state transitions to other volatile states. The state transitions are implemented by the relevant commands.

The SF.AC.FILE_AC function ensures that the assets (keys, Data Groups, TSF data) can only be accessed under the control of the operating system and as defined by the access rights written during the personalization process. This SF controls the reading and writing access in personalization (Mutual Authenticate Access Control) and user phases (Basic Access Control and Extended Access Control).

7.1.1.3 SF.SYM_AUT: Symmetric Authentication Mechanisms

The SF.AC security function is divided to the following SSFs:

1. SF.SYM_AUT.RNG
2. SF.SYM_AUT.MANUF
3. SF.SYM_AUT.MANUF_PROT
4. SF.SYM_AUT.MANUF_KEY_CHANGE
5. SF.SYM_AUT.BAC
6. SF.SYM_AUT.BAC_RESTR

The SF.SYM_AUT.RNG SSF provides pseudo-random numbers.

The SF.SYM_AUT.MANUF SSF enforces mutual authentication with Manufacturer Key during manufacturing phase. The SF.SYM_AUT.MANUF_KEY_CHANGE manages the Manufacturer Key changes between the terminal and the TOE. The key can be changed in previous phase for next phase as shown in the following picture.

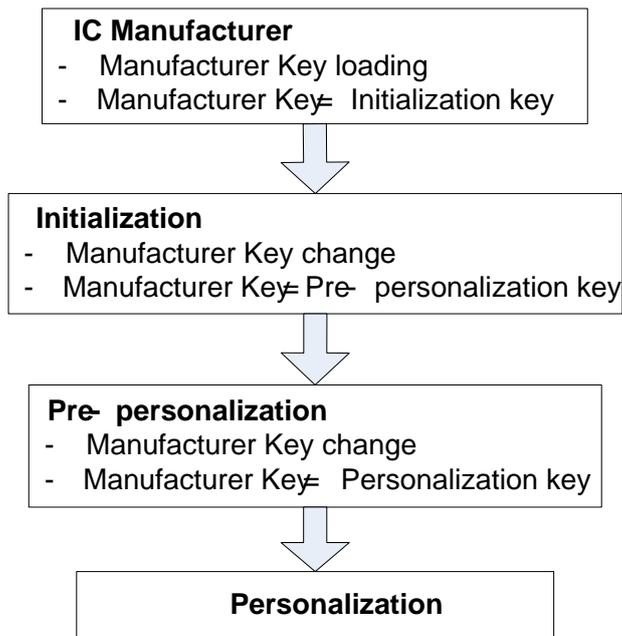


Figure 5: Manufacturer key

The SF.SYM_AUT.MANUF detects each unsuccessful authentication attempt. In such a case it warns the connected terminal. In case of successful termination of the protocol it stores appropriate keys for the secure messaging.

The SF.SYM_AUT.MANUF_PROT protects Manufacturer Key. After three consecutive false authentication attempts the key is locked.

SF.SYM_AUT.BAC enforces mutual authentication during Basic Access Control mechanism and manages the key exchanges between the terminal and the TOE. The SSF detects each unsuccessful authentication attempt. In such a case it warns the connected terminal. In case of successful termination of the protocol it stores appropriate keys for the secure messaging.

SF.SYM_AUT.BAC_RESTR restricts false Basic Access Control authentication attempts. After unsuccessful BAC authentication there is delay before next authentication attempt is possible. Every consecutive false attempt increases the delay until maximum value is reached.

7.1.1.4 SF.SM: Secure Messaging

The SF.SM function provides the management of the secure channel for the sensitive data exchange with the terminal. The integrity and authenticity of the communication is handled by using encryption and Message Authentication Codes. The authentication procedures differ between life cycles states, but once the session keys are generated, the SM processing is equal in all of them. If a SM error occurs, the session keys are cleared and the SM is aborted. Defined authentication status information is also cleared upon such event. A SM error may be due to not using SM, having too few or wrong SM fields, incorrect order of SM fields or having MAC or padding errors in SM fields.

7.1.2 TSFs provided by the Infineon chip

The evaluation is a composite evaluation and uses the results of the CC evaluation provided by [CR-IC-800] and [CR-IC-1440]. The IC and its primary embedded software have been evaluated at level EAL 5+.

These SF are the same for the three IC considered in this ST, ie: SLE66CLX360PEM, SLE66CLX360PE, SLE66CLX800PEM, SLE66CLX800PE, SLE66CLX1440PEM, and SLE66CLX1440PE.

SF	Description
SEF.1	Operating state checking
SEF.2	Phase management with test mode lock-out
SEF.3	Protection against snooping
SEF.4	Data encryption and data disguising
SEF.5	Random number generation
SEF.6	TSF self test
SEF.7	Notification of physical attack
SEF.8	Memory Management Unit (MMU)
SEF.9	Cryptographic support

Table 7: SF provided by the IFX chips

These SF are described in [ST-IC-800], and [ST-IC-1440].

7.2 ASSURANCE MEASURES

Assurance Measure	Document title
AM_ASE	MultiApp V2 BAC Security Target
AM_ADV_Spec	Functional Specifications - MultiApp V2
AM_ADV_Design	Design – MultiApp V2
AM_ADV_Int	Internals – MultiApp V2
AM_ALC	Class ALC – MultiApp V2
AM_AGD	Guidance – MultiApp V2
AM_ATE	Class ATE – MultiApp V2
AM_CODE	Source Code – MultiApp V2
AM_Samples	Samples – MultiApp V2

Table 8: Assurance Measures.

The development team uses a configuration management system that supports the generation of the TOE. The configuration management system is well documented and identifies all different configuration items. The configuration management tracks the implementation representation, design documentation, test documentation, guidance documentation. The security of the configuration management is described in detail in a separate document.

The delivery process of the TOE is well defined and follows strict procedures. Several measures prevent the modification of the TOE based on the developer’s master copy and the user’s version. The Administrator and the User are provided with necessary documentation for initialization and start-up of the TOE.

The implementation is based on an informal design of the components of the TOE. The description is sufficient to generate the TOE without other design requirements.

The correspondence of the Security Functional Requirements (SFR) with less abstract representations will be demonstrated in a separate document. This addresses ADV_ARC, ADV_FSP, ADV_IMP, and ADV_TDS.

The tools used in the development environment are appropriate to protect the confidentiality and integrity of the TOE design and implementation. The development is controlled by a life cycle model of the TOE. The development tools are well defined and documented.

The Gemalto R&E organization is equipped with organizational and personnel means that are necessary to develop the TOE.

As the evaluation is identified as a composite evaluation based on the CC evaluation of the hardware, the assurance measures related to the hardware (IC) will be provided by documents of the IC manufacturer.