UM_security_target_lite_eMRTD_EAC

User manual

ST-Doc eMRTD EAC with PACE on STeID JC Open OS v1.0 - Security Target Lite

Common Criteria
for IT security evaluation

1 Purpose

This document presents the Security Target of the ST-Doc eMRTD EAC with PACE on STeID JC Open OS v1.0.

2 Scope

This document is public.

3 Reference documents

Table 1: List of reference CC documents

Reference	Document
[CC_P1]	Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and general model. Version 3.1. Revision 5. April 2017
[CC_P2]	Common Criteria for Information Technology Security Evaluation, Part 2: Security functional requirements. Version 3.1 Revision 5. April 2017
[CC_P3]	Common Criteria for Information Technology Security Evaluation, Part 3: Security assurance requirements. Version 3.1. Revision 5. April 2017.
[CEM]	Common Methodology for Information Technology Security Evaluation, Evaluation Methodology. Version 3.1. Revision 5. April 2017. CCMB-2017-04-004.
[AIS31/20]	Bundesamt für Sicherheit in der Informationstechnik, Anwendungshinweise und Interpretationen zum Schema (AIS), AIS 31, A proposal for Functionality classes for random number generators Version 2.0 vom 18.09.2011, Bundesamt für Sicherheit in der Informationstechnik (BSI)
[AIS36]	Bundesamt für Sicherheit in der Informationstechnik, Anwendungshinweise und Interpretationen zum Schema (AIS), AIS 36, Version 2 vom 12.11.2007, Bundesamt für Sicherheit in der Informationstechnik (BSI)
[SOGIS-COMP]	Composite product evaluation for Smart Cards and similar devices, version 1.5.1, May 2018
[CERT_ST31N600]	ST31N600 A03, ANSSI - CC - 2022/21 - R02
[CERT_ STeID_JCOS]	SteID JC Open OS v1.0, v1.3.2, NSCIB-CC-2400079-01

Table 2: List of reference Protection Profiles and Technical Guidelines

Reference	Document
[PP-0055]	CC Protection Profile – Machine Readable Travel Document with “ICAO Application", Basic Access Control – Version 1.10, 25 March 2009
[PP-0056]	CC Protection Profile – Machine Readable Travel Document with “ICAO Application", Extended Access Control with PACE – Version 1.3.2, 5 December 2012
[PP-0068]	CC Protection Profile – Machine Readable Travel Document using Standard Inspection Procedure with PACE (PACE PP). BSI-CC-PP-0068-V2-2011 – Version 1.0, November 2011
[ICAO_9303]	ICAO Doc 9303, Machine Readable Travel Documents – Part 10 Logical Data Structure (LDS) for Storage of Biometric and Other Data in the Contactless Integrated Circuit (IC) – Eighth Edition, 2021
	ICAO Doc 9303, Machine Readable Travel Documents – Part 11 Security Mechanisms for MRTDs – Eighth Edition, 2021
	ICAO Doc 9303, Machine Readable Travel Documents – Part 12 Public Key Infrastructure for MRTDs – Eighth Edition, 2021
[ICAO_TR]	TECHNICAL REPORT – Supplemental Access Control for Machine Readable Travel Documents – Version 1.1 – April 15, 2014
[TR-03110-1]	Technical Guideline TR-03110-1: Advanced Security Mechanisms for Machine Readable Travel Documents – Part 1 – eMRTDs with BAC/PACEv2 and EACv1, Version 2.10, 20. March 2012
[TR-03110-2]	Technical Guideline TR-03110-2: Advanced Security Mechanisms for Machine Readable Travel Documents Part 2, Version 2.10, Bundesamt für Sicherheit in der Informationstechnik (BSI), 2012-03-20
[TR-03110-3]	Technical Guideline TR-03110-3: Advanced Security Mechanisms for Machine Readable Travel Documents – Part 3 – Common Specifications, Version 2.11, 12. July 2013
[TR-03111]	Technical Guideline TR-03111: Elliptic Curve Cryptography, Version 1.11, Bundesamt für Sicherheit in der Informationstechnik (BSI), 2009-04-17

Table 3: List of reference Specifications

Reference	Document
[PKCS1_v1_5]	PKCS #1 v1.5: RSA Encryption Standard – RSA Laboratories – 1 Nov 1993
[PKCS_#3]	Diffie-Hellman Key-Agreement Standard, An RSA Laboratories Technical Note, Version 1.4, Revised, November 1, 1993
[FIPS_46_3]	Federal Information Processing Standards Publication FIPS PUB 46-3, Data Encryption Standard (DES), Reaffirmed 1999 October 25, U.S. Department of Commerce/National Institute of Standards and Technology
[ANSI_X9.62]	ANSI X9.62-2005: The Elliptic Curve Digital Signature Algorithm (ECDSA), approved November 16, 2005
[FIPS_180-2]	FIPS Publication 180-2: SECURE HASH STANDARD, U.S. DEPARTMENT OF COMMERCE/National Institute of Standards and Technology, 2002 August 1

[FIPS_PUB_197]	Federal Information Processing Standards Publication 197, Advanced Encryption Standard (AES), U.S. Department of Commerce/National Institute of Standards and Technology, 2001-11-26
[SP800-38B]	National Institute of Standards and Technology, Recommendation for Block Cipher Modes of Operation: The CMAC Mode for Authentication, Special Publication 800-38B, May 2005.
[SP800-22]	National Institute of Standards and Technology, A Statistical Test Suite for Random and Pseudorandom Number Generators for Cryptographic Applications Special Publication 800-22 Rev.1a April 2010
[ISO 10116]	ISO/IEC 10116, Information technology - Security Techniques -- Modes of operation of an n-bit block cipher, ISO, 2006.
[RFC4493]	JH. Song, R. Poovendran The AES-CMAC Algorithm, June 2006
[RFC3447]	NWG Request For Comments 3447 – February 2003
[ISO_9797-1]	ISO/IEC 9797-1:1999: Information technology - Security techniques – Message Authentication Codes (MACs) - Part 1: Mechanisms using a block cipher
[ISO_9796-2]	ISO/IEC 9796-2:2010 Information technology — Security techniques Digital signature schemes giving message recovery — Part 2: Integer factorization based mechanisms
[ISO_18013]	ISO/IEC 18013-2 – Information technology – Personal identification – ISO-compliant driving Licence Part 2: Machine-readable technologies – First Edition, 2008
[ISO_18013]	ISO/IEC 18013-3 – Information technology – Personal identification – ISO-compliant driving Licence Part 3: Access control, authentication and integrity validation – Second Edition, 2017

Table 4: List of reference STMicroelectronics documents

Reference	Document
[ST_SteidJCOS]	STMicroelectronics, STeID JC Open OS v1.0 Security Target, Version H, 2025-10-24
[AGD_PRE]	STMicroelectronics, ST-Doc ICAO on STeID JC Open OS - Preparative User Guidance for EMRTDApplet, Rev. 2, January 2026
[AGD_OPE]	STMicroelectronics, ST-Doc ICAO on STeID JC Open OS - Operational User Guidance for EMRTDApplet, Rev. 2, January 2026
[AGD_OPE_STeID]	STeID JC Open OS v1.0 – Operational guidance document (AGD_OPE), Rev. 3

4 Abbreviations

Table 5: List of abbreviations

Term	Definition
ATR	Answer To Reset
ATS	Answer To Select
AUTH	External Authentication
BIS	Basic Inspection System
BIS-PACE	Basic Inspection System with PACE
CA	Chip Authentication
CAN	Card Access Number
CC	Common Criteria for IT Security Evaluation
CEM	Common Methodology for Information Technology Security Evaluation

Term	Definition
DF	Dedicated File
DPA	Differential Power Analysis
EAC	Extended Access Control
EAL	Evaluation Assurance Level
ECC	Elliptic Curve Cryptography
EF	Elementary File
Enc	Encryption
ENC	Content Data Encryption
GIS	General Inspection System
HW	Hardware
ICCSN	Integrated Circuit Card Serial Number.
ID	Identifier
IT	Information Technology
MF	Master File
MRTD	Machine Readable Travel Document
MRZ	Machine readable zone
n.a.	Not applicable
NIST	National Institute of Standards and Technology
OSP	Organizational security policy
PACE	Password Authenticated Connection Establishment
PCD	Proximity Coupling Device
PICC	Proximity Integrated Circuit Chip
PIN	Personal Identification Number
PKI	Public Key Infrastructure
PP	Protection Profile
PT	Personalization Terminal
PTRNG	Physical True Random Number Generator
PUK	PIN Unlock Key
RF	Radio Frequency
RNG	Random Number Generator
SAR	Security Assurance Requirement
SEMA	Simple Electromagnetic Analysis
SF	Security Function
SFP	Security Function Policy
SFR	Security Functional Requirement
SHA	Secure Hash Algorithm
SIG	Content Data Signature
Sign	Signature
SIP	Standard Inspection Procedure
SPA	Simple Power Analysis
ST	Security Target
TA	Terminal Authentication
TOE	Target Of Evaluation
TRNG	True Random Number Generator
TSF	TOE Security Functionality
TSP	TOE Security Policy (defined by the current document)

5 Glossary

Term	Description
Accurate Terminal Certificate	A Terminal Certificate is accurate, if the issuing Document Verifier is trusted by the travel document's chip to produce Terminal Certificates with the correct certificate effective date, see [TR-03110-1].
Active Authentication	Security mechanism defined in [ICAO_9303] option by which means the travel document's chip proves and the inspection system verifies the identity and authenticity of the travel document's chip as part of a genuine travel document issued by a known State or Organization.
Advanced Inspection Procedure (with PACE)	A specific order of authentication steps between a travel document and a terminal as required by [ICAO_TR], namely (i) PACE, (ii) Chip Authentication v.1, (iii) Passive Authentication with SOD and (iv) Terminal Authentication v.1. AIP can generally be used by EIS-AIP-PACE.
Agreement	This term is used in the current PP in order to reflect an appropriate relationship between the parties involved, but not as a legal notion.
Application note	Optional informative part of the PP containing sensitive supporting information that is considered relevant or useful for the construction, evaluation, or use of the TOE.
Audit records	Write-only-once non-volatile memory area of the travel document's chip to store the Initialization Data and Pre-personalization Data.
Authenticity	Ability to confirm the travel document and its data elements on the travel document's chip were created by the issuing State or Organization.
Basic Access Control (BAC)	Security mechanism defined in [ICAO_9303] by which means the travel document's chip proves and the inspection system protects their communication by means of secure messaging with Document Basic Access Keys.
Basic Inspection System (BIS)	An inspection system which implements the terminals part of the Basic Access Control Mechanism and authenticates itself to the travel document's chip using the Document Basic Access Keys derived from the printed MRZ data for reading the logical travel document.
Basic Inspection System with PACE protocol (BIS-PACE)	A technical system being used by an inspecting authority and operated by a governmental organization (i.e. an Official Domestic or Foreign Document Verifier) and verifying the travel document presenter as the travel document holder (for ePassport: by comparing the real biometric data (face) of the travel document presenter with the stored biometric data (DG2) of the travel document holder). The Basic Inspection System with PACE is a PACE Terminal additionally supporting/applying the Passive Authentication protocol and is authorized by the travel document Issuer through the Document Verifier of receiving state to read a subset of data stored on the travel document.
Biographical data (biodata)	The personalized details of the travel document's holder of the document appearing as text in the visual and machine readable zones on the biographical data page of a travel document. [ICAO_9303]
Biometric reference data	Data stored for biometric authentication of the travel document holder in the travel document's chip as (i) digital portrait and (ii) optional biometric reference data. Counterfeit an unauthorized copy or reproduction of a genuine security document made by whatever means. [ICAO_9303]
Card Access Number (CAN)	Password derived from a short number printed on the front side of the data-page.

Certificate chain	A sequence defining a hierarchy certificates. The Inspection System Certificate is the lowest level, Document Verifier Certificate in between, and Country Verifying Certification Authority Certificates are on the highest level. A certificate of a lower level is signed with the private key corresponding to the public key in the certificate of the next higher level.
Counterfeit	An unauthorized copy or reproduction of a genuine security document made by whatever means. [ICAO_9303]
Country Signing CA Certificate (CCSCA)	Self-signed certificate of the Country Signing Certification Authority Public Key (KPuCSCA) issued by Country Signing Certification Authority and stored in the inspection system.
Country Signing Certification Authority (CSCA)	An organization enforcing the policy of the travel document Issuer with respect to confirming correctness of user and TSF data stored in the travel document. The CSCA represents the country specific root of the PKI for the travel documents and creates the Document Signer Certificates within this PKI. The CSCA also issues the self-signed CSCA Certificate (CCSCA) having to be distributed by strictly secure diplomatic means, see. [ICAO_9303], 5.5.1. The Country Signing Certification Authority issuing certificates for Document Signers (cf. [ICAO_9303]) and the domestic CVCA may be integrated into a single entity, e.g. a Country Certification Authority. However, even in this case, separate key pairs must be used for different roles, see [TR-03110-1].
Country Verifying Certification Authority (CVCA)	An organization enforcing the privacy policy of the travel document Issuer with respect to protection of user data stored in the travel document (at a trial of a terminal to get an access to these data). The CVCA represents the country specific root of the PKI for the terminals using it and creates the Document Verifier Certificates within this PKI. Updates of the public key of the CVCA are distributed in form of CVCA Link-Certificates, see [TR-03110-1]. Since the Standard Inspection Procedure does not imply any certificate-based terminal authentication, the current TOE cannot recognize a CVCS as a subject; hence, it merely represents an organizational entity within this PP. The Country Signing Certification Authority (CSCA) issuing certificates for Document Signers (cf. [ICAO_9303]) and the domestic CVCA may be integrated into a single entity, e.g. a Country Certification Authority. However, even in this case, separate key pairs must be used for different roles, see [TR-03110-1].
Current date	The maximum of the effective dates of valid CVCA, DV and domestic Inspection System certificates known to the TOE. It is used the validate card verifiable certificates.
CV Certificate	Card Verifiable Certificate according to [TR-03110-1].
CVCA link Certificate	Certificate of the new public key of the Country Verifying Certification Authority signed with the old public key of the Country Verifying Certification Authority where the certificate effective date for the new key is before the certificate expiration date of the certificate for the old key.
Document Basic Access Key Derivation Algorithm	The [ICAO_9303] describes the Document Basic Access Key Derivation Algorithm on how terminals may derive the Document Basic Access Keys from the second line of the printed MRZ data.
Document Details Data	Data printed on and electronically stored in the travel document representing the document details like document type, issuing state, document number, date of issue, date of expiry, issuing authority. The document details data are less-sensitive data.

Document Security Object (SOD)	A RFC3369 CMS Signed Data Structure, signed by the Document Signer (DS). Carries the hash values of the LDS Data Groups. It is stored in the travel document's chip. It may carry the Document Signer Certificate (CDS) [ICAO_9303]
Document Signer (DS)	An organization enforcing the policy of the CSCA and signing the Document Security Object stored on the travel document for passive authentication. A Document Signer is authorized by the national CSCA issuing the Document Signer Certificate (CDS), see [TR-03110-1] and [ICAO_9303]. This role is usually delegated to a Personalization Agent.
Document Verifier (DV)	An organization enforcing the policies of the CVCA and of a Service Provider (here: of a governmental organization / inspection authority) and managing terminals belonging together (e.g. terminals operated by a State's border police), by – inter alia – issuing Terminal Certificates. A Document Verifier is therefore a Certification Authority, authorized by at least the national CVCA to issue certificates for national terminals, see [TR-03110-1]. Since the Standard Inspection Procedure does not imply any certificate-based terminal authentication, the current TOE cannot recognize a DV as a subject; hence, it merely represents an organizational entity within this PP. There can be Domestic and Foreign DV: A domestic DV is acting under the policy of the domestic CVCA being run by the travel document Issuer; a foreign DV is acting under a policy of the respective foreign CVCA (in this case there shall be an appropriate agreement between the travel document Issuer und a foreign CVCA ensuring enforcing the travel document Issuer's privacy policy).
Eavesdropper	A threat agent with high attack potential reading the communication between the travel document's chip and the inspection system to gain the data on the travel document's chip.
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; see [ICAO_9303] (there "Machine Readable Travel Document").
Travel document (electronic)	The contact based or contactless smart card integrated into the plastic or paper, optical readable cover and providing the following application: ePassport.
Travel document Holder	The rightful holder of the travel document for whom the issuing State or Organization personalized the travel document.
Travel document's Chip	A contact based/contactless integrated circuit chip complying with ISO/IEC 14443 and programmed according to the Logical Data Structure as specified by ICAO, [ICAO_9303], sec III.
Travel document's Chip Embedded Software	Software embedded in a travel document's chip and not being developed by the IC Designer. The travel document's chip Embedded Software is designed in Phase 1 and embedded into the travel document's chip in Phase 2 of the TOE life-cycle.
Electronic document	ICAO compliant ID document, ISO Driving Licence document, or ID document issued by a State or Organization, which may be used by the rightful holder for identification and authorization.
Electronic document holder	Person presenting the electronic document to the inspection system and claiming the identity of the electronic document holder.
Enrolment	The process of collecting biometric samples from a person and the subsequent preparation and storage of biometric reference templates representing that person's identity. [ICAO_9303]

ePassport application	A part of the TOE containing the non-executable, related user data (incl. biometric) as well as the data needed for authentication (incl. MRZ); this application is intended to be used by authorities, amongst other as a machine readable travel document (MRTD). See [TR-03110-1].
ePassport application	Non-executable data defining the functionality of the operating system on the IC as the travel document'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.DG13, EF.DG16, EF.COM and EF.SOD) and - the TSF Data including the definition the authentication data but except the authentication data itself.
Extended Access Control	Security mechanism identified in [ICAO_9303] by which means the travel document's chip (i) verifies the authentication of the inspection systems authorized to read the optional biometric reference data, (ii) controls the access to the optional biometric reference data and (iii) protects the confidentiality and integrity of the optional biometric reference data during their transmission to the inspection system by secure messaging. The Personalization Agent may use the same mechanism to authenticate themselves with Personalization Agent Private Key and to get write and read access to the logical travel document and TSF data.
Extended Inspection System (EIS)	A role of a terminal as part of an inspection system which is in addition to Basic Inspection System authorized by the issuing State or Organization to read the optional biometric reference data and supports the terminals part of the Extended Access Control Authentication Mechanism.
Forgery	Fraudulent alteration of any part of the genuine document, e.g. changes to the biographical data or the portrait. [ICAO_9303]
Global Interoperability	The capability of inspection systems (either manual or automated) in different States throughout the world to exchange data, to process data received from systems in other States, and to utilize that data in inspection operations in their respective States. Global interoperability is a major objective of the standardized specifications for placement of both eye-readable and machine readable data in all travel documents. [ICAO_9303]
IC Dedicated Software	Software developed and injected into the chip hardware by the IC manufacturer. Such software might support special functionality of the IC hardware and be used, amongst other, for implementing delivery procedures between different players. The usage of parts of the IC Dedicated Software might be restricted to certain life phases.
IC Dedicated Support Software	That part of the IC Dedicated Software (refer to above) which provides functions after TOE Delivery. The usage of parts of the IC Dedicated Software might be restricted to certain phases.
IC Dedicated Test Software	That part of the IC Dedicated Software (refer to above) which is used to test the TOE before TOE Delivery but which does not provide any functionality thereafter.
IC Embedded Software	Software embedded in an IC and not being designed by the IC developer. The IC Embedded Software is designed in the design life phase and embedded into the IC in the manufacturing life phase of the TOE.
IC Identification Data	The IC manufacturer writes a unique IC identifier to the chip to control the IC as travel document material during the IC manufacturing and the delivery process to the travel document manufacturer.
Impostor	A person who applies for and obtains a document by assuming a false name and identity, or a person who alters his or her physical appearance to represent himself or herself as another person for the purpose of using that person's document. [ICAO_9303]
Improperly documented person	A person who travels, or attempts to travel with: (a) an expired travel document or an invalid visa; (b) a counterfeit, forged or altered travel document or visa; (c) someone else's travel document or visa; or (d) no travel document or visa, if required. [ICAO_9303]

Initialization	Process of writing Initialization Data to the TOE.
Initialization Data	Any data defined by the TOE Manufacturer and injected into the non-volatile memory by the Integrated Circuits manufacturer (Phase 2). These data are for instance used for traceability and for IC identification as travel document's material (IC identification data).
Inspection	The act of an organization examining a travel document presented to it by the travel document's presenter and verifying its authenticity [ICAO_9303]
Inspection system (IS)	Technical system used to examine the travel document presented by the document holder, to verify its authenticity and to verify the holder as travel document holder
Integrated circuit (IC)	Electronic component(s) designed to perform processing and/or memory functions. The travel document's chip is an integrated circuit.
Integrity	Ability to confirm the travel document and its data elements on the travel document's chip have not been altered from that created by the issuing State or 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	Country issuing travel documents [ICAO_9303]
Logical Data Structure (LDS)	The collection of groupings of Data Elements stored in the optional capacity expansion technology [ICAO_9303]. The capacity expansion technology used is the travel document's chip.
Logical travel document	Data of the travel document's holder stored according to the Logical Data Structure as specified by ICAO [ICAO_9303] in the contact based/contactless integrated circuit. It presents contact based/contactless readable data including (but not limited to) (1) personal data of the travel document's holder (2) the digital Machine Readable Zone Data (3) the digitized portraits (4) the biometric reference data of finger(s) or iris image(s) or both (5) the other data according to LDS (6) EF.COM and EF.SOD
Machine readable travel document (MRTD)	Official document issued by a State or Organization which is used by the holder for international travel (e.g. passport, visa, official document of identity) and which contains mandatory visual (eye readable) data and a separate mandatory data summary, intended for global use, reflecting essential data elements capable of being machine read. [ICAO_9303]
Machine readable zone (MRZ)	Fixed dimensional area located on the front of the travel document or MRP Data Page or, in the case of the TD1, the back of the travel document, containing mandatory and optional data for machine reading using OCR methods. [ICAO_9303] The MRZ-Password is a restricted-revealable secret that is derived from the machine readable zone and may be used for PACE.
Machine-verifiable biometrics feature	A unique physical personal identification feature (e.g. an iris pattern, fingerprint or facial characteristics) stored on a travel document in a form that can be read and verified by machine. [ICAO_9303]
Manufacturer	Generic term for the IC Manufacturer producing integrated circuit and the travel document Manufacturer completing the IC to the travel document. The Manufacturer is the default user of the TOE during the manufacturing life phase. The TOE itself does not distinguish between the IC Manufacturer and travel document Manufacturer using this role Manufacturer.

Metadata of a CV Certificate	Data within the certificate body (excepting Public Key) as described in [TR-03110-1]. The metadata of a CV certificate comprise the following elements: - Certificate Profile Identifier, - Certificate Authority Reference, - Certificate Holder Reference, - Certificate Holder Authorization Template, - Certificate Effective Date, - Certificate Expiration Date.
Optional biometric reference data	Data stored for biometric authentication of the travel document holder in the travel document's chip as (i) encoded finger image(s) or (ii) encoded iris image(s) or (iii) both. Note, that the European commission decided to use only fingerprint and not to use iris images as optional biometric reference data.
PACE Password	A password needed for PACE authentication, that is MRZ, CAN, Input string, PIN, or PUK.
PACE passwords	Passwords used as input for PACE. This may either be the CAN or the SHA-1-value of the concatenation of Serial Number, Date of Birth and Date of Expiry as read from the MRZ, see [ICAO_TR],
Passive authentication	Verification of the digital signature of the Document Security Object and (ii) comparing the hash values of the read LDS data fields with the hash values contained in the Document Security Object.
Password Authenticated Connection Establishment (PACE)	A communication establishment protocol defined in [ICAO_TR],. The PACE Protocol is a password authenticated Diffie-Hellman key agreement protocol providing implicit password-based authentication of the communication partners (e.g. smart card and the terminal connected): i.e. PACE provides a verification, whether the communication partners share the same value of a password π). Based on this authentication, PACE also provides a secure communication, whereby confidentiality and authenticity of data transferred within this communication channel are maintained.
Personalization	The process by which the Personalization Data are stored in and unambiguously, inseparably associated with the travel document. This may also include the optional biometric data collected during the "Enrolment"
Personalization Agent	An organization acting on behalf of the travel document Issuer to personalize the travel document for the travel document holder by some or all of the following activities: (i) establishing the identity of the travel document holder for the biographic data in the travel document, (ii) enrolling the biometric reference data of the travel document holder, (iii) writing a subset of these data on the physical travel document (optical personalization) and storing them in the travel document (electronic personalization) for the travel document holder as defined in [TR-03110-1], (iv) writing the document details data, (v) writing the initial TSF data, (vi) Signing the Document Security Object defined in [ICAO_9303] (in the role of DS). Please note that the role 'Personalization Agent' may be distributed among several institutions according to the operational policy of the travel document Issuer. Generating signature key pair(s) is not in the scope of the tasks of this role.
Personalization Agent Authentication Information	TSF data used for authentication proof and verification of the Personalization Agent.

Personalization Agent Key	Cryptographic authentication key used (i) by the Personalization Agent to prove his identity and to get access to the logical travel document and (ii) by the travel document's chip to verify the authentication attempt of a terminal as Personalization Agent according to the SFR FIA_UAU.4/PACE, FIA_UAU.5/PACE and FIA_UAU.6/EAC.
Personalization Data	A set of data incl. (i) individual-related data (biographic and biometric data) of the travel document holder, (ii) dedicated document details data and (iii) dedicated initial TSF data (incl. the Document Security Object). Personalization data are gathered and then written into the non-volatile memory of the TOE by the Personalization Agent in the life-cycle phase card issuing.
Physical travel document	Physical part of the 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
Pre-Personalization	Process of writing Pre-Personalization Data (see below) to the TOE including the creation of the travel document Application
Pre-personalization Data	Any data that is injected into the non-volatile memory of the TOE by the travel document Manufacturer (Phase 2) for traceability of non-personalized travel document's and/or to secure shipment within or between life cycle phases 2 and 3. It contains (but is not limited to) the Personalization Agent Key Pair.
Pre-personalized travel document's chip	Travel document's chip equipped with a unique identifier.
Receiving State	The Country to which the electronics document presenter is applying for entry. [ICAO_9303]
Reference data	Data enrolled for a known identity and used by the verifier to check the verification data provided by an entity to prove this identity in an authentication attempt.
RF-terminal	A device being able to establish communication with an RF-chip according to ISO/IEC 14443
Secondary image	A repeat image of the holder's portrait reproduced elsewhere in the document by whatever means. [ICAO_9303]
Secure messaging in encrypted/combined mode	Secure messaging using encryption and message authentication code according to ISO/IEC 7816-4
Service Provider	An official organization (inspection authority) providing inspection service which can be used by the travel document holder. Service Provider uses terminals (BIS-PACE) managed by a DV.
Skimming	Imitation of the inspection system to read the logical travel document or parts of it via the contactless communication channel of the TOE without knowledge of the printed MRZ data.
Standard Inspection Procedure	A specific order of authentication steps between a travel document and a terminal as required by [ICAO_TR], namely (i) PACE or BAC and (ii) Passive Authentication with SOD. SIP can generally be used by BIS-PACE and BIS-BAC.
Terminal	A terminal is any technical system communicating with the TOE either through the contact based or contactless interface. A technical system verifying correspondence between the password stored in the travel document and the related value presented to the terminal by the travel document presenter. In this PP the role 'Terminal' corresponds to any terminal being authenticated by the TOE. Terminal may implement the terminal's part of the PACE protocol and thus authenticate itself to the travel document using a shared password (CAN or MRZ).

Terminal Authorization	Intersection of the Certificate Holder Authorizations defined by the Inspection System Certificate, the Document Verifier Certificate and Country Verifying Certification Authority which shall be all valid for the Current Date.
Terminal Authorization Level	Intersection of the Certificate Holder Authorizations defined by the Terminal Certificate, the Document Verifier Certificate and Country Verifying Certification Authority which shall be all valid for the Current Date.
TOE tracing data	Technical information about the current and previous locations of the travel document gathered by inconspicuous (for the travel document holder) recognizing the travel document.
TSF data	Data created by and for the TOE that might affect the operation of the TOE ([CC_P1]).
Unpersonalized travel document	The travel document that contains the travel document chip holding only Initialization Data and Pre-personalization Data as delivered to the Personalization Agent from the Manufacturer.
User data	All data (being not authentication data) (i) stored in the context of the ePassport application of the travel document as defined in [TR-03110-1] and (ii) Being allowed to be read out solely by an authenticated terminal acting as Basic Inspection System with PACE. CC give the following generic definitions for user data: Data created by and for the user that does not affect the operation of the TSF ([CC_P1]). Information stored in TOE resources that can be operated upon by users in accordance with the SFRs and upon which the TSF places no special meaning ([CC_P2]).
Verification	The process of comparing a submitted biometric sample against the biometric reference template of a single enrollee whose identity is being claimed, to determine whether it matches the enrollee's template. [ICAO_9303]
Verification data	Data provided by an entity in an authentication attempt to prove their identity to the verifier. The verifier checks whether the verification data match the reference data known for the claimed identity.

6 Introduction

The ST-Doc eMRTD EAC with PACE is a Java Card Applet that implements the Machine Readable Travel Document (MRTD) based on the requirements and recommendations of the International Civil Aviation Organization (ICAO) and supports the Basic Access Control (BAC), the Extended Access Control (EAC), the Password Authenticated Connection Establishment (PACE), the Chip Authentication (CA) and the Active Authentication (AA), as described in the 'ICAO Doc 9303' [ICAO_9303].

The applet is integrated with the CC certified STMicroelectronics Java Card™ operating system 'STeID JC Open OS v1.0' [ST_SteidJCOS], designed on the CC certified STMicroelectronics ST31N600 Security Integrated Circuit [CERT_ST31N600][CERT_ST31N600].

The TOE certification depends on the certification of the platform 'STeID JC Open OS v1.0' [ST_SteidJCOS][CERT_ STeID_JCOS].

The product is a contact/contactless chip that can be personalized as

- electronic travel document according to [ICAO_9303],
- ISO Driving Licence electronic document according to [ISO_18013], or
- Digital Identity electronic document.

The product supports user authentication by PACE PIN/PUK when it is personalized as Digital Identity electronic document.

This document is the Security Target for the Common Criteria evaluation of the ST-Doc eMRTD EAC with PACE on STeID JC Open OS v1.0. It provides information about the Target of Evaluation (TOE), that is the item subject of the Common Criteria evaluation. The TOE is evaluated in composition with the STMicroelectronics Java Card Platform STeID JC Open OS.

6.1 ST Reference

Title:	ST-Doc eMRTD EAC with PACE on STeID JC Open OS v1.0 Security Target Lite
Developer:	STMicroelectronics, Z.I. Marcianise Sud, 81025, Marcianise (CE), ITALY
Version:	Rev. C
Date:	January, 2026

6.2 TOE Reference

TOE name:	ST-Doc eMRTD EAC with PACE
TOE version:	1.0
com.st.steid.bsi version:	1.4
com.st.steid.emrtd version:	1.6

The ST-Doc eMRTD EAC with PACE is made of two Java Card packages: the com.st.steid.bsi library package and the com.st.steid.emrtd package containing the EMRTDApplet class that implements the MRTD application.

The TOE version 1.0 contains the com.st.steid.bsi and the com.st.steid.emrtd packages with version defined above. The TOE version can be verified using the GET_DATA command. In fact, the concatenation of the two versions is returned by that command, according to the

instructions in section "TOE identification" of the Preparative User Guidance for EMRTDApplet of this TOE [AGD_PRE].

6.3 Platform Reference

STeID JC Open OS v1.0 on ST31N600 Security Integrated Circuit

OS Identification: 00000900

OS Version: 00010302

CC certificate [CERT_ STeID_JCOS]

OS Identification and OS Version can be verified using the GET DATA command according to the instructions in the section "TOE identification" of the Preparative User Guidance of this TOE [AGD_PRE].

6.4 TOE Overview

The TOE is the STMicroelectronics ST-Doc eMRTD EAC with PACE, integrated with the STMicroelectronics Java Card™ operating system STeID JC Open OS v1.0, designed on the STMicroelectronics ST31N600 Security Integrated Circuit. The TOE is evaluated according to the composition approach.

The TOE is a contact/contactless chip personalized as electronic travel document according to [ICAO_9303].

The TOE is based on the Machine Readable Travel Document (MRTD) and complies with the requirements and recommendations of the International Civil Aviation Organization (ICAO) and implements the advanced security methods Extended Access Control (EAC), the Password Authenticated Connection Establishment (PACE), Chip Authentication (CA) and the Active Authentication (AA) as described in the ‘ICAO Doc 9303’ [ICAO_9303].

The TOE protects the user data and the TSF data needed to execute the access protocols and to verify the integrity and authenticity of user data.

6.4.1 TOE Description

The TOE is a composite product comprising hardware, software and documentation.

The physical scope is defined as follows:

- Certified platform: the STMicroelectronics Java Card™ Operating System STeID JC Open OS v1.0 on the STMicroelectronics ST31N600 Secure Integrated Circuit [ST_SteidJCOS]
- Software: the STMicroelectronics TOE Java Card applet EMRTDApplet implementing the Machine Readable Travel Document (MRTD) based on the requirements and recommendations of the International Civil Aviation Organization (ICAO) programmed according to the Logical Data Structure (LDS) and implementing the advanced security methods, Extended Access Control (EAC), the Password Authenticated Connection Establishment (PACE), Chip Authentication (CA) and the Active Authentication (AA) as described in the ‘ICAO Doc 9303’ [ICAO_9303].
- Documentation:
    - ST-Doc ICAO on STeID JC Open OS - Preparative User Guidance for EMRTDApplet [AGD_PRE]

- ST-Doc ICAO on STeID JC Open OS - Operational User Guidance for EMRTDApplet [AGD_OPE]

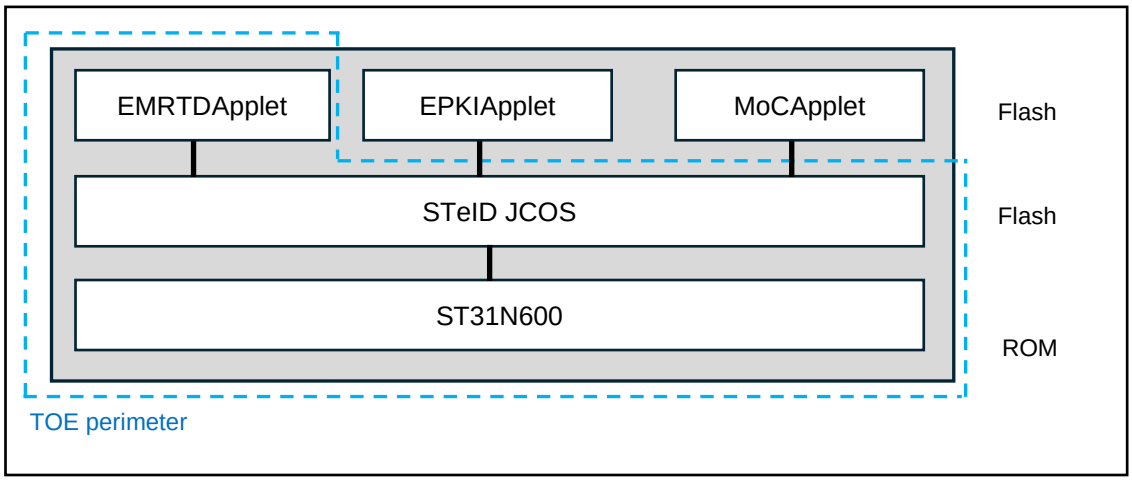
The platform guidance, as described in the ST of the platform [ST_SteidJCOS], is also included

The first two components of the TOE (hardware and software) are delivered by trusted couriers at the end of the lifecycle Phase 2 “TOE Manufacturing” Step 3 “Embedded software loading” in wafer or micromodule D70, D76, CB6 format to Document manufacturer (see chap. 6.4.3).

The last component of the TOE (documentation) is delivered at the end of the lifecycle Phase 2 Step 3 “Embedded software loading” in printed copy by trusted couriers or in enciphered pdf format by e-mail to Document Personalization Agent (see chap. 6.4.3).

The Figure 1 shows the composition of the TOE parts, including their location in the memory areas of the TOE. The TOE is a Java Card Flash memory-based product.

Figure 1 - TOE architecture



Important note: The product is an open Java Card implementation including pre-loaded packages of EMRTDApplet, EPKIApplet, and MoCApplet. The EPKIApplet and the MoCApplet are out of the scope of the TOE. The EMRTDApplet is default selected after product reset. The applets are installed and initialized in Phase 2 “TOE Manufacturing” Step 3 “Embedded software loading” of TOE life cycle (see chap. 6.4.3). Upgrading of the applets and loading of further applets post-issuing is possible.

The STeID JC Open OS Operating System and the EMRTDApplet Java Card applet loaded in the non-volatile memory (NVM) of the IC during the manufacturing phase.

The EMRTDApplet uses the IC RAM and NVM for storage of operational and permanent data, to provide security functionality.

During the “TOE Operational Use” life cycle phase (Phase 4) the EMRTDApplet interacts with other external entities.

This ST is based on the ST of the underlying STeID JC Open OS platform [ST_SteidJCOS].

6.4.2 TOE usage and security features for operational use

A State or Organization issues travel documents to be used by the holder for international travel. The electronics document presenter presents the document to the inspection system to prove his or her identity. The document in context of this ST 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), and
- data elements on the TOE according to LDS for contactless machine reading. The authentication of the electronics document presenter is based on
  i. the possession of a valid document personalized for a holder with the claimed identity as given on the biographical data page, and
  ii. optional biometrics using the reference data stored in the travel document.

The issuing State or Organization ensures the authenticity of the data of genuine travel documents. The receiving State trusts a genuine document of an issuing State or Organization.

For this ST the travel document is viewed as unit of:

- the **physical part of the travel document** in form of paper, plastic and chip (TOE). It presents visual readable data including (but not limited to) personal data of the document holder:
  i. the biographical data on the biographical data page of the travel document surface,
  ii. the printed data in the Machine-Readable Zone (MRZ), and
  iii. the printed portrait
- the **logical travel document** that is data of the document holder stored according to the Logical Data Structure [ICAO_9303] as specified by ICAO on the contact based or contactless integrated circuit. It presents contact based / contactless readable data including (but not limited to) personal data of the document holder:
  i. the digital Machine-Readable Zone Data (digital MRZ data, EF.DG1)
  ii. the digitized portraits (EF.DG2)
  iii. the optional biometric reference data of finger(s) (EF.DG3) or iris image(s) (EF.DG4) or both[1]
  iv. the other data according to LDS (EF.DG5 to EF.DG16)
  v. the Document security object (SOD)

The issuing State or Organisation implements security features of the travel document to maintain the authenticity and integrity of the travel document and their data. The physical part of the travel document and the travel document's chip are identified by the Document Number.

The physical part of the travel document is protected by physical security measures (e.g. watermark on paper, security printing), logical (e.g. authentication keys of the TOE) and organizational security measures (e.g. control of materials, personalization procedures) [ICAO_9303]. These security measures include the binding of the travel document's chip to the travel document.

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

[1] These biometric reference data are optional according to [ICAO_9303]. It is assumed that the issuing State or Organization uses this option and protects these data by means of EAC

The ICAO defines the baseline security methods Passive Authentication and the optional advanced security methods Basic Access Control to the logical travel document, Active Authentication of the travel document's chip, Extended Access Control to and the Data Encryption of sensitive biometrics as optional security measure in the [ICAO_9303], and Password Authenticated Connection Establishment [ICAO_TR]. The Passive Authentication Mechanism is performed completely and independently of the TOE by the TOE environment.

The TOE protects the integrity of logical travel document by write-only-once access control and by physical means, and the confidentiality of logical TRAVEL DOCUMENT by the Extended Access Control Mechanism.

The PACE is a security feature supported by the TOE. This mechanism shall be evaluated considering high attack potential (i.e. AVA_VAN.5). For the PACE protocol the TOE performs the following steps:

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

After successful key negotiation the terminal and the TOE provide private communication (secure messaging).

The TOE implement the Extended Access Control (EAC) as defined in [TR-03110-1]. The EAC consists of two parts

- (i) the Chip Authentication Protocol v.1 and
- (ii) the Terminal Authentication Protocol v.1

The Chip Authentication Protocol v.1

- (i) authenticates the TOE to the inspection system and
- (ii) establishes secure messaging which is used by Terminal Authentication Protocol v.1 to protect the confidentiality and integrity of the sensitive biometric reference data during their transmission from the TOE to the inspection system.

Therefore, Terminal Authentication Protocol v.1 can only be performed if Chip Authentication Protocol v.1 has been successfully executed.

The Terminal Authentication Protocol v.1 consists of

- (i) the authentication of the inspection system as entity authorized by the receiving State or Organisation through the issuing State, and
- (ii) an access control by the TOE to allow reading the sensitive biometric reference data only to successfully authenticated authorized inspection systems.

The issuing State or Organisation authorizes the receiving State by means of certification the authentication public keys of Document Verifiers who create Inspection System Certificates.

The TOE implements the Active Authentication as defined in [ICAO_9303]. Keys for Active Authentication can be loaded into the TOE. These operations take place at personalization time.

6.4.3 Life Cycle

The life cycle of the TOE is described in the PP MRTD EAC with PACE [PP-0056] and it is split in seven steps, grouped in four phases:

- Phase 1: “TOE Development” (steps 1 and 2)
- Phase 2: “TOE Manufacturing” (steps 3, 4, and 5)
- Phase 3: “TOE Personalization” (step 6)
- Phase 4: “TOE Operational Use” (step 7)

In the beneath discussion, the following entities and roles are identified:

- *Document Embedded Software Developer:* STMicroelectronics srl, Marcianise (CE), Italy
- *IC Developer:* STMicroelectronics SAS, Rousset, France
- *IC Manufacturer:* STMicroelectronics srl, Marcianise (CE), Italy
- *Document Manufacturer:* National accredited document manufacturing center
- *Document Personalization Agent:* Public administration or national accredited personalization center enabled to issue personalized documents

6.4.3.1 Phase 1 “TOE Development”

The TOE development includes the design of the IC and the development of the embedded software. The embedded software includes IC dedicated software, embedded cryptographic library, operating system, and applications.

The “TOE Development” is split into Step 1 and Step 2.

Phase 1 Step 1 “IC design and dedicated software development”

- Design of the IC, performed by the *IC Developer*
- Development of the IC dedicated software and embedded cryptographic library, performed by the *IC Developer*

Phase 1 Step 2 “OS and applications development”

- Development of the operating system, performed by the *Document Embedded Software Developer*
- Development of the applications, performed by the *Document Embedded Software Developer*. The binaries are always verified with the off-card verifier during their building and saved on a repository where they cannot be altered. Later the binaries are loaded on the TOE that verifies their integrity.
- Development of the guidance documentation, performed by the *Document Embedded Software Developer*

The embedded software is delivered to the *IC Manufacturer*.

6.4.3.2 Phase 2 “TOE Manufacturing”

The “TOE manufacturing” is split into Step 3, Step 4, and Step 5.

Phase 2 Step 3 “Embedded software loading”

The *IC manufacturer* makes the IC, loads the embedded software on the IC programmable memory, and delivers the IC and the guidance documentation to the *Document manufacturer*.

The TOE Delivery occurs at the end of this Phase 2 Step 3 “Embedded software loading”, from the *IC manufacturer* to the *Document manufacturer*.

Phase 2 Step 4 “Document manufacturing”

The *Document manufacturer* makes the document by combining the IC with the hardware for the contactless interface.

Phase 2 Step 5 “Document initialization”

The *Document manufacturer* creates the EMRTD application (application installation) or updates it (application upgrade) and loads third-parties’ packages, if any (post-issuing).

6.4.3.3 Phase 3 “TOE Personalization” (Step 6)

The *Document Personalization Agent* personalizes the TOE with:

- the survey of the document holder’s biographical data,
- the enrolment of the document 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 document,
- the writing of the TOE User Data and TSF Data into the logical document. This step is performed by the Personalization Agent and includes but is not limited to creation of:
  i. the digital MRZ data (EF.DG1),
  ii. the digitized portrait (EF.DG2) and
  iii. the Document security object
- Configuration of the TSF if necessary.
- The signing of the Document security object by the Document Signer [ICAO_9303] finalizes the personalization of the genuine travel document for the travel document holder.
- The personalized document (together with appropriate guidance for TOE use if necessary) is handed over to the travel document holder for operational use.

The TSF data (data created by and for the TOE, that might affect the operation of the TOE) comprise (but are not limited to) the Personalization Agent Authentication Key(s), the Terminal Authentication trust anchor, the effective date and the Chip Authentication Private Key

6.4.3.4 Phase 4 “TOE Operational Use” (Step 7)

The TOE is used by the document holder and the inspection systems. The user data can be read according to the security policy of the issuing State or Organization and can be used according to the security policy of the issuing State but they can never be modified.

Application note: The authorized Personalization Agents might be allowed to add (not to modify) data in the other data groups of the MRTD application (e.g. person(s) to notify

EF.DG16) in the Phase 4 “TOE Operational Use”. This will imply an update of the Document Security Object including the re-signing by the Document Signer.

Application note: The Phase 1 (steps 1 and 2) and Phase 2 Step 3 are part of the TOE evaluation. The TOE delivery is after Phase 2 Step 3 “Embedded software loading”. Phase 2 Step 4 “Document manufacturing” is of minor security relevance and so is not part of the CC evaluation under ALC. The issuing State or Organization is responsible for this production step.

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

The antenna, the EPKIApplet Java Card applet, and the MoCApplet Java Card applet are not in the scope of 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 travel document, nevertheless these parts are not inevitable for the secure operation of the TOE.

7 Conformance claim

7.1 CC Conformance Claim

This Security Target claims conformance to:

- Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and General Model [CC_P1]
- Common Criteria for Information Technology Security Evaluation, Part 2: Security Functional Components [CC_P2]
- Common Criteria for Information Technology Security Evaluation, Part 3: Security Assurance Requirements [CC_P3]

The ST claims conformance to CC Part 2 extended and CC Part 3 conformant.

For the evaluation the following methodology is used:

- Common Methodology for Information Technology Security Evaluation, Evaluation Methodology [CEM]

7.2 PP Claim

This Security Target claims strict conformance to:

- Protection Profile Machine Readable Travel Document with “ICAO Application", Extended Access Control with PACE [PP-0056]

7.3 Package Claim

This Security Target claims conformance to the assurance package EAL5+, that is EAL5 augmented with ALC_DVS.2 and AVA_VAN.5 as defined in [CC_P3].

7.4 Conformance Claim Rationale

This Security Target claims strict conformance to EAC PP [PP-0056].

All the contents of Protection Profile EAC [PP-0056] have been added to this Security Target. In addition, the following items have been added to specify the Active Authentication functions:

- the Security Objective “OT.Active_Auth_MRTD_Proof”,
- the Security Objectives for the Operational Environment “**OE.Active_Auth_Sign**” and “**OE.Active_Auth_Verif**”,
- the Organizational Security Policies “**P.Active_Auth**”, and
- the Security Functional Requirement “**FCS_COP.1/AA**” (Cryptographic operation – Active Authentication)
- the Security Functional Requirement “**FMT_MTD.1/AA**“ (Management of TSF data – Active Authentication Private Key).

The operations done for the SFRs taken from EAC PP [PP-0056] are clearly indicated.

The **Security Assurance Requirements** statement for the TOE in this Security Target includes all the requirements for the TOE from EAC PP [PP-0056].

8 Security problem definition

8.1 Assets

The assets to be protected by the TOE include the User Data stored in the TOE, user data transferred between the TOE and the terminal and travel document tracing data.

8.1.1 Authenticity of the travel document's chip

The authenticity of the travel document's chip personalised by the issuing State or Organisation for the travel document holder is used by the electronics document presenter to prove his possession of a genuine travel document.

8.1.2 Travel document tracing data

Technical information about the current and previous locations of the travel document gathered unnoticeable by the travel document holder recognising the TOE not knowing any PACE password.

TOE tracing data can be provided / gathered

Security properties for the asset are: unavailability

8.1.3 Sensitive user data

Sensitive biometric reference data.

Application note: the Sensitive user data are the following:

- EF.DG3 "Additional Id Feature - Finger(s)"
- EF.DG4 "Additional Id Feature - Iris(es)"

8.1.4 User data stored on the TOE

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

This asset covers 'User Data on the MRTD's chip', 'Logical MRTD Data' and 'Sensitive User Data' in BAC PP [PP-0055].

Security properties for the asset are: Confidentiality, Integrity and Authenticity.

8.1.5 User data transferred between the TOE and the terminal

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

User data can be received and sent.

Security properties for the asset are: Confidentiality, Integrity and Authenticity.

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

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

Security properties for the asset are: availability

8.1.7 Genuineness of the TOE

The TOE to be authentic in order to provide claimed security functionality in a proper way. This asset also covers ‘Authenticity of the MRTD’s chip’ in BAC PP [PP-0055].

Security properties for the asset are: availability.

8.1.8 Travel document communication establishment authorisation data

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

Security properties for the asset are: Confidentiality and Integrity

8.1.9 TOE internal secret cryptographic keys

Permanently or temporarily stored secret cryptographic material used by the TOE in order to enforce its security functionality including Active Authentication Public Key in EF.DG15.

Security properties for the asset are: Confidentiality and Integrity

8.1.10 TOE internal non-secret cryptographic material

Permanently or temporarily stored non-secret cryptographic (public) keys and other non-secret material (Document Security Object SOD containing digital signature) used by the TOE in order to enforce its security functionality.

Security properties for the asset are: Integrity and Authenticity

8.2 Subjects and external entities

This ST considers the following subjects:

8.2.1 Manufacturer

Generic term for the IC manufacturer, producing the integrated circuit, and the travel document manufacturer, integrating the IC with the travel document. The Manufacturer is the default user of the TOE during the “TOE Manufacturing” life cycle phase (Phase 2). The TOE does not distinguish between the IC manufacturer and travel document manufacturer using this role Manufacturer. This entity is commensurate with ‘Manufacturer’ in BAC PP [PP-0055].

8.2.2 Personalization Agent

The organisation acting on behalf of the travel document Issuer to personalise the travel document for the travel document holder by some or all of the following activities:

i. establishing the identity of the travel document holder for the biographic data in the travel document

ii. enrolling the biometric reference data of the travel document holder e.g. the portrait, the encoded finger image(s) and/or the encoded iris image(s)

iii. writing a subset of these data on the physical travel document (optical personalisation) and storing them in the travel document (electronic personalisation) for the travel document holder as defined in [ICAO_9303]

iv. writing the document details data

v. writing the initial TSF data

vi. signing the Document Security Object defined in [ICAO_9303] (in the role of DS)

The role 'Personalisation Agent' may be distributed among several institutions according to the operational policy of the travel document Issuer.

This entity is commensurate with 'Personalisation agent' in BAC PP [PP-0055].

8.2.3 Travel document holder

The person for whom the travel document Issuer has personalised the travel document. This entity is commensurate with 'MRTD Holder' in BAC PP [PP-0055].

8.2.4 Travel document presenter

A person presenting the travel document to a terminal and claiming the identity of the travel document holder. This external entity is commensurate with 'Traveler ' in BAC PP [PP-0055].

The travel document presenter can also be an attacker.

8.2.5 Terminal

Any technical system communicating with the TOE either through the contact interface or through the contactless interface.

The role 'Terminal' is the default role for any terminal being recognised by the TOE as not being PACE authenticated ('Terminal' is used by the travel document presenter). This entity is commensurate with 'Terminal' in BAC PP [PP-0055].

8.2.6 Inspection system (IS)

Technical system used to examine the travel document presented by the document holder, to verify its authenticity and to verify the holder as travel document holder.

The **Extended Inspection System** (EIS) performs the Advanced Inspection Procedure and therefore (i) contains a terminal for the communication with the travel document's chip, (ii) implements the terminals part of PACE and/or BAC; (iii) gets the authorization to read the logical travel document either under PACE or BAC by optical reading the travel document providing this information. (iv) implements the Terminal Authentication and Chip Authentication Protocols both v.1 according to [TR-03110-1] and (v) is authorized by the issuing State or Organisation through the Document Verifier of the receiving State to read the sensitive biometric reference data. Security attributes of the EIS are defined by means of the Inspection System Certificates. BAC may only be used if supported by the TOE. If both PACE and BAC are supported by the TOE and the BIS, PACE must be used.

8.2.7 Basic Inspection System with PACE (BIS-PACE)

A technical system being used by an inspecting authority and verifying the travel document presenter as the travel document holder (for ePassport: by comparing the real biometric data (face) of the travel document presenter with the stored biometric data (DG2) of the travel document holder). BIS-PACE implements the terminal's part of the PACE protocol and authenticates itself to the travel document using a shared password (PACE password) and supports Passive Authentication.

8.2.8 Attacker

A threat agent (a person or a process acting on his behalf) trying to undermine the security policy defined by the current PP, especially to change properties of the assets having to be maintained. The attacker is assumed to possess an at most high attack potential. Please note that the attacker might 'capture' any subject role recognised by the TOE. This external entity is commensurate with 'Attacker' in BAC PP [PP-0055].

Additionally, to the previously definition an attacker is refined as follows:

A threat agent trying:

i. to manipulate the logical travel document without authorization,

ii. to read sensitive biometric reference data,

iii. to forge a genuine travel document, or

iv. to trace a travel document

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

8.2.9 Digital Signer (DS)

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

8.2.10 Country Signing Certification Authority (CSCA)

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

8.2.11 Country Verifying Certification Authority

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

8.2.12 Document Verifier

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

8.3 Assumptions

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

8.3.1 A.Insp_Sys (Inspection Systems for global interoperability)

The Extended Inspection System (EIS) for global interoperability (i) includes the Country Signing CA Public Key and (ii) implements the terminal part of PACE and/or BAC. BAC may only be used if supported by the TOE.

If both PACE and BAC are supported by the TOE and the IS, PACE must be used.

The EIS reads the logical travel document under PACE or BAC and performs the Chip Authentication v.1 to verify the logical travel document and establishes secure messaging. The EIS supports the Terminal Authentication Protocol v.1 in order to ensure access control and is authorized by the issuing State or Organisation through the Document Verifier of the receiving State to read the sensitive biometric reference data.

Justification: The assumption A.Insp_Sys does not confine the security objectives of PACE PP [PP-0068] as it repeats the requirements of P.Terminal and adds only assumptions for the Inspection Systems for handling the EAC functionality of the TOE.

8.3.2 A.Auth_PKI (PKI for Inspection Systems)

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

Justification: This assumption only concerns the EAC part of the TOE. The issuing and use of card verifiable certificates of the Extended Access Control is neither relevant for the PACE part of the TOE nor will the security objectives of PACE PP [PP-0068] be restricted by this assumption. For the EAC functionality of the TOE the assumption is necessary because it covers the pre-requisite for performing the Terminal Authentication Protocol v.1.

8.3.3 A.Passive_Auth (PKI for Passive Authentication)

The issuing and receiving States or Organisations establish a public key infrastructure for passive authentication i.e. digital signature creation and verification for the logical travel document. The issuing State or Organisation runs a Certification Authority (CA) which securely generates, stores and uses the Country Signing CA Key pair. The CA keeps the Country Signing CA Private Key secret and is recommended to distribute the Country Signing CA

Public Key to ICAO, all receiving States maintaining its integrity. The Document Signer (i) generates the Document Signer Key Pair, (ii) hands over the Document Signer Public Key to the CA for certification, (iii) keeps the Document Signer Private Key secret and (iv) uses securely the Document Signer Private Key for signing the Document Security Objects of the travel documents. The CA creates the Document Signer Certificates for the Document Signer Public Keys that are distributed to the receiving States and Organisations. It is assumed that the Personalisation Agent ensures that the Document Security Object contains only the hash values of genuine user data according to [ICAO_9303].

8.4 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.

8.4.1 T.Read_Sensitive_Data (Read the sensitive biometric reference data)

Adverse action: An attacker tries to gain the sensitive biometric reference data through the communication interface of the travel document's chip. The attack **T.Read_Sensitive_Data** is similar to the threat **T.Skimming** in BAC PP [PP-0055] in respect of the attack path (communication interface) and the motivation (to get data stored on the travel document's chip) but differs from those in the asset under the attack (sensitive biometric reference data vs. digital MRZ, digitized portrait and other data), the opportunity (i.e. knowing the PACE Password) and therefore the possible attack methods. Note, that the sensitive biometric reference data are stored only on the travel document's chip as private sensitive personal data whereas the MRZ data and the portrait are visually readable on the physical part of the travel document as well.

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

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

8.4.2 T.Counterfeit (Counterfeit of travel document chip data)

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

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

Asset: authenticity of user data stored on the TOE

8.4.3 T.Skimming (Skimming travel document / Capturing Card-Terminal Communication)

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

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

Asset: confidentiality of logical travel document data

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

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

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

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

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

Asset: confidentiality of logical travel document data

Application Note: A product using BIS-BAC cannot avert this threat in the context of the security policy defined in this ST.

8.4.5 T.Tracing (Tracing travel document)

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

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

Asset: privacy of the travel document holder

Application Note: This Threat completely covers and extends “T.Chip-ID” from BAC PP [PP-0055].

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

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

8.4.6 T.Abuse-Func (Abuse of Functionality)

Adverse action: An attacker may use functions of the TOE which shall not be used in the “TOE operational use” life cycle phase (Phase 4) in order (i) to manipulate or to disclose the User Data stored in the TOE, (ii) to manipulate or to disclose the TSF-data stored in the TOE or (iii) to manipulate (bypass, deactivate or modify) soft-coded security functionality of the TOE. This threat addresses the misuse of the functions for the initialisation and personalisation in the “TOE operational use” life cycle phase (Phase 4) after delivery to the travel document holder.

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

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

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

8.4.7 T.Information_Leakage (Information Leakage from travel document)

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

Threat agent: having high attack potential

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

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

8.4.8 T.Phys-Tamper (Physical Tampering)

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

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

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

Application Note: Physical tampering may be focused directly on the disclosure or manipulation of the user data (e.g. the biometric reference data for the inspection system) or the TSF data (e.g. authentication key of the travel document) or indirectly by preparation of the TOE to following attack methods by modification of security features (e.g. to enable information leakage through power analysis). Physical tampering requires a direct interaction with the travel document's internals. Techniques commonly employed in IC failure analysis and IC reverse engineering efforts may be used. Before that, hardware security mechanisms and layout characteristics need to be identified. Determination of software design including treatment of the user data and the TSF data may also be a pre-requisite. The modification may result in the deactivation of a security function. Changes of circuitry or data can be permanent or temporary.

8.4.9 T.Malfunction (Malfunction due to Environmental Stress)

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

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

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

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

8.4.10 T.Forgery (Forgery of data)

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

Threat agent: having high attack potential.

Asset: integrity of the travel document.

8.5 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_P1]).

8.5.1 P.Sensitive_Data (Privacy of sensitive biometric reference data)

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

8.5.2 P.Personalisation (Personalisation of the travel document by issuing State or Organisation only)

The issuing State or Organisation guarantees the correctness of the biographical data, the printed portrait and the digitized portrait, the biometric reference data and other data of the logical travel document with respect to the travel document holder. The personalisation of the

travel document for the holder is performed by an agent authorized by the issuing State or Organisation only.

8.5.3 P.Pre-Operational (Pre-operational handling of the travel document)

The travel document Issuer issues the travel document and approves it using the terminals complying with all applicable laws and regulations.

i. The travel document Issuer guarantees correctness of the user data (amongst other of those, concerning the travel document holder) and of the TSF-data permanently stored in the TOE

ii. The travel document Issuer uses only such TOE's technical components (IC) which enable traceability of the travel documents in their manufacturing and issuing life cycle phases, i.e. before they are in the operational phase.

iii. If the travel document Issuer authorises a Personalisation Agent to personalise the travel document for travel document holders, the travel document Issuer has to ensure that the Personalisation Agent acts in accordance with the travel document Issuer's policy.

8.5.4 P.Card_PKI (PKI for Passive Authentication - issuing branch)

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

1. The travel document Issuer shall establish a public key infrastructure for the passive authentication, i.e. for digital signature creation and verification for the travel document. For this aim, he runs a Country Signing Certification Authority (CSCA). The travel document Issuer shall publish the CSCA Certificate (CCSCA).

2. The CSCA shall securely generate, store and use the CSCA key pair. The CSCA shall keep the CSCA Private Key secret and issue a self-signed CSCA Certificate (CCSCA) having to be made available to the travel document Issuer by strictly secure means. The CSCA shall create the Document Signer Certificates for the Document Signer Public Keys (CDS) and make them available to the travel document Issuer

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

8.5.5 P.Trustworthy_PKI (Trustworthiness of PKI)

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

8.5.6 P.Manufact (Manufacturing of the travel document's chip)

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

8.5.7 P.Terminal (Abilities and trustworthiness of terminals)

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

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

8.5.8 P.Active_Auth (Active Authentication)

The TOE implements the Active Authentication according to [ICAO_9303]

9 Security objectives

This chapter describes the security objectives for the TOE (OTs) and the security objectives for the Operation Environment (OEs) of the TOE.

9.1 Security Objectives for the TOE (OTs)

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.

9.1.1 OT.Sens_Data_Conf (Confidentiality of sensitive biometric reference data)

The TOE must ensure the confidentiality of the sensitive biometric reference data (see 8.1.3) by granting read access only to authorized Extended Inspection Systems. The authorization of the inspection system is drawn from the Inspection System Certificate used for the successful authentication and shall be a non-strict subset of the authorization defined in the Document Verifier Certificate in the certificate chain to the Country Verifier Certification Authority of the issuing State or Organisation. The TOE must ensure the confidentiality of the logical travel document data during their transmission to the Extended Inspection System. The confidentiality of the sensitive biometric reference data shall be protected against attacks with high attack potential.

9.1.2 OT.Chip_Auth_Proof (Proof of the travel document's chip authenticity)

The TOE must support the Inspection Systems to verify the identity and authenticity of the travel document's chip as issued by the identified issuing State or Organisation by means of the Chip Authentication Protocol v1. The authenticity proof provided by travel document's chip shall be protected against attacks with high attack potential.

Application note: The OT.Chip_Auth_Proof implies the travel document's chip to have (i) a unique identity as given by the travel document's Document Number, (ii) a secret to prove its identity by knowledge i.e. a private authentication key as TSF data. The TOE shall protect this TSF data to prevent their misuse. The terminal shall have the reference data to verify the authentication attempt of travel document's chip i.e. a certificate for the Chip Authentication Public Key that matches the Chip Authentication Private Key of the travel document's chip. This certificate is provided by (i) the Chip Authentication Public Key (EF.DG14) in the LDS defined in [ICAO_9303] and (ii) the hash value of DG14 in the Document Security Object signed by the Document Signer.

9.1.3 OT.Data_Integrity (Integrity of Data)

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

9.1.4 OT.Data_Authenticity (Authenticity of Data)

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

Authentication. It shall happen by enabling such a verification at the terminal-side (at receiving by the terminal) and by an active verification by the TOE itself (at receiving by the TOE).

9.1.5 OT.Data_Confidentiality (Confidentiality of data)

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

9.1.6 OT.Tracing (Tracing travel document)

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

9.1.7 OT.Prot_Abuse-Func (Protection against Abuse of Functionality)

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

9.1.8 OT.Prot_Inf_Leak (Protection against Information Leakage)

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

- 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.

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

9.1.9 OT.Prot_Phys-Tamper (Protection against Physical Tampering)

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

- measuring through galvanic contacts 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.

9.1.10 OT.AC_Pers (Access Control for Personalization of logical MRTD)

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

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

9.1.11 OT.Prot_Malfunction (Protection against Malfunctions)

The TOE must ensure its correct operation. The TOE must prevent its operation outside the normal operating conditions where reliability and secure operation have not been proven or tested. This is to prevent functional errors in the TOE. The environmental conditions may include external energy (esp. electromagnetic) fields, voltage (on any contacts), clock frequency or temperature.

9.1.12 OT.Identification (Identification and Authentication of the TOE)

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

9.1.13 OT.Active_Auth_MRTD_Proof (Proof of MRTD's chip authenticity by Active Authentication)

The TOE shall support the Inspection Systems to verify the identity and authenticity of the MRTD's chip as issued by the identified issuing State or Organization by means of the Active Authentication as defined in 'ICAO Doc 9303' [ICAO_9303]. The Active Authentication mechanism provided by the TOE shall resist to high potential attack.

9.2 Security Objectives for the Operational Environment (OEs)

9.2.1 Issuing State or Organization

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

9.2.1.1 OE.Legislative_Compliance (Issuing of the travel document)

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

9.2.1.2 OE.Passive_Auth_Sign (Authentication of travel document by Signature)

The travel document Issuer has to establish the necessary public key infrastructure as follows: the CSCA acting on behalf and according to the policy of the travel document Issuer must (i) generate a cryptographically secure CSCA Key Pair, (ii) ensure the secrecy of the CSCA

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

9.2.1.3 OE.Personalization (Personalization of travel document)

The travel document Issuer must ensure that the Personalisation Agents acting on his behalf (i) establish the correct identity of the travel document holder and create the biographical data for the travel document, (ii) enroll the biometric reference data of the travel document holder, (iii) write a subset of these data on the physical Passport (optical personalisation) and store them in the travel document (electronic personalisation) for the travel document holder as defined in [ICAO_9303], (iv) write the document details data, (v) write the initial TSF data, (vi) sign the Document Security Object defined in [ICAO_9303] (in the role of a DS).

9.2.1.4 OE.Auth_Key_Travel_Document (Travel document Authentication Key)

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

Justification: This security objective for the operational environment is needed in order to counter the Threat **T.Counterfeit** as it specifies the pre-requisite for the Chip Authentication Protocol v.1 which is a feature of the TOE.

9.2.1.5 OE.Authoriz_Sens_Data (Authorization for Use of Sensitive Biometric Reference Data)

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

Justification: This security objective for the operational environment is needed in order to handle the Threat **T.Read_Sensitive_Data**, the Organisational Security Policy **P.Sensitive_Data** and the Assumption **A.Auth_PKI** as it specifies the pre-requisite for the Terminal Authentication Protocol v.1 as it concerns the need of an PKI for this protocol and the responsibilities of its root instance. The Terminal Authentication Protocol v.1 is a feature of the TOE.

9.2.1.6 OE.Active_Auth_Sign (Active Authentication of logical MRTD by Signature)

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

9.2.2 Receiving State or Organization

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

9.2.2.1 OE.Exam_Travel_Document (Examination of the physical part of the travel document)

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

Justification: This security objective for the operational environment is needed in order to handle the Threat **T.Counterfeit** and the Assumption **A.Insp_Sys** by demanding the Inspection System to perform the Chip Authentication protocol v.1. OE.Exam_Travel_Document counters **T.Forgery** and **A.Passive_Auth**. This is done because a new type of Inspection System is introduced in this ST as the Extended Inspection System is needed to handle the additional features of a travel document with Extended Access Control.

9.2.2.2 OE.Prot_Logical_Travel_Document (Protection of data from the logical travel document)

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

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

9.2.2.3 OE.Ext_Insp_Systems (Authorization of Extended Inspection Systems)

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

Justification: This security objective for the operational environment is needed in order to handle the Threat **T.Read_Sensitive_Data**, the Organisational Security Policy

P.Sensitive_Data and the Assumption **A.Auth_PKI** as it specifies the pre-requisite for the Terminal Authentication Protocol v.1 as it concerns the responsibilities of the Document Verifier instance and the Inspection Systems.

9.2.2.4 OE.Terminal (Terminal operating)

The terminal operators must operate their terminals as follows:

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

Application note: OE.Terminal completely covers and extends “OE.Exam_MRTD”, “OE.Passive_Auth_Verif“ and “OE.Prot_Logical_MRTD” from BAC PP [PP-0055].

9.2.2.5 OE.Travel_Document_Holder (Travel document holder Obligations)

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

9.2.2.6 OE.Active_Auth_Verif (Verification by Active Authentication)

The inspection systems to check the MRTD authenticity may use the active authentication verification, this is a stronger mechanism to guarantee the authenticity of the travel document.

9.3 Security Objective Rationale

The following table provides an overview for security objectives coverage.

Table 6: Security Objectives Rationale

Threats, Policies, and Assumptions \ Objectives	OT.Sens_Data_Conf	OT.Chip_Auth_Proof	OT.AC_Pers	OT.Data_Integrity	OT.Data_Authenticity	OT.Data_Confidentiality	OT.Tracing	OT.Prot_Abuse-Func	OT.Prot_Inf_Leak	OT.Identification	OT.Prot_Phys-Tamper	OT.Prot_Malfunction	OT.Active_Auth_MRTD_Proof	OE.Auth_Key_Travel_Document	OE.Authoriz_Sens_Data	OE.Exam_Travel_Document	OE.Prot_Logical_travel_Document	OE.Ext_Insp_Systems	OE.Personalization	OE.Passive_Auth_Sign	OE.Terminal	OE.Travel_Document_Holder	OE.Legislative_Compliance	OE.Active_Auth_Sign	OE.Active_Auth_Verif
T.Read_Sensitive_Data	x														x			x							
T.Counterfeit		x												x		x									
T.Skimming				x	x	x																x			
T.Eavesdropping						x																			
T.Tracing							x															x			
T.Abuse-Func								x																	
T.Information_Leakage									x																
T.Phys-Tamper											x														
T.Malfunction												x													
T.Forgery			x	x	x			x			x					x			x	x	x				
P.Sensitive_Data	x														x			x							
P.Personalization			x							x									x						
P.Manufact										x															
P.Pre-Operational			x							x									x				x		
P.Terminal																x					x				
P.Card_PKI																				x					
P.Trustworthy_PKI																				x					
P.Active_Auth													x											x	x
A.Insp_Sys																x	x								
A.Auth_PKI															x			x							
A.Passive_Auth																x				x					

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

Authentication of the TOE". The security objective **OT.AC_Pers** limits the management of TSF data and the management of TSF to the Personalisation Agent.

The OSP **P.Sensitive_Data** "Privacy of sensitive biometric reference data" is fulfilled and the threat T.Read_Sensitive_Data "Read the sensitive biometric reference data" is countered by the TOE-objective **OT.Sens_Data_Conf** "Confidentiality of sensitive biometric reference data" requiring that read access to the EF containing the sensitive biometric reference data (see 8.1.3) is only granted to authorized inspection systems. Furthermore, it is required that the transmission of these data ensures the data's confidentiality. The authorization is based on Document Verifier certificates issued by the issuing State or Organisation as required by **OE.Authoriz_Sens_Data** "Authorization for use of sensitive biometric reference data". The Document Verifier of the receiving State has to authorize Extended Inspection Systems by creating appropriate Inspection System certificates for access to the sensitive biometric reference data as demanded by **OE.Ext_Insp_Systems** "Authorization of Extended Inspection Systems".

The OSP **P.Terminal** "Abilities and trustworthiness of terminals" is countered by the security objective **OE.Exam_Travel_Document** additionally to the security objectives from PACE PP [PP-0068]. **OE.Exam_Travel_Document** enforces the terminals to perform the terminal part of the PACE protocol.

The OSP **P.Active_Auth** "Active Authentication" addresses the active authentication protocol as described in [ICAO_9303]. The TOE environment will detect partly forged logical travel document data by means of digital signature which will be created according to **OE.Active_Auth_Sign** "Active Authentication of logical travel document by Signature" and verified by the inspection system according to **OE.Active_Auth_Verif** "Verification by Active Authentication". This is possible only because genuine TOE enforce Active Authentication as specified in **OT.Active_Auth_Proof**.

The threat **T.Counterfeit** "Counterfeit of travel document chip data" addresses the attack of unauthorized copy or reproduction of the genuine travel document's chip. This attack is thwarted by chip an identification and authenticity proof required by **OT.Chip_Auth_Proof** "Proof of travel document's chip authentication" using an authentication key pair to be generated by the issuing State or Organisation. The Public Chip Authentication Key has to be written into EF.DG14 and signed by means of Documents Security Objects as demanded by **OE.Auth_Key_Travel_Document** "Travel document Authentication Key". According to **OE.Exam_Travel_Document** "Examination of the physical part of the travel document" the General Inspection system has to perform the Chip Authentication Protocol v.1 to verify the authenticity of the travel document's chip.

The threat **T.Forgery** "Forgery of data" addresses the fraudulent, complete or partial alteration of the User Data or/and TSF-data stored on the TOE or/and exchanged between the TOE and the terminal. Additionally to the security objectives from PACE PP [PP-0068] which counter this threat, the examination of the presented travel document according to **OE.Exam_Travel_Document** "Examination of the physical part of the travel document" shall ensure its authenticity by means of the physical security measures and detect any manipulation of the physical part of the travel document.

OT.Active_Auth_MRTD_Proof "Proof of travel document's chip authenticity by Active Authentication" using a authentication key pair to be generated by the issuing State or Organization. The Public Active Authentication Key has to be written into EF.DG15 The TOE environment will also detect partly forged logical travel document data by means of digital signature which will be created according to **OE.Active_Auth_Sign** "Active Authentication of logical travel document by Signature" and verified by the inspection system according to **OE.Active_Auth_Verif** "Verification by Active Authentication".

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

The assumption **A.Passive_Auth** “PKI for Passive Authentication” is directly covered by the security objective for the TOE environment **OE.Passive_Auth_Sign** “Authentication of travel document by Signature” from PACE PP [PP-0068] covering the necessary procedures for the Country Signing CA Key Pair and the Document Signer Key Pairs. The implementation of the signature verification procedures is covered by **OE.Exam_Travel_Document** “Examination of the physical part of the travel document”.

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

10 Extended components definition

This Security Target uses components defined as extensions to [CC_P2]. All these extended components are derived from EAC PP [PP-0056].

10.1 Family FAU_SAS (Audit Data Storage)

To define the security functional requirements of the TOE a sensitive family FAU_SAS (Audit Data Storage) of the Class FAU (Security Audit) is defined here. This family describes the functional requirements for the storage of audit data. It has a more general approach than FAU_GEN, because it does not necessarily require the data to be generated by the TOE itself and because it does not give specific details of the content of the audit records.

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

FAU_SAS	Audit data storage
Family behavior	This family defines functional requirements for the storage of audit data.

Component leveling

FAU_SAS.1	Requires the TOE to provide the possibility to store audit data.
Management:	FAU_SAS.1 There are no management activities foreseen.
Audit:	FAU_SAS.1 There are no actions defined to be auditable.

10.1.1 FAU_SAS.1 (Audit storage)

Hierarchical to:	No other components.
Dependencies:	No dependencies.
FAU_SAS.1.1	The TSF shall provide [assignment: authorized users] with the capability to store [assignment: list of audit information] in the audit records.

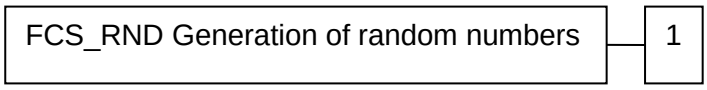
10.2 Family FCS_RND (Generation of random numbers)

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

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

FCS_RND	Generation of random numbers
Family behavior	This family defines quality requirements for the generation of random numbers which are intended to be used for cryptographic purposes.

Component leveling:



FCS_RND.1	Generation of random numbers requires that the random number generator implements defined security capabilities and that the random numbers meet a defined quality metric.
Management:	FCS_RND.1 There are no management activities foreseen.
Audit:	FCS_RND.1 There are no actions defined to be auditable.

10.2.1 FCS_RND.1 (Quality metric for random numbers)

Hierarchical to:	No other components.
Dependencies:	No dependencies.
FCS_RND.1.1	The TSF shall provide a mechanism to generate random numbers that meet [assignment*: a defined quality metric*].

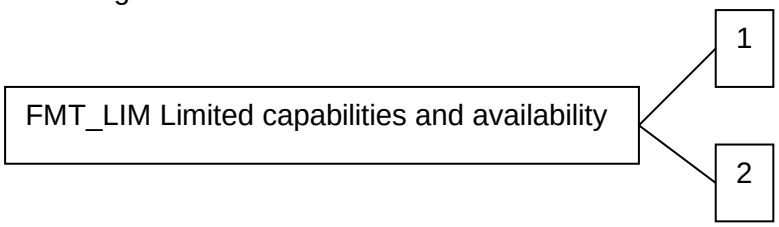
10.3 Family FMT_LIM (Limited capabilities and availability)

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 require that the TSF is built to provide only the capabilities (perform action, gather information) which are 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 lifecycle.
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 a sensitive 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.

10.3.1 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*].

10.3.2 FMT_LIM.2 (Limited availability)

Hierarchical to:	No other components.
Dependencies:	FMT_LIM.1 Limited capabilities.

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

Application Note: 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

1. 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,

2. 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.

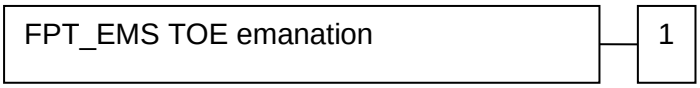
10.4 Family FPT_EMS (TOE Emanation)

The sensitive family FPT_EMS (TOE Emanation) of the Class FPT (Protection of the TSF) is defined here to describe the IT security functional requirements of the TOE. The TOE shall prevent attacks against the 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_P2].

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

FPT_EMS	TOE Emanation
Family behavior	This family defines requirements to mitigate intelligible emanations.

Component leveling:



FPT_EMS.1	TOE emanation has two constituents:
FPT_EMS.1.1	Limit of Emissions requires to not emit intelligible emissions enabling access to TSF data or user data.
FPT_EMS.1.2	Interface Emanation requires to not emit interface emanation enabling access to TSF data or user data.
Management:	FPT_EMS.1 There are no management activities foreseen.
Audit:	FPT_EMS.1 There are no actions defined to be auditable.

10.4.1 FPT_EMS.1 (TOE Emanation)

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

10.5 Family FIA_API (Authentication Proof of Identity)

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

Application Note: The other families of the Class FIA describe only the authentication verification of users' identity performed by the TOE and do not describe the functionality of the user to prove their identity. The following paragraph defines the family FIA_API in the style of the Common Criteria part 2 ([CC_P2], chapter "Explicitly stated IT security requirements (APE_SRE)") from a TOE point of view.

FIA_API	Authentication Proof of Identity
Family behavior	This family defines functions provided by the TOE to prove their identity and to be verified by an external entity in the TOE IT environment.

Component leveling:

FIA_API Authentication Proof of Identity	1

Management:	FIA_API.1 The following actions could be considered for the management functions in FMT: Management of authentication information used to prove the claimed identity.
Audit:	There are no actions defined to be auditable.

10.5.1 FIA_API.1 (Authentication Proof of Identity)

Hierarchical to:	No other components.
Dependencies:	No dependencies.
FIA_API.1.1	The TSF shall provide a [assignment: *authentication mechanism*] to prove the identity of the [assignment: *authorized user or role*].

11 Security requirements

This section of the ST defines the detailed security requirements that shall be satisfied by the TOE. The statement of **TOE security requirements** shall define the *functional* and *assurance* security requirements that the TOE needs to satisfy to meet the security objectives for the TOE.

The CC allows several operations to be performed on functional requirements; *refinement*, *selection*, *assignment*, and *iteration* are defined in section 8.1 of Part 1 of the Common Criteria [CC_P1]. Each of these operations is used in this ST.

The **refinement** operation is used to add detail to a requirement, and thus further restricts a requirement. Refinements of security requirements are denoted in such a way that added words are in **bold text** and removed are ~~crossed out~~.

The **selection** operation is used to select one or more options provided by the CC in stating a requirement. Selections having been made by the PP author are denoted as underlined text. Selections made by the ST author appear *slanted and underlined*.

The **assignment** operation is used to assign a specific value to an unspecified parameter, such as the length of a password. Assignments having been made by the PP author are denoted by showing as underlined text. Assignments made by the ST author appear *slanted and underlined*.

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

This part defines the detailed security requirements that are satisfied by the TOE. These requirements comprise functional components from CC Part 2 [CC_P1], Extended components as defined in Chapter 10, and the assurance components as defined for the Evaluation Assurance Level EAL5 from Common Criteria Part 3 [CC_P3] augmented with ALC_DVS.2 and AVA_VAN.5

The definition of the subjects “Manufacturer”, “Personalization Agent”, “Extended Inspection System”, “Country Verifying Certification Authority”, “Document Verifier” and “Terminal” used in the following chapter is given in section 8. Note, that all these subjects are acting for homonymous external entities. 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_P2]. The operation “load” is synonymous with “import” used in [CC_P2].

Security attributes

The following table defines the security attributes of this ST.

Table 7: Security attributes

Security attribute	Values	Meaning
Terminal authentication status	None (any Terminal)	Default role (i.e. without authorization after start-up)

Security attribute	Values	Meaning
	CVCA	Roles defined in the certificate used for authentication ([TR-03110-1]); Terminal is authenticated as Country Verifying Certification Authority after successful CA v.1 and TA v.1
	DV (domestic)	Roles defined in the certificate used for authentication ([TR-03110-1]); Terminal is authenticated as domestic Document Verifier after successful CA v.1 and TA v.1
	DV (foreign)	Roles defined in the certificate used for authentication ([TR-03110-1]); Terminal is authenticated as foreign Document Verifier after successful CA v.1 and TA v.1
	IS	Roles defined in the certificate used for authentication ([TR-03110-1]); Terminal is authenticated as Extended Inspection System after successful CA v.1 and TA v.1
Terminal Authorization	None	-
	Iris	Read access to Iris
	Fingerprint	Read access to Fingerprint
	Fingerprint / Iris	Read access to Fingerprint and Iris

Application note: the Terminal Authorization security attribute has the following meaning:

- Fingerprint means Read access to EF.DG3 “Additional Id Feature - Finger(s)”
- Iris means Read access to EF.DG4 “Additional Id Feature - Iris(es)”
- Fingerprint and Iris means Read access to EF.DG3 “Additional Id Feature - Finger(s)” and EF.DG4 “Additional Id Feature - Iris(es)”

Keys and certificates

The following table provides an overview of the keys and certificates used.

Table 8: Keys and certificates

Name	Data
TOE intrinsic secret cryptographic keys	Permanently or temporarily stored secret cryptographic material used by the TOE in order to enforce its security functionality
Country Verifying Certification Authority Private Key (SK_{CVCA})	The Country Verifying Certification Authority (CVCA) holds a private key (SK_{CVCA}) used for signing the Document Verifier Certificates.
Country Verifying Certification Authority Public Key (PK_{CVCA})	The TOE stores the Country Verifying Certification Authority Public Key (PK_{CVCA}) as part of the TSF data to verify the Document Verifier Certificates. The PK_{CVCA} has the security attribute Current Date as the most recent valid effective date of the Country Verifying Certification Authority Certificate or of a domestic Document Verifier Certificate.

Country Verifying Certification Authority Certificate (C_{CVCA})	The Country Verifying Certification Authority Certificate may be a self-signed certificate or a link certificate (cf. [TR-03110-1] and Glossary). It contains (i) the Country Verifying Certification Authority Public Key (PK_{CVCA}) as authentication reference data, (ii) the coded access control rights of the Country Verifying Certification Authority, (iii) the Certificate Effective Date and the Certificate Expiration Date as security attributes.
Document Verifier Certificate (C_{DV})	The Document Verifier Certificate C_{DV} is issued by the Country Verifying Certification Authority. It contains (i) the Document Verifier Public Key (PK_{DV}) as authentication reference data (ii) identification as domestic or foreign Document Verifier, the coded access control rights of the Document Verifier, the Certificate Effective Date and the Certificate Expiration Date as security attributes.
Inspection System Certificate (C_{IS})	The Inspection System Certificate (C_{IS}) is issued by the Document Verifier. It contains (i) as authentication reference data the Inspection System Public Key (PK_{IS}), (ii) the coded access control rights of the Extended Inspection System, the Certificate Effective Date and the Certificate Expiration Date as security attributes.
Chip Authentication Public Key Pair	The Chip Authentication Public Key Pair (SK_{ICC}, PK_{ICC}) are used for Key Agreement Protocol: Diffie-Hellman (DH) according to RFC 2631 or Elliptic Curve Diffie-Hellman according to ISO 11770-3 [11].
Chip Authentication Public Key (PK_{ICC})	The Chip Authentication Public Key (PK_{ICC}) is stored in the EF.DG14 Chip Authentication Public Key of the TOE's logical travel document and used by the inspection system for Chip Authentication v.1 of the travel document's chip. It is part of the user data provided by the TOE for the IT environment
Chip Authentication Private Key (SK_{ICC})	The Chip Authentication Private Key (SK_{ICC}) is used by the TOE to authenticate itself as authentic travel document's chip. It is part of the TSF data.
Country Signing Certification Authority Key Pair	Country Signing Certification Authority of the issuing State or Organization signs the Document Signer Public Key Certificate with the Country Signing Certification Authority Private Key and the signature will be verified by receiving State or Organization (e.g. an Extended Inspection System) with the Country Signing Certification Authority Public Key.
Document Signer Key Pairs	Document Signer of the issuing State or Organization signs the Document Security Object of the logical travel document with the Document Signer Private Key and the signature will be verified by an Extended Inspection System of the receiving State or Organization with the Document Signer Public Key.
Chip Authentication Session Keys	Secure messaging encryption key and MAC computation key agreed between the TOE and an Inspection System in result of the Chip Authentication Protocol v.1.
PACE Session Keys	Secure messaging encryption key and MAC computation key agreed between the TOE and an Inspection System in result of PACE.

Application note: The Country Verifying Certification Authority identifies a Document Verifier as “domestic” in the Document Verifier Certificate if it belongs to the same State as the Country Verifying Certification Authority. The Country Verifying Certification Authority identifies a Document Verifier as “foreign” in the Document Verifier Certificate if it does not belong to the same State as the Country Verifying Certification Authority. From travel document’s point of view the domestic Document Verifier belongs to the issuing State or Organisation.

11.1 Security Functional Requirements (SFRs)

The following table summarizes all TOE security functional requirements of this ST. They are described in the following sections.

Table 9: SFR Overview

Class FAU: Security Audit	
FAU_SAS.1	Audit Storage
Class FCS: Cryptographic Support	
FCS_CKM.1/CA-DH-3DES	Cryptographic key generation – Diffie-Hellman for Chip Authentication session keys
FCS_CKM.1/CA-DH-AES	
FCS_CKM.1/CA-ECDH-3DES	
FCS_CKM.1/CA-ECDH-AES	
FCS_CKM.1/DH-PACE-3DES	Cryptographic key generation – Diffie-Hellman for PACE session keys
FCS_CKM.1/DH-PACE-AES	
FCS_CKM.1/ECDH-PACE-3DES	
FCS_CKM.1/ECDH-PACE-AES	
FCS_CKM.4	Cryptographic key destruction – Session key
FCS_COP.1/PACE_ENC	Cryptographic operation – Encryption/Decryption AES/3DES
FCS_COP.1/PACE_MAC	Cryptographic operation – MAC
FCS_COP.1/CA_ENC	Cryptographic operation – Symmetric Encryption/Decryption
FCS_COP.1/CA_MAC	Cryptographic operation – MAC
FCS_COP.1/SIG_VER	Cryptographic operation - Signature verification by travel document
FCS_COP.1/AA	Cryptographic operation – Active Authentication
FCS_RND.1	Random number generation - Quality metric for random numbers
Class FIA: Identification and Authentication	
FIA_AFL.1/PACE	Authentication failure handling - PACE authentication using non-blocking authorisation data
FIA_UID.1/PACE	Timing of identification
FIA_UAU.1/PACE	Timing of authentication
FIA_UAU.4/PACE	Single-use authentication mechanisms - Single-use authentication of the Terminal by the TOE
FIA_UAU.5/PACE	Multiple authentication mechanisms
FIA_UAU.6/PACE	Re-authenticating of the Terminal by the TOE
FIA_UAU.6/EAC	Re-authenticating of the Terminal by the TOE
FIA_API.1	Authentication Proof of Identity
Class FDP: User Data Protection	
FDP_RIP.1	Subset residual information protection
FDP_UCT.1/TRM	Basic data exchange confidentiality - MRTD
FDP_UIT.1/TRM	Data exchange integrity
FDP_ACC.1/TRM	Subset access control
FDP_ACF.1/TRM	Security attribute based access control

Class FMT: Security Management	
FMT_SMF.1	Specification of management functions
FMT_SMR.1/PACE	Security roles
FMT_LIM.1	Limited capabilities
FMT_LIM.2	Limited availability
FMT_MTD.1/INI_ENA	Management of TSF data - Writing of Initialization Data and Pre-personalization Data
FMT_MTD.1/INI_DIS	Management of TSF data - Disabling of Read Access to Initialization Data and Pre-personalization Data
FMT_MTD.1/PA	Management of TSF data - Personalization Agent
FMT_MTD.1/CVCA_INI	Management of TSF data - Initialization of CVCA Certificate and Current Date
FMT_MTD.1/CVCA_UPD	Management of TSF data - Country Verifying Certification Authority
FMT_MTD.1/DATE	Management of TSF data – Current Date
FMT_MTD.1/CAPK	Management of TSF data – Chip Authentication Private Key
FMT_MTD.1/AA	Management of TSF data – Active Authentication Private Key
FMT_MTD.1/KEY_READ	Management of TSF data – Key Read
FMT_MTD.3	Secure TSF data
Class FTP: Trusted Path/Channels	
FTP_ITC.1/PACE	Inter-TSF trusted channel after PACE
Class FPT: Protection of the TSF	
FPT_EMS.1	TOE emanation
FPT_FLS.1	Failure with preservation of secure state
FPT_TST.1	TSF testing
FPT_PHP.3	Resistance to physical attack

11.2 SFRs: Class FAU (Security Audit)

11.2.1 Family FAU_SAS (Audit Data Storage)

The TOE shall meet the following requirements for the storage of audit data.

11.2.1.1 FAU_SAS.1 (Audit storage)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No dependencies.
FAU_SAS.1.1	The TSF shall provide the Manufacturer[2] with the capability to store the Identification and Pre-Personalization Data[3] in the audit records.

Application note: The Manufacturer role is the default user identity assumed by the TOE in the “TOE Manufacturing life cycle phase (Phase 2). The IC manufacturer and the travel document manufacturer in the Manufacturer role write the Initialization Data and/or Pre-personalization Data as TSF Data of the TOE. The audit records are write-only-once data of the travel document (see FMT_MTD.1/INI_ENA in sec. 11.6.4.1 and FMT_MTD.1/INI_DIS in sec. 11.6.4.2).

[2] [assignment: *authorized users*]
[3] [assignment: *list of audit information*]

11.3 SFRs: Class FCS (Cryptographic Support)

11.3.1 Family FCS_CKM (Cryptographic key generation)

The TOE shall meet the following requirements for the generation of cryptographic keys. The iterations are caused by different cryptographic key generation algorithms to be implemented and key to be generated by the TOE.

11.3.1.1 FCS_CKM.1/DH_PACE (Diffie-Hellman for PACE session keys)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: [FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation] fulfilled by FCS_CKM.2/DH.

Justification: A Diffie-Hellman key agreement is used in order to have no key distribution, therefore FCS_CKM.2 makes no sense in this case.

FCS_CKM.4 Cryptographic key destruction: fulfilled by FCS_CKM.4

FCS_CKM.1.1 The TSF shall generate cryptographic keys in accordance with a specified cryptographic key generation algorithm [selection: Diffie-Hellman-Protocol compliant to [PKCS_#3], ECDH compliant to [TR-03111]] [4] and specified cryptographic key sizes [assignment: cryptographic key sizes] that meet the following: [ICAO_TR][5].

Iteration	[Selection: ……]	[Assignment: Cryptographic key sizes]
/DH-PACE-3DES	*Diffie-Hellman-Protocol compliant to [PKCS_#3]*	*112 bits*
/DH-PACE-AES	*Diffie-Hellman-Protocol compliant to [PKCS_#3]*	*128, 192 and 256 bits*
/ECDH-PACE-3DES	*ECDH compliant to [TR-03111]*	*112 bits*
/ECDH-PACE-AES	*ECDH compliant to [TR-03111]*	*128, 192 and 256 bits*

Application note: For [PKCS_#3] the RSA key length supported are 1024-, 2048-, 3072- and 4096-bits and for [TR-03111] the EC key length supported are 160-, 192-, 224-, 256-, 320-, 384-, 512- and 521-bits.

Application note: The TOE generates a shared secret value K with the terminal during the PACE protocol. This protocol may be based on the Diffie-Hellman-Protocol compliant to [PKCS_#3],] or on the ECDH compliant to [TR-03111]]. The shared secret value K is used for deriving the AES or DES session keys for message encryption and message authentication (PACE-K_{MAC}, PACE-K_{Enc}) according to [ICAO_TR] for the TSF required by FCS_COP.1/PACE_ENC and FCS_COP.1/PACE_MAC.

Application note: The TOE supports the following DH standardized domain parameters according to ICAO Doc 9303 Part 11 [ICAO_9303]:

[4] [assignment: *cryptographic key generation algorithm*]
[5] [assignment: list of standards]

1024-bit MODP Group with 160-bit Prime Order Subgroup
2048-bit MODP Group with 224-bit Prime Order Subgroup
2048-bit MODP Group with 256-bit Prime Order Subgroup

Application note: The TOE supports the following ECDH standardized domain parameters according to ICAO Doc 9303 Part 11 [ICAO_9303]:

NIST P-192 (secp192r1), NIST P-224 (secp224r1), NIST P-256 (secp256r1), NIST P-384 (secp384r1), NIST P-521 (secp521r1)
BrainpoolP192r1, BrainpoolP224r1, BrainpoolP256r1, BrainpoolP320r1, BrainpoolP384r1, BrainpoolP512r1

11.3.1.2 FCS_CKM.1/CA (Diffie-Hellman for Chip Authentication session keys)

Defined in: EAC PP [PP-0056]

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 *[*assignment*: cryptographic key generation algorithm]* and specified cryptographic key sizes *[*assignment*: cryptographic key sizes]*_that meet the following:[selection: *based on the Diffie-Hellman key derivation protocol compliant to [TR-03110-1] and [PKCS_#3], based on an ECDH protocol compliant to [TR-03111]*] [6].

Iteration	[Assignment: Cryptographic key generation algorithm]	[Assignment: Cryptographic key sizes]	[Selection: Based on…….]
/CA-DH-3DES	*DH Key Agreement Algorithm*	*112 bits*	*Diffie-Hellman key derivation protocol compliant to [TR-03110-1] and [PKCS_#3]*
/CA-DH-AES	*DH Key Agreement Algorithm*	*128, 192 and 256 bits*	*Diffie-Hellman key derivation protocol compliant to [TR-03110-1] and [PKCS_#3]*
/CA-ECDH-3DES	*ECDH Key Agreement Algorithm*	*112 bits*	*based on an ECDH protocol compliant to [TR-03111]*
/CA-ECDH-AES	*ECDH Key Agreement Algorithm*	*128, 192 and 256 bits*	*based on an ECDH protocol compliant to [TR-03111]*

Application note: For [PKCS_#3] the RSA key lengths supported are 1024-, 2048-, 3072- and 4096-bits and for [TR-03111] the EC key lengths supported are 160-, 192-, 224-, 256-, 320-, 384-, 512- and 521-bits.

Application note: The TOE implements the hash functions for the cryptographic primitive to derive the keys for secure messaging from any shared secrets of the Authentication

[6] [assignment: list of standards]

Mechanisms. The Chip Authentication Protocol v.1 may use SHA-1. The TOE implements additional hash functions SHA-224, SHA-256, SHA-384 and SHA-512.

Application note: The TOE destroys any session keys in accordance with FCS_CKM.4

11.3.1.3 FCS_CKM.4 (Cryptographic key destruction – Session keys)

Defined in:	PACE PP [PP-0068]
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]: fulfilled by FCS_CKM.1
FCS_CKM.4.1	The TSF shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method *physical deletion by overwriting the memory data with zeros*[7] that meets the following: *none*[8].

11.3.2 Family FCS_COP (Cryptographic operation)

The TOE shall meet the following requirements for the cryptographic operations. The iterations are caused by different cryptographic algorithms to be implemented by the TOE.

11.3.2.1 FCS_COP.1/PACE_ENC (Encryption / Decryption AES / 3DES for PACE)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	[FDP_ITC.1 Import of user data without security attributes, or FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation] FCS_CKM.4 Cryptographic key destruction
FCS_COP.1.1/PACE_ENC	The TSF shall perform secure messaging – encryption and decryption[9] in accordance with a specified cryptographic algorithm *AES and 3DES* in CBC mode[10] and cryptographic key sizes *112, 128, 192 and 256* bit[11] that meet the following: compliant to [ICAO_TR][12].

11.3.2.2 FCS_COP.1/PACE_MAC (MAC for PACE)

Defined in:	PACE PP [PP-0068]
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

[7] [assignment: *cryptographic key destruction method*]
[8] [assignment: *list of standards*]
[9] [assignment: *list of cryptographic operations*]
[10] [assignment: *cryptographic algorithm*]
[11] [assignment: *cryptographic key sizes*]
[12] [assignment: *list of standards*]

FCS_COP.1.1/PACE_MAC The TSF shall perform secure messaging – message authentication code[13] in accordance with a specified cryptographic algorithm *CMAC and Retail-MAC*[14] and cryptographic key sizes *112, 128, 192 and 256* bit[15] that meet the following: compliant to [ICAO_TR][16].

11.3.2.3 FCS_COP.1/CA_ENC (Symmetric encryption/decryption for Chip Authentication)

Defined in: EAC PP [PP-0056]

Hierarchical to: No other components.

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

FCS_COP.1.1/CA_ENC The TSF shall perform secure messaging – encryption and decryption[17] in accordance with a specified cryptographic algorithm *AES and 3DES*[18] and cryptographic key sizes *112, 128, 192 and 256* bit[19] that meet the following: *compliant to [TR-03110-1]*[20].

Application note: The TOE implements the cryptographic primitives (e.g. 3DES and/or AES) for secure messaging with encryption of the transmitted data. The keys are agreed between the TOE and the terminal as part of the Chip Authentication Protocol v.1.

11.3.2.4 FCS_COP.1/CA_MAC (MAC for Chip Authentication)

Defined in: EAC PP [PP-0056]

Hierarchical to: No other components.

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

FCS_COP.1.1/CA_MAC The TSF shall perform secure messaging – message authentication code[21] in accordance with a specified cryptographic algorithm *CMAC and Retail-MAC* [22] and cryptographic key sizes *112, 128, 192 and 256* bit[23] that meet the following: *compliant to [TR-03110-1]*[24].

Application note: The TOE implements the cryptographic primitive for secure messaging with encryption and message authentication code over the transmitted data. The key is agreed between the TSF by Chip Authentication Protocol v.1.

[13] [assignment: *list of cryptographic operations*]
[14] [assignment: *cryptographic algorithm*]
[15] [assignment: *cryptographic key sizes*]
[16] [assignment: *list of standards*]
[17] [assignment: *list of cryptographic operations*]
[18] [assignment: *cryptographic algorithm*]
[19] [assignment: *cryptographic key sizes*]
[20] [assignment: *list of standards*]
[21] [assignment: *list of cryptographic operations*]
[22] [assignment: *cryptographic algorithm*]
[23] [assignment: *cryptographic key sizes*]
[24] [assignment: *list of standards*]

11.3.2.5 FCS_COP.1/SIG_VER (Signature verification by travel document)

Defined in: EAC PP [PP-0056]

Hierarchical to: No other components.

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

FCS_COP.1.1/SIG-VER The TSF shall perform digital signature verification[25] in accordance with a specified cryptographic algorithm *ECDSA, RSA PSS and RSA PKCS#1*[26] and cryptographic key sizes *192-, 224-, 256-, 320-, 384-, 512-, and 521-bits for EC Key and 1024-, 2048-, 3072- and 4096-bits for RSA key* that meet the following: *[TR-03111], [RFC3447] and [PKCS1_v1_5]*[27].

Application note: The TOE implements signature algorithms to implemented the Terminal Authentication Protocol v.1. The signature verification is used to verify the card verifiable certificates and the authentication attempt of the terminal creating a digital signature for the TOE challenge.

11.3.2.6 FCS_COP.1/AA (Signature computation for Active Authentication)

Defined in: This ST

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]: fulfilled by FMT_MTD.1/AA

Justification: The Active Authentication cryptographic key is only imported in the TOE, therefore FCS_CKM.1 makes no sense in this case. The key is imported by the personalization agent according to the SFR FMT_MTD.1/AA

FCS_CKM.4 Cryptographic key destruction

FCS_COP.1.1/AA The TSF shall perform Table 10 column 1[28] in accordance with a specified cryptographic algorithm Table 10 column 2[29] and cryptographic key sizes Table 10 column 3[30] that meet the following standards Table 10 column 4[31].

[25] [assignment: *list of cryptographic operations*]
[26] [assignment: *cryptographic algorithm*]
[27] [assignment: *list of standards*]
[28] [assignment: *list of cryptographic operations*]
[29] [assignment: *cryptographic algorithm*]
[30] [assignment: *cryptographic key sizes*]
[31] [assignment: *list of standards*]

Table 10: Cryptographic algorithms and keys of "FCS_COP.1/AA"

List of cryptographic operations	Cryptographic algorithm	Cryptographic key sizes in bits	List of standards
Digital signature creation	RSA CRT	1024, 2048, 3072, 4096	[ISO_9796-2]
Digital signature creation	ECDSA	192, 224, 256, 320, 384, 512, 521	[TR-03111]

11.3.3 Family FCS_RND (Generation of random numbers)

The TOE shall meet the following requirements for the generation of random numbers.

11.3.3.1 FCS_RND.1 (Quality metric for random numbers)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No dependencies.
FCS_RND.1.1	The TSF shall provide a mechanism to generate random numbers that meet *DRG.3 capabilities defined in [AIS31/20] standard*[32].

Application note: The TOE implements a deterministic random number generator. When initialized with a random seed using a PTRNG of class PTG.2 as random source, the internal state of the RNG has at least 100 bits of min-entropy. The TOE's RNG is initialized with a random seed at each TOE startup/reset/power-up. It generates output, for which 2^{34} strings of bit length 128 are mutually different with probability greater than $1\text{-}2^{-16}$. The TOE's RNG provides forward secrecy. It provides backward secrecy even if the current internal state is known. Statistical test suites cannot practically distinguish the TOE's RNG sequences from output sequences of an ideal RNG. The TOE's RNG pass test procedure A and the NIST statistical test suite [SP800-22].

Application note: TOE to generate random numbers (random nonce) used for the authentication protocol (PACE).

11.4 SFRs: Class FIA (Identification and Authentication)

Class defined in Common Criteria Par 2 [CC_P2].

The unambiguous identification of authorised users and the correct association of security attributes with users and subjects is critical to the enforcement of the intended security policies.

Other classes of requirements (e.g. User Data Protection, Security Audit) are dependent upon correct identification and authentication of users in order to be effective.

Application note: The following table provides an overview on the authentication mechanisms used by the TOE.

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

Table 11: Overview on the authentication mechanisms

Name	SFR for the TOE
Authentication Mechanism for Personalization Agents	FIA_UAU.4/PACE
Chip Authentication Protocol v.1	FIA_API.1, FIA_UAU.5/PACE, FIA_UAU.6/EAC
Terminal Authentication Protocol v.1	FIA_UAU.5/PACE
PACE protocol	FIA_UAU.1/PACE FIA_UAU.5/PACE FIA_AFL.1/PACE
Passive Authentication	FIA_UAU.5/PACE

Application note: the Chip Authentication Protocol v.1 includes:

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

The Chip Authentication Protocol v.1 may be used independent of the Terminal Authentication Protocol v.1. But if the Terminal Authentication Protocol v.1 is used the terminal shall use the same public key as presented during the Chip Authentication Protocol v.1.

11.4.1 Family FIA_UID (User identification)

The TOE shall meet the following requirements for the identification of the user.

11.4.1.1 FIA_UID.1/PACE (Timing of identification)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UID.1.1/PACE The TSF shall allow

1. to establish the communication channel,
2. carrying out the PACE Protocol according to [ICAO_TR]
3. to read the Initialization Data if it is not disabled by TSF according to FMT_MTD.1/INI_DIS
4. to carry out the Chip Authentication Protocol v.1 according to [TR-03110-1]
5. to carry out the Terminal Authentication Protocol v.1 according to [TR-03110-1]
6. *Personalization agent authentication by authentication key*[33].

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

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

Application note: In the “TOE Manufacturing” life cycle phase (Phase 2) the Manufacturer is the only user role known to the TOE which writes the Initialization Data and/or Pre-personalisation Data in the audit records of the IC. The travel document manufacturer may create the user role Personalisation Agent for transition from the “TOE Manufacturing” to the

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

"TOE Personalisation" life cycle phase (Phase 3). The users in role Personalisation Agent identify themselves by means of selecting the authentication key. After TOE personalisation the PACE domain parameters, the Chip Authentication data and Terminal Authentication Reference Data are written into the TOE. The Inspection System is identified as default user after power up or reset of the TOE i.e. the TOE will run the PACE protocol, to gain access to the Chip Authentication Reference Data and to run the Chip Authentication Protocol v.1. After successful authentication of the chip the terminal may identify itself as (i) Extended Inspection System by selection of the templates for the Terminal Authentication Protocol v.1 or (ii) if necessary and available by authentication as Personalisation Agent (using the Personalisation Agent Key).

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

Application note: In "TOE Manufacturing" life cycle phase (Phase 2) the Manufacturer is the only user role known to the TOE. The Manufacturer writes the Initialisation Data and/or Pre-personalisation Data in the audit records of the IC.Please note that a Personalisation Agent acts on behalf of the travel document Issuer under his and CSCA and DS policies. Hence, they define authentication procedure(s) for Personalisation Agents. The TOE must functionally support these authentication procedures being subject to evaluation within the assurance components ALC_DEL.1 and AGD_PRE.1. The TOE assumes the user role 'Personalisation Agent', when a terminal proves the respective Terminal Authorisation Level as defined by the related policy (policies).

11.4.2 Family FIA_UAU (User authentication)

11.4.2.1 FIA_UAU.1/PACE (Timing of authentication)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	FIA_UID.1 Timing of identification: fulfilled by FIA_UID.1/PACE
FIA_UAU.1.1/PACE	The TSF shall allow

7. to establish the communication channel,
8. carrying out the PACE Protocol according to [ICAO_TR] ,
9. to read the Initialization Data if it is not disabled by TSF according to FMT_MTD.1/INI_DIS,
10. to identify themselves by selection of the authentication key
11. to carry out the Chip Authentication Protocol v.1 according to [TR-03110-1]
12. to carry out the Terminal Authentication Protocol v.1 according to [TR-03110-1]
13. *none*[34]

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

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

Application note: The user authenticated after a successfully performed PACE protocol is a terminal. Please note that neither CAN nor MRZ effectively represent secrets, but are restricted revealable; i.e. it is either the travel document holder itself or an authorised other

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

person or device (BIS-PACE). If PACE was successfully performed, secure messaging is started using the derived session keys (PACE-K_{MAC}, PACE-K_{Enc}).

The TOE shall meet the requirements of "Single-use authentication mechanisms (FIA_UAU.4)" as specified below ([CC_P2]).

11.4.2.2 FIA_UAU.4/PACE (Single-use authentication mechanisms - Single-use authentication of the Terminal by the TOE)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: No dependencies.

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

1. PACE Protocol according to [ICAO_TR],
2. Authentication Mechanism based on *AES*[35].
3. Terminal Authentication Protocol v.1 according to [TR-03110-1]

Application note: The authentication mechanisms may use either a challenge freshly and randomly generated by the TOE to prevent reuse of a response generated by a terminal in a successful authentication attempt. However, the authentication of Personalisation Agent may rely on other mechanisms ensuring protection against replay attacks, such as the use of an internal counter as a diversifier.

11.4.2.3 FIA_UAU.5/PACE (Multiple authentication mechanisms)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: No dependencies.

FIA_UAU.5.1/PACE The TSF shall provide

1. PACE Protocol according to [ICAO_TR],
2. Passive Authentication according to [ICAO_9303]
3. Secure messaging in MAC-ENC mode according to [ICAO_TR],
4. Symmetric Authentication Mechanism based on *AES*[36].
5. Terminal Authentication Protocol v.1 according to [TR-03110-1]

to support user authentication

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

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

[35] [assignment: *identified authentication mechanism(*s)]
[36] [assignment: *list of multiple authentication mechanisms]*

the Chip Authentication Protocol v.1 and the secure messaging established by the Chip Authentication Mechanism v.1.

5. *none*[37]

Application note: The Personalization Agent may use Symmetric Authentication Mechanism without secure messaging mechanism as well if the personalization environment prevents eavesdropping to the communication between TOE and personalization terminal.

11.4.2.4 FIA_UAU.6/PACE (Re-authenticating of Terminal by the TOE)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No dependencies.
FIA_UAU.6.1/PACE	The TSF shall re-authenticate the user under the conditions each command sent to the TOE after successful run of the PACE protocol shall be verified as being sent by the PACE terminal[38].

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

11.4.2.5 FIA_UAU.6/EAC (Re-authenticating of Terminal by the TOE)

Defined in:	EAC PP [PP-0056]
Hierarchical to:	No other components.
Dependencies:	No dependencies.
FIA_UAU.6.1/EAC	The TSF shall re-authenticate the user under the conditions each command sent to the TOE after successful run of the Chip Authentication Protocol v.1 shall be verified as being sent by the Inspection System[39].

Application note: The Password Authenticated Connection Establishment and the Chip Authentication Protocol specified in [ICAO_9303] include secure messaging for all commands exchanged after successful authentication of the Inspection System. The TOE checks by secure messaging in MAC_ENC mode each command based on a corresponding MAC algorithm whether it was sent by the successfully authenticated terminal (see FCS_COP.1/CA_MAC for further details). The TOE does not execute any command with incorrect message authentication code. Therefore the TOE re-authenticates the user for each received command and accepts only those commands received from the previously authenticated user.

[37] [assignment: *rules describing how the multiple authentication mechanisms provide authentication*]
[38] [assignment: *list of conditions under which re-authentication is required*]
[39] [assignment: *list of conditions under which re-authentication is required*]

11.4.3 Family FIA_AFL (Authentication failures)

The TOE shall meet the following requirements for authentication failures.

11.4.3.1 FIA_AFL.1/PACE (Authentication failure handling – PACE authentication using non-blocking authorisation data)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	FIA_UAU.1 Timing of authentication: fulfilled by FIA_UAU.1/PACE
FIA_AFL.1.1/PACE	The TSF shall detect when *1*[40] unsuccessful authentication attempt occurs related to authentication attempts using the PACE password as shared password[41].
FIA_AFL.1.2/PACE	When the defined number of unsuccessful authentication attempts has been met[42], the TSF shall *consecutively increase the reaction time of the TOE to the next authentication attempt using PACE passwords*[43].

11.4.4 Family FIA_API (Authentication Proof of Identity)

The TOE shall meet the following requirements for allowing the authentication of its identity by an external entity in the TOE IT environment.

11.4.4.1 FIA_API.1 (Authentication Proof of Identity)

Defined in:	EAC PP [PP-0056]
Hierarchical to:	No other components.
Dependencies:	No dependencies.
FIA_API.1.1	The TSF shall provide a Chip Authentication Protocol v.1 according to [ICAO_TR][44] to prove the identity of the TOE[45].

Application note: This SFR requires the TOE to implement the Chip Authentication Mechanism v.1 specified in [ICAO_TR]. The TOE and the terminal generate a shared secret using the Diffie-Hellman Protocol (DH or EC-DH) and two session keys for secure messaging in ENC_MAC mode according to [ICAO_9303]. The terminal verifies by means of secure messaging whether the travel document's chip was able or not to run his protocol properly using its Chip Authentication Private Key corresponding to the Chip Authentication Key (EF.DG14).

11.5 SFRs: Class FDP (User Data Protection)

11.5.1 Family FDP_ACC (Access control policy)

The TOE shall meet the following requirements for the access control policy.

[40] [assignment: *positive integer number*]
[41] [assignment: *list of authentication events*]
[42] [selection: *met, surpassed*]
[43] [assignment: *list of actions*]
[44] [assignment: *authentication mechanism*]
[45] [assignment: *authentication role*]

11.5.1.1 FDP_ACC.1/TRM (Subset access control – Terminal Access)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	FDP_ACF.1 Security attribute based access control: fulfilled by FDP_ACF.1/TRM
FDP_ACC.1.1/TRM	The TSF shall enforce the Access Control SFP[46] on terminals gaining access to the User Data and data stored in EF.SOD of the logical travel document[47].

11.5.2 Family FDP_ACF (Access control functions)

The TOE shall meet the following requirements for the access control functions.

11.5.2.1 FDP_ACF.1/TRM (Security attribute based access control – Terminal Access)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	FDP_ACC.1 Subset access control FMT_MSA.3 Static attribute initialization: fulfilled by FDP_ACC.1/TRM
FDP_ACF.1.1/TRM	The TSF shall enforce the Access Control SFP[48] to objects based on the following:

1. Subjects:
   a. Terminal,
   b. BIS-PACE,
   c. Extended Inspection System,
2. Objects:
   a. data in EF.DG1, EF.DG2 and EF.DG5 to EF.DG16, EF.SOD and EF.COM of the logical travel document ,
   b. data in EF of the logical travel document containing sensitive user data (see 8.1.3),
   c. all TOE intrinsic secret cryptographic keys stored in the travel document[49]
3. Security attributes
   a. PACE Authentication
   b. Terminal Authentication v.1
   c. Authorisation of the Terminal[50].

FDP_ACF.1.2/TRM	The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: A BIS-PACE is allowed to read data objects from FDP_ACF.1.1/TRM according to [ICAO_TR] after a successful PACE authentication as required by FIA_UAU.1/PACE[51].

[46] [assignment: *access control SFP*]
[47] [assignment: *list of subjects, objects, and operations among subjects and objects covered by the SFP*]
[48] [assignment: *access control SFP*]
[49] e.g. Chip Authentication v.1 and ephemeral keys
[50] [assignment: *list of subjects and objects controlled under the indicated SFP, and. for each, the SFP relevant security attributes, or named groups of SFP-relevant security attributes*]
[51] [assignment: *rules governing access among controlled subjects and controlled objects using controlled operations on controlled objects*]

FDP_ACF.1.3/TRM The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: none[52].

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

1. Any terminal being not authenticated as PACE authenticated BIS-PACE is not allowed to read, to write, to modify, to use any User Data stored on the travel document.
2. Terminals not using secure messaging are not allowed to read, to write, to modify, to use any data stored on the travel document.
3. Any terminal being not successfully authenticated as Extended Inspection System with the Read access to DG 3 (Fingerprint) granted by the relative certificate holder authorization encoding is not allowed to read the data objects 2b) of FDP_ACF.1.1/TRM.
4. Any terminal being not successfully authenticated as Extended Inspection System with the Read access to DG 4 (Iris) granted by the relative certificate holder authorization encoding is not allowed to read the data objects 2c) of FDP_ACF.1.1/TRM.
5. Nobody is allowed to read the data objects 2d) of FDP_ACF.1.1/TRM.
6. Terminals authenticated as CVCA or as DV are not allowed to read data in the EF containing sensitive user data (see 8.1.3)[53].

Application note: The relative certificate holder authorization encoded in the CVC of the inspection system is defined in [TR-03110-1]. The TOE verifies the certificate chain established by the Country Verifying Certification Authority, the Document Verifier Certificate and the Inspection System Certificate (FMT_MTD.3). The Terminal Authorization is the intersection of the Certificate Holder Authorization in the certificates of the Country Verifying Certification Authority, the Document Verifier Certificate and the Inspection System Certificate in a valid certificate chain.

Application note: Please note that the Document Security Object (SOD) stored in EF.SOD ([ICAO_9303]) does not belong to the user data, but to the TSF data. The Document Security Object can be read out by Inspection Systems using PACE, ([ICAO_TR]).

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

11.5.3 Family FDP_RIP (Residual information protection)

The TOE shall meet the following requirements for the residual information protection.

11.5.3.1 FDP_RIP.1 (Subset residual information protection)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No dependencies.

[52] [assignment: *rules, based on security attributes, that explicitly authorize access of subjects to objects*]
[53] [assignment: *rules, based on security attributes, that explicitly authorize access of subjects to objects*]

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

1. Session Keys (immediately after closing related communication session),
2. the ephemeral private key ephem - SK $_{PICC}$- PACE (by having generated a DH shared secret K [ICAO_TR]) [54]
3. *None*[55].

11.5.4 Family FDP_UCT (Inter-TSF user data confidentiality transfer protection)

The TOE shall meet the following requirements for the Inter-TSF user data confidentiality transfer protection.

11.5.4.1 FDP_UCT.1/TRM (Basic data exchange confidentiality – travel document)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: [FTP_ITC.1 Inter-TSF trusted channel, or
FTP_TRP.1 Trusted path] fulfilled by FTP_ITC.1/PACE

[FDP_ACC.1 Subset access control, or
FDP_IFC.1 Subset information flow control]

fulfilled by FDP_ACC.1/TRM

FDP_UCT.1.1/TRM The TSF shall enforce the Access Control SFP[56] to be able to transmit and receive[57] user data in a manner protected from unauthorized disclosure.

11.5.5 Family FDP_UIT (Inter-TSF user data integrity transfer protection)

The TOE shall meet the following requirements for the Inter-TSF user data integrity transfer protection.

11.5.5.1 FDP_UIT.1/TRM (Data exchange integrity)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

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

fulfilled by FDP_ACC.1/TRM

FDP_UIT.1.1/TRM The TSF shall enforce the Access Control SFP[58] to be able to transmit and receive[59] user data in a manner protected from modification, deletion, insertion and replay[60] errors.

[54] [assignment: *list of objects*]
[55] [assignment: *list of objects*]
[56] [assignment: *access control SFP(s) and/or information flow control SFP(s)*]
[57] [selection: *transmit receive*]
[58] [assignment: *access control SFP(s) and/or information flow control SFP(s)*]
[59] [selection: *transmit receive*]
[60] [selection: *modification, deletion, insertion, replay*]

FDP_UIT.1.2/TRM	The TSF shall be able to determine on receipt of user data, whether modification, deletion, insertion and replay[61] has occurred.

11.6 SFRs: Class FMT (Security Management)

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

11.6.1 Family FMT_SMF (Specification of Management Functions)

The TOE shall meet the following requirements for the management functions.

Management functions provide TSFI that allow administrators to define the parameters that control the operation of security related aspects of the TOE, such as data protection attributes, TOE protection attributes, audit attributes, and identification and authentication attributes. Management functions also include those functions performed by an operator to ensure continued operation of the TOE, such as backup and recovery.

11.6.1.1 FMT_SMF.1 (Specification of Management Functions)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No Dependencies
FMT_SMF.1.1	The TSF shall be capable of performing the following management functions: 1. Initialization, 2. Pre-personalization, 3. Personalization, 4. Configuration[62].

11.6.2 Family FMT_SMR (Security management roles)

The TOE shall meet the following requirements for controlling the assignment of different roles to users.

11.6.2.1 FMT_SMR.1/PACE (Security roles)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	FIA_UID.1 Timing of identification: fulfilled by FIA_UID.1/PACE
FMT_SMR.1.1/PACE	The TSF shall maintain the roles 1. Manufacturer, 2. Personalisation Agent, 3. Terminal, 4. PACE authenticated BIS-PACE, 5. Country Verifying Certification Authority, 6. Document Verifier, 7. Domestic Extended Inspection System, 8. Foreign Extended Inspection System[63].

[61] [selection: *modification, deletion, insertion, replay*]
[62] [assignment: *list of management functions to be provided by the TSF*]
[63] [assignment: *the authorized identified roles*]

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

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

11.6.3 Family FMT_LIM (Limited capabilities and availability)

The TOE shall meet the following requirements for the management of the TSF and TSF data to prevent misuse of test features of the TOE over the life cycle phases.

11.6.3.1 FMT_LIM.1 (Limited capabilities)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	FMT_LIM.2 Limited availability: fulfilled by FMT_LIM.2
FMT_LIM.1.1	The TSF shall be designed in a manner that limits their capabilities so that in conjunction with “Limited availability (FMT_LIM.2)” the following policy is enforced:

Deploying Test Features after TOE Delivery does not allow

1. User Data to be manipulated and disclosed
2. TSF data to be manipulated or disclosed
3. software to be reconstructed
4. substantial information about construction of TSF to be gathered which may enable other attacks and
5. sensitive user data (see 8.1.3) to be disclosed[64].

11.6.3.2 FMT_LIM.2 (Limited availability)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	FMT_LIM.1 Limited capabilities: fulfilled by FMT_LIM.1
FMT_LIM.2.1	The TSF shall be designed in a manner that limits their availability so that in conjunction with “Limited capabilities (FMT_LIM.1)” the following policy is enforced:

Deploying Test Features after TOE Delivery does not allow

1. User Data to be manipulated and disclosed
2. TSF data to be manipulated or disclosed
3. software to be reconstructed
4. substantial information about construction of TSF to be gathered which may enable other attacks and
5. sensitive user data (see 8.1.3) to be disclosed[65].

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

[64] [assignment: *Limited capability and availability policy*]
[65] [assignment: *Limited capability and availability policy*]

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

11.6.4 Family FMT_MTD (Management of TSF data)

The TOE shall meet the following requirements for the management of TSF data. The iterations address different management functions and different TSF data.

11.6.4.1 FMT_MTD.1/INI_ENA (Management of TSF data - Writing of Initialization Data and Pre-personalization Data)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1
FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/INI_ENA The TSF shall restrict the ability to write[66] the Initialization Data and Pre-personalization Data[67] to the Manufacturer[68].

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

11.6.4.2 FMT_MTD.1/INI_DIS (Management of TSF data - Disabling of Read Access to Initialization Data and Pre-personalization Data)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1
FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/INI_DIS The TSF shall restrict the ability to read out[69] Initialization Data and Pre-personalization Data[70] to the Personalization Agent[71].

Application note: The TOE may restrict the ability to write the Initialisation Data and the Pre-personalisation Data by (i) allowing writing these data only once and (ii) blocking the role Manufacturer at the end of the manufacturing phase. The Manufacturer may write the Initialisation Data (as required by FAU_SAS.1) including, but being not limited to a unique identification of the IC being used to trace the IC in the life cycle phases ‘manufacturing’ and ‘issuing’, but being not needed and may be misused in the ‘operational use’. Therefore, read and use access to the Initialisation Data shall be blocked in the ‘operational use’ by the Personalisation Agent, when he switches the TOE from the life cycle phase ‘issuing’ to the life cycle phase ‘operational use’.

[66] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[67] [assignment: *list of TSF data*]
[68] [assignment: *the authorized identified roles*]
[69] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[70] [assignment: *list of TSF data*]
[71] [assignment: *the authorized identified roles*]

11.6.4.3 FMT_MTD.1/PA (Management of TSF data - Personalisation Agent)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1
FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/PA The TSF shall restrict the ability to write[72] the Document Security Object (SOD)[73] to the Personalization Agent [74].

Application note: By writing SOD into the TOE, the Personalisation Agent confirms (on behalf of DS) the correctness and genuineness of all the personalisation data related. This consists of user- and TSF- data.

11.6.4.4 FMT_MTD.1/CVCA_INI (Management of TSF data - Initialization of CVCA Certificate and Current Date)

Defined in: EAC PP [PP-0056]

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1
FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/CVCA_INI The TSF shall restrict the ability to write[75] the

1. initial Country Verifying Certification Authority Public Key,
2. initial Country Verifying Certification Authority Certificate,
3. initial Current Date,
4. *None* [76]

to the *Personalization Agent* [77].

11.6.4.5 FMT_MTD.1/CVCA_UPD (Management of TSF data - Country Verifying Certification Authority)

Defined in: EAC PP [PP-0056]

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1
FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/CVCA_UPD The TSF shall restrict the ability to update[78] the

1. Country Verifying Certification Authority Public Key,
2. Country Verifying Certification Authority Certificate,

to Country Verifying Certification Authority [79].

[72] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[73] [assignment: *list of TSF data*]
[74] [assignment: *the authorized identified roles*]
[75] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[76] [assignment: *list of TSF data*]
[77] [assignment: *the authorized identified roles*]
[78] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[79] [assignment: *the authorized identified roles*]

Application note: The Country Verifying Certification Authority updates its asymmetric key pair and distributes the public key be means of the Country Verifying CA Link-Certificates ([TR-03110-1]). The TOE updates its internal trust-point if a valid Country Verifying CA Link-Certificates (cf. FMT_MTD.3) is provided by the terminal ([TR-03110-1]).

11.6.4.6 FMT_MTD.1/DATE (Management of TSF data - Current date)

Defined in: EAC PP [PP-0056]

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1
FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/DATE The TSF shall restrict the ability to modify[80] the Current Date[81] to

1. Country Verifying Certification Authority,
2. Document Verifier,
3. Domestic Extended Inspection System[82].

Application note: The authorized roles are identified in their certificate ([TR-03110-1]) and authorized by validation of the certificate chain (cf. FMT_MTD.3). The authorized role of the terminal is part of the Certificate Holder Authorization in the card verifiable certificate provided by the terminal for the identification and the Terminal Authentication v.1 ([TR-03110-1]).

11.6.4.7 FMT_MTD.1/CAPK (Management of TSF data - Chip Authentication Private Key)

Defined in: EAC PP [PP-0056]

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1

FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/CAPK The TSF shall restrict the ability to *load*[83] the Chip Authentication Private Key[84] to the *Personalization Agent*[85].

Application note: The verb “load” means here that the Chip Authentication Private Key is generated securely outside the TOE and written into the TOE memory.

[80] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[81] [assignment: *list of TSF data*]
[82] [assignment: *the authorized identified roles*]
[83] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[84] [assignment: *list of TSF data*]
[85] [assignment: *the authorized identified roles*]

11.6.4.8 FMT_MTD.1/KEY_READ (Management of TSF data - Key Read)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1
FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/KEY_READ The TSF shall restrict the ability to read[86] the

1. PACE passwords ,
2. Chip Authentication Private Key,
3. **Active Authentication Private Key**
4. Personalisation Agent Keys[87]

to none[88].

Application note: This ST includes the Active Authentication Private Key to the list of TSF data defined in EAC PP [PP-0056].

11.6.4.9 FMT_MTD.1/AA (Management of TSF data - Active Authentication Private Key)

Defined in: this ST

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions: fulfilled by FMT_SMF.1

FMT_SMR.1 Security roles: fulfilled by FMT_SMR.1/PACE

FMT_MTD.1.1/AA The TSF shall restrict the ability to *load*[89] the *Active Authentication Private Key*[90] to the *Personalization Agent*[91].

Application note: The verb “load” means here that the Active Authentication Private Key is generated securely outside the TOE and written into the TOE memory.

11.6.4.10 FMT_MTD.3 (Secure TSF data)

Defined in: EAC PP [PP-0056]

Hierarchical to: No other components.

Dependencies: FMT_MTD.1 Management of TSF data: fulfilled by FMT_MTD.1/CVCA_INI and FMT_MTD.1/CVCA_UPD

FMT_MTD.3.1 The TSF shall ensure that only secure values **of the certificate chain** are accepted for TSF data of the Terminal Authentication Protocol v.1 and the Access Control[92].

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

[86] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[87] [assignment: *list of TSF data*]
[88] [assignment: *the authorized identified roles*]
[89] [selection: *change, default, query, modify, delete, clear*, [assignment: *other operations*]]
[90] [assignment: *list of TSF data*]
[91] [assignment: *the authorized identified roles*]
[92] [assignment: *list of TSF data*]

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

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

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

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

11.7 SFRs: Class FTP (Trusted Path/Channels)

11.7.1 Family FTP_ITC (Inter-TSF trusted channel)

The TOE shall meet the following requirements for the creation of a trusted channel between the TSF and other trusted IT products for the performance of security critical operations.

11.7.1.1 FTP_ITC.1/PACE (Inter-TSF trusted channel after PACE)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No Dependencies.
FTP_ITC.1.1/PACE	The TSF shall provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.
FTP_ITC.1.2/PACE	The TSF shall permit another trusted IT product to initiate communication via the trusted channel.
FTP_ITC.1.3/PACE	The TSF shall enforce communication via the trusted channel for any data exchange between the TOE and the Terminal[93].

Application note: The TOE is a passive device that can not initiate the communication. All the communication are initiated by the Terminal, and the TOE enforce the trusted channel.

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

Application note: The trusted channel is established after successful performing the PACE protocol (FIA_UAU.1/PACE). If the PACE was successfully performed, secure messaging is immediately started using the derived session keys (PACE-K_{MAC}, PACE-K_{Enc}): this secure messaging enforces preventing tracing while Passive Authentication and the required properties of operational trusted channel; the cryptographic primitives being used for the secure messaging are as required by FCS_COP.1/PACE_ENC and FCS_COP.1/PACE_MAC. The establishing phase of the PACE trusted channel does not enable tracing due to the requirements FIA_AFL.1/PACE.

11.8 SFRs: Class FPT (Protection of the TSF)

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

11.8.1 Family FPT_EMS (TOE emanation)

The TOE shall meet the following requirements to mitigate intelligible emanations.

11.8.1.1 FPT_EMS.1 (TOE Emanation)

Defined in: PACE PP [PP-0068]

Hierarchical to: No other components.

Dependencies: No Dependencies.

FPT_EMS.1.1 The TOE shall not emit power variations, timing variations during command execution[94] in excess of non-useful information[95] enabling access to

1. Chip Authentication Session Keys
2. PACE session Keys (PACE-K MAC, PACE-KEnc),
3. the ephemeral private key ephem SK PICC-PACE,
4. *none,*
5. Personalisation Agent Key(s),
6. Chip Authentication Private Key
7. *Active Authentication Private Key* [96] and
8. *none.*

FPT_EMS.1.2 The TSF shall ensure any users[97] are unable to use the following interface smart card circuit contacts[98] to gain access

1. Chip Authentication Session Keys
2. PACE session Keys (PACE-K MAC, PACE-KEnc),
3. the ephemeral private key ephem SK PICC-PACE,
4. *none,*
5. Personalisation Agent Key(s),
6. Chip Authentication Private Key
7. *Active Authentication Private Key* [99] and

[94] [assignment: *types of emissions*]
[95] [assignment: *specified limits*]
[96] [assignment: *list of types of TSF data*]
[97] [assignment: *type of users*]
[98] [assignment: *type of connection*]
[99] [assignment: *list of types of TSF data*]

8. *none.*

Application note: The TOE shall prevent attacks against the listed secret data where the attack is based on external observable physical phenomena of the TOE. Such attacks may be observable at the interfaces of the TOE or may be originated from internal operation of the TOE or may be caused by an attacker that varies the physical environment under which the TOE operates. The set of measurable physical phenomena is influenced by the technology employed to implement the smart card. The travel document's chip can provide a smart card contactless interface and contact based interface according to ISO/IEC 7816-2 as well (in case the package only provides a contactless interface the attacker might gain access to the contacts anyway). Examples of measurable phenomena include, but are not limited to, variations in the power consumption, the timing of signals and the electromagnetic radiation due to internal operations or data transmissions.

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

11.8.2 Family FPT_FLS (Fail secure)

The TOE shall meet the following requirements for ensuring that the TOE will always enforce its SFRs in the event of identified categories of failures in the TSF.

11.8.2.1 FPT_FLS.1 (Failure with preservation of secure state)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No Dependencies.
FPT_FLS.1.1	The TSF shall preserve a secure state when the following types of failures occur:

1. Exposure to operating conditions causing a TOE malfunction,
2. failure detected by TSF according to FPT_TST.1[100].
3. *none*

11.8.3 Family FPT_TST (TSF self test)

The TOE shall meet the following requirements for the self-testing of the TSF.

11.8.3.1 FPT_TST.1 (TSF testing)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No Dependencies.
FPT_TST.1.1	The TSF shall run a suite of self tests *during initial start-up and before calling a security sensitive module*[101] to demonstrate the correct operation of the TSF[102].

[100] [assignment: *list of types of failures in the TSF*]
[101] [selection: *during initial start-up. [assignment: conditions under which self test should occur*]
[102] [selection: *[assignment: parts of TSF], the TSF*]

FPT_TST.1.2	The TSF shall provide authorised users with the capability to verify the integrity of the TSF data[103].
FPT_TST.1.3	The TSF shall provide authorised users with the capability to verify the integrity of stored TSF executable code.

Application note: If the travel document's chip uses state of the art smart card technology, it will run some self tests at the request of an authorised user and some self tests automatically. E.g. a self test for the verification of the integrity of stored TSF executable code required by FPT_TST.1.3 may be executed during initial start-up by the 'authorised user' Manufacturer in the life cycle phase 'Manufacturing'. Other self tests may automatically run to detect failures and to preserve the secure state according to FPT_FLS.1 in the phase 'operational use', e.g. to check a calculation with a private key by the reverse calculation with the corresponding public key as a countermeasure against Differential Failure Analysis.

11.8.4 Family FPT_PHP (TSF physical protection)

The TOE shall meet the following requirements for protection from physical tampering and interference.

11.8.4.1 FPT_PHP.3 (Resistance to physical attack)

Defined in:	PACE PP [PP-0068]
Hierarchical to:	No other components.
Dependencies:	No dependencies.
FPT_PHP.3.1	The TSF shall resist physical manipulation and physical probing[104] to the TSF[105] by responding automatically such that the SFRs are always enforced.

Application note: The TOE will implement appropriate measures to continuously counter physical manipulation and physical probing. Due to the nature of these attacks (especially manipulation) the TOE can by no means detect attacks on all of its elements. Therefore, permanent protection against these attacks is required ensuring that the TSP could not be violated at any time. Hence, 'automatic response' means here (i) assuming that there might be an attack at any time and (ii) countermeasures are provided at any time.

11.9 Security Assurance Requirements (SARs)

The security assurance requirements for the evaluation of the TOE, its development and operating environment are those taken from the Evaluation Assurance Level 5 in [CC_P3] augmented with the following components (EAL5+):

- ALC_DVS.2 (Sufficiency of security measures)
- AVA_VAN.5 (Advanced methodical vulnerability analysis).

The following table lists the security assurance requirements of the TOE.

[103] [selection: *[assignment: parts of TSF], TSF data*]
[104] [assignment: *physical tampering scenarios*]
[105] [assignment: *list of TSF devices/elements*]

Table 12: Security Assurance Requirements - EAL5+

Assurance Class	Assurance Components
ADV: Development	ADV_ARC.1 Security architecture description
	ADV_FSP.5 Complete semi-formal functional specification with additional error information
	ADV_IMP.1 Implementation representation of the TSF
	ADV_INT.2 Well-structured internals
	ADV_TDS.4 Semiformal modular design
AGD: Guidance documents	AGD_OPE.1 Operational user guidance
	AGD_PRE.1 Preparative procedures These SARs ensure proper installation and configuration: the TOE will be properly configured and the TSFs are configured to process as expected
ALC: Life-cycle support	ALC_CMC.4 Production support, acceptance procedures and automation
	ALC_CMS.5 Development tools CM coverage
	ALC_DEL.1 Delivery procedures
	ALC_DVS.2 Sufficiency of security measures (augmentation)
	ALC_LCD.1 Developer defined life-cycle model
	ALC_TAT.2 Compliance with implementation standards
ASE: Security Target evaluation	ASE_CCL.1 Conformance claims
	ASE_ECD.1 Extended components definition
	ASE_INT.1 ST introduction
	ASE_OBJ.2 Security objectives
	ASE_REQ.2 Derived security requirements
	ASE_SPD.1 Security problem definition
	ASE_TSS.1 TOE summary specification
ATE: Tests	ATE_COV.2 Analysis of coverage
	ATE_DPT.3 Testing: modular design
	ATE_FUN.1 Functional testing
	ATE_IND.2 Independent testing – sample
AVA: Vulnerability assessment	AVA_VAN.5 Advanced methodical vulnerability analysis (augmentation)

11.10 Security Requirements Rationale

11.10.1 Security Functional Requirements (SFRs) Rationale

The following table provides an overview for security objectives coverage.

Table 13: Coverage of Security Objectives for the TOE by SFR

SFR \ Security Objectives	OT.Sens_Data_Conf	OT.Chip_Auth_Proof	OT.AC_Pers	OT.Data_Integrity	OT.Data_Authenticity	OT.Data_Confidentiality	OT.Identification	OT.Prot_Abuse-Func	OT.Prot_Inf_Leak	OT.Tracing	OT.Prot_Phys-Tamper	OT.Prot_Malfuntion	OT.Active_Auth_MRTD_Proof
FAU_SAS.1			X				X						
FCS_CKM.1/DH-PACE-3DES				X	X	X							
FCS_CKM.1/DH-PACE-AES				X	X	X							
FCS_CKM.1/ECDH-PACE-3DES				X	X	X							
FCS_CKM.1/ECDH-PACE-AES				X	X	X							
FCS_CKM.1/CA-DH-3DES	X	X	X	X	X	X							
FCS_CKM.1/CA-DH-AES	X	X	X	X	X	X							
FCS_CKM.1/CA-ECDH-3DES	X	X	X	X	X	X							
FCS_CKM.1/CA-ECDH-AES	X	X	X	X	X	X							
FCS_CKM.4	X		X	X	X	X							
FCS_COP.1/PACE_ENC						X							
FCS_COP.1/CA_ENC	X	X	X	X		X							
FCS_COP.1/PACE_MAC				X	X								
FCS_COP.1/CA_MAC	X	X	X	X									
FCS_COP.1/SIG_VER	X		X										
FCS_COP.1/AA													X
FCS_RND.1	X		X	X	X	X							
FIA_AFL.1/PACE										X			
FIA_UID.1/PACE	X		X	X	X	X							
FIA_UAU.1/PACE	X		X	X	X	X							
FIA_UAU.4/PACE	X		X	X	X	X							
FIA_UAU.5/PACE	X		X	X	X	X							
FIA_UAU.6/PACE				X	X	X							
FIA_UAU.6/EAC	X		X	X	X	X							
FIA_API.1		X											
FDP_ACC.1/TRM	X		X	X		X							
FDP_ACF.1/TRM	X		X	X		X							
FDP_RIP.1				X	X	X							
FDP_UCT.1/TRM	X			X		X							
FDP_UIT.1/TRM				X		X							
FMT_SMF.1		X	X	X	X	X	X						
FMT_SMR.1/PACE		X	X	X	X	X	X						
FMT_LIM.1								X					
FMT_LIM.2								X					
FMT_MTD.1/INI_ENA			X				X						
FMT_MTD.1/INI_DIS			X				X						
FMT_MTD.1/CVCA_INI	X												
FMT_MTD.1/CVCA_UPD	X												
FMT_MTD.1/DATE	X												
FMT_MTD.1/CAPK	X	X		X									
FMT_MTD.1/AA													X

SFR \ Security Objectives	OT.Sens_Data_Conf	OT.Chip_Auth_Proof	OT.AC_Pers	OT.Data_Integrity	OT.Data_Authenticity	OT.Data_Confidentiality	OT.Identification	OT.Prot_Abuse-Func	OT.Prot_Inf_Leak	OT.Tracing	OT.Prot_Phys-Tamper	OT.Prot_Malfuntion	OT.Active_Auth_MRTD_Proof
FMT_MTD.1/PA			x	x	x	x							
FMT_MTD.1/KEY_READ	x	x	x	x	x	x							x
FMT_MTD.3	x												
FPT_EMS.1			x						x				
FPT_TST.1									x			x	
FPT_FLS.1									x			x	
FPT_PHP.3				x					x		x		
FTP_ITC.1/PACE				x	x	x				x			

11.10.2 Rationale for the Fulfilment of the Security Objectives for the TOE

In the following, a detailed justification as required to show the suitability and sufficiency of the security functional requirements to achieve the security objectives defined for the TOE is given.

11.10.2.1 OT.Identification

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

11.10.2.2 OT.AC_Pers

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

The authentication of the terminal as Personalisation Agent shall be performed by TSF according to SFR FIA_UAU.4/PACE and FIA_UAU.5/PACE. If the Personalisation Terminal want to authenticate itself to the TOE by means of the Terminal Authentication Protocol v.1

(after Chip Authentication v.1) with the Personalisation Agent Keys the TOE will use TSF according to the FCS_RND.1 (for the generation of the challenge), FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES and FCS_CKM.1/CA-ECDH-AES (for the derivation of the new session keys after Chip Authentication v.1), and FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC (for the ENC_MAC_Mode secure messaging), FCS_COP.1/SIG_VER (as part of the Terminal Authentication Protocol v.1) and FIA_UAU.6/EAC (for the re-authentication). If the Personalisation Terminal wants to authenticate itself to the TOE by means of the Authentication Mechanism with Personalisation Agent Key the TOE will use TSF according to the FCS_RND.1 (for the generation of the challenge) and FCS_COP.1/CA_ENC (to verify the authentication attempt). The session keys are destroyed according to FCS_CKM.4 after use.

11.10.2.3 OT.Data_Integrity

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

Unauthorised modifying of the exchanged data is addressed, in the first line, by FTP_ITC.1/PACE using FCS_COP.1/PACE_MAC. For PACE secured data exchange, a prerequisite for establishing this trusted channel is a successful PACE Authentication (FIA_UID.1/PACE, FIA_UAU.1/PACE) using FCS_CKM.1/DH-PACE-3DES, FCS_CKM.1/DH-PACE-AES, FCS_CKM.1/ECDH-PACE-3DES, and FCS_CKM.1/ECDH-PACE-AES and possessing the special properties FIA_UAU.5/PACE, FIA_UAU.6/PACE resp. FIA_UAU.6/EAC. The trusted channel is established using PACE, Chip Authentication v.1, and Terminal Authentication v.1. FDP_RIP.1 requires erasing the values of session keys (here: for KMAC).

The TOE supports the inspection system detect any modification of the transmitted logical travel document data after Chip Authentication v.1. The SFR FIA_UAU.6/EAC and FDP_UIT.1/TRM requires the integrity protection of the transmitted data after Chip Authentication v.1 by means of secure messaging implemented by the cryptographic functions according to FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES and FCS_CKM.1/CA-ECDH-AES (for the generation of shared secret andfor the derivation of the new session keys), and FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC for the ENC_MAC_Mode secure messaging. The session keys are destroyed according to FCS_CKM.4 after use.

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

11.10.2.4 OT.Data_Authenticity

The security objective **OT.Data_Authenticity** aims ensuring authenticity of the User- and TSF data (after the PACE Authentication) by enabling its verification at the terminal-side and by an active verification by the TOE itself. This objective is mainly achieved by FTP_ITC.1/PACE using FCS_COP.1/PACE_MAC. A prerequisite for establishing this trusted channel is a successful PACE or Chip and Terminal Authentication v.1 (FIA_UID.1/PACE, FIA_UAU.1/PACE) using FCS_CKM.1/DH-PACE-3DES, FCS_CKM.1/DH-PACE-AES, FCS_CKM.1/ECDH-PACE-3DES and FCS_CKM.1/ECDH-PACE-AES resp. FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES and FCS_CKM.1/CA-ECDH-AES and possessing the special properties FIA_UAU.5/PACE, FIA_UAU.6/PACE resp. FIA_UAU.6/EAC. FDP_RIP.1 requires erasing the values of session keys (here: for KMAC). FIA_UAU.4/PACE, FIA_UAU.5/PACE and FCS_CKM.4 represent some required specific properties of the protocols used. The SFR FMT_MTD.1./KEY_READ restricts the access to the PACE passwords and the Chip Authentication Private Key. FMT_MTD.1/PA requires that SOD containing signature over the User Data stored on the TOE and used for the Passive Authentication is allowed to be written by the Personalisation Agent only and, hence, is to be considered as trustworthy.The SFR FCS_RND.1 represents a general support for cryptographic operations needed.The SFRs FMT_SMF.1 and FMT_SMR.1/PACE support the functions and roles related.

11.10.2.5 OT.Data_Confidentiality

The security objective **OT.Data_Confidentiality** aims that the TOE always ensures confidentiality of the User- and TSF-data stored and, after the PACE Authentication resp. Chip Authentication, of these data exchanged.This objective for the data stored is mainly achieved by (FDP_ACC.1/TRM, FDP_ACF.1/TRM). FIA_UAU.4/PACE, FIA_UAU.5/PACE and FCS_CKM.4 represent some required specific properties of the protocols used. This objective for the data exchanged is mainly achieved by FDP_UCT.1/TRM, FDP_UIT.1/TRM and FTP_ITC.1/PACE using FCS_COP.1/PACE_ENC resp. FCS_COP.1/CA_ENC. A prerequisite for establishing this trusted channel is a successful PACE or Chip and Terminal Authentication v.1 (FIA_UID.1/PACE, FIA_UAU.1/PACE) using FCS_CKM.1/DH-PACE-3DES, FCS_CKM.1/DH-PACE-AES, FCS_CKM.1/ECDH-PACE-3DES and FCS_CKM.1/ECDH-PACE-AES resp. FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES and FCS_CKM.1/CA-ECDH-AES and possessing the special properties FIA_UAU.5/PACE, FIA_UAU.6/PACE resp. FIA_UAU.6/EAC. FDP_RIP.1 requires erasing the values of session keys (here: for Kenc). The SFR FMT_MTD.1./KEY_READ restricts the access to the PACE passwords and the Chip Authentication Private Key. FMT_MTD.1/PA requires that SOD containing signature over the User Data stored on the TOE and used for the Passive Authentication is allowed to be written by the Personalisation Agent only and, hence, is to be considered trustworthy.The SFR FCS_RND.1 represents the general support for cryptographic operations needed.The SFRs FMT_SMF.1 and FMT_SMR.1/PACE support the functions and roles related.

11.10.2.6 OT.Sense_Data_Conf

The security objective **OT.Sense_Data_Conf** “Confidentiality of sensitive biometric reference data” is enforced by the Access Control SFP defined in FDP_ACC.1/TRM and FDP_ACF.1/TRM allowing the sensitive user data (see 8.1.3) only to be read by successfully authenticated Extended Inspection System being authorized by a valid certificate according FCS_COP.1/SIG_VER.

The SFRs FIA_UID.1/PACE and FIA_UAU.1/PACE require the identification and authentication of the inspection systems. The SFR FIA_UAU.5/PACE requires the successful Chip Authentication (CA) v.1 before any authentication attempt as Extended Inspection

System. During the protected communication following the CA v.1 the reuse of authentication data is prevented by FIA_UAU.4/PACE. The SFR FIA_UAU.6/EAC and FDP_UCT.1/TRM requires the confidentiality protection of the transmitted data after Chip Authentication v.1 by means of secure messaging implemented by the cryptographic functions according to FCS_RND.1 (for the generation of the terminal authentication challenge), FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES and FCS_CKM.1/CA-ECDH-AES (for the generation of shared secret and for the derivation of the new session keys), and FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC for the ENC_MAC_Mode secure messaging. The session keys are destroyed according to FCS_CKM.4 after use. The SFR FMT_MTD.1/CAPK and FMT_MTD.1/KEY_READ require that the Chip Authentication Key cannot be written unauthorized or read afterwards.

To allow a verification of the certificate chain as in FMT_MTD.3 the CVCA's public key and certificate as well as the current date are written or updated by authorized identified role as of FMT_MTD.1/CVCA_INI, FMT_MTD.1/CVCA_UPD and FMT_MTD.1/DATE.

11.10.2.7 OT.Chip_Auth_Proof

The security objective **OT.Chip_Auth_Proof** "Proof of travel document's chip authenticity" is ensured by the Chip Authentication Protocol v.1 provided by FIA_API.1 proving the identity of the TOE. The Chip Authentication Protocol v.1 defined by FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES and FCS_CKM.1/CA-ECDH-AES is performed using a TOE internally stored confidential private key as required by FMT_MTD.1/CAPK and FMT_MTD.1/KEY_READ. The Chip Authentication Protocol v.1 [TR-03110-1] requires additional TSF according to FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES and FCS_CKM.1/CA-ECDH-AES (for the derivation of the session keys), FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC (for the ENC_MAC_Mode secure messaging).The SFRs FMT_SMF.1 and FMT_SMR.1/PACE support the functions and roles related.

11.10.2.8 OT.Prot_Abuse-Func

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

11.10.2.9 OT.Prot_Inf_Leak

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

- by measurement and analysis of the shape and amplitude of signals or the time between events found by measuring signals on the electromagnetic field, power consumption, clock, or I/O lines which is addressed by the SFR FPT_EMS.1,
- by forcing a malfunction of the TOE which is addressed by the SFR FPT_FLS.1 and FPT_TST.1, and/or
- by a physical manipulation of the TOE which is addressed by the SFR FPT_PHP.3.

11.10.2.10 OT.Tracing

The security objective **OT.Tracing** aims that the TOE prevents gathering TOE tracing data by means of unambiguous identifying the travel document remotely through establishing or

listening to a communication via the contactless interface of the TOE without a priori knowledge of the correct values of shared passwords (CAN, MRZ).This objective is achieved as follows:(i) while establishing PACE communication with CAN or MRZ (non-blocking authorisation data) – by FIA_AFL.1/PACE;(ii) for listening to PACE communication (is of importance for the current PP, since SOD is card-individual) – FTP_ITC.1/PACE.

11.10.2.11 OT.Prot_Phys-Tamper

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

11.10.2.12 OT.Prot_Malfunction

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

11.10.2.13 OT.Active_Auth_MRTD_Proof

The security objective **OT.Active_Auth_MRTD_Proof** “Proof of travel document’s chip authenticity by Active Authentication” “is covered by the SFRs FCS_COP.1.1/AA, FMT_MTD.1/AA and FMT_MTD.1/KEY_READ.

11.10.3 SFR Dependency Rationale

The dependency analysis for the security functional requirements shows that the basis for mutual support and internal consistency between all defined functional requirements is satisfied. All dependencies between the chosen functional components are analyzed, and non-dissolved dependencies are appropriately explained. The table below shows the dependencies between the SFR of the TOE

Table 14: Dependencies between the SFRs

SFR	Dependencies	Support of the Dependencies
FCS_SAS.1	No dependencies	n.a.
FCS_CKM.1/CA-DH-3DES FCS_CKM.1/CA-DH-AES FCS_CKM.1/CA-ECDH-3DES FCS_CKM.1/CA-ECDH-AES	[FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation],	Fulfilled by FCS_COP.1/CA_ENC and FCS_COP.1/CA_MAC,
	FCS_CKM.4 Cryptographic key destruction,	Fulfilled by FCS_CKM.4
FCS_CKM.1/DH-PACE-3DES FCS_CKM.1/DH-PACE-AES FCS_CKM.1/ECDH-PACE-3DES FCS_CKM.1/ECDH-PACE-AES	[FCS_CKM.2 Cryptographic key distribution or FCS_COP.1 Cryptographic operation]	Fulfilled by FCS_CKM.2/DH
FCS_CKM.4	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or	Fulfilled by: FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES

SFR	Dependencies	Support of the Dependencies
	FCS_CKM.1 Cryptographic key generation]	FCS_CKM.1/CA-ECDH-AES
FCS_COP.1/CA_ENC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation]	Fulfilled by: FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES FCS_CKM.1/CA-ECDH-AES
	FCS_CKM.4 Cryptographic key destruction.	Fulfilled by FCS_CKM.4
FCS_COP.1/CA_MAC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation],	Fulfilled by: FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES FCS_CKM.1/CA-ECDH-AES
	FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.4
FCS_COP.1/SIG_VER	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation],	Fulfilled by: FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES FCS_CKM.1/CA-ECDH-AES
	FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.4
FCS_COP.1/PACE_ENC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation],	Fulfilled by: FCS_CKM.1/DH-PACE-3DES FCS_CKM.1/DH-PACE-AES FCS_CKM.1/ECDH-PACE-3DES FCS_CKM.1/ECDH-PACE-AES
	FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.4
FCS_COP.1/PACE_MAC	[FDP_ITC.1 Import of user data without security attributes, FDP_ITC.2 Import of user data with security attributes, or FCS_CKM.1 Cryptographic key generation],	Fulfilled by: FCS_CKM.1/DH-PACE-3DES FCS_CKM.1/DH-PACE-AES FCS_CKM.1/ECDH-PACE-3DES FCS_CKM.1/ECDH-PACE-AES
	FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.4
FCS_COP.1/AA	[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]	Fulfilled by FMT_MTD.1/AA
	FCS_CKM.4 Cryptographic key destruction	Fulfilled by FCS_CKM.4
FCS_RND.1	No dependencies	n.a.

SFR	Dependencies	Support of the Dependencies
FIA_AFL.1/PACE	FIA_UAU.1 Timing of authentication	Fulfilled by FIA_UAU.1/PACE
FIA_UID.1/PACE	No dependencies	n.a.
FIA_UAU.1/PACE	FIA_UID.1 Timing of identification	Fulfilled by FIA_UID.1/PACE
FIA_UAU.4/PACE	No dependencies	n.a.
FIA_UAU.5/PACE	No dependencies	n.a.
FIA_UAU.6/PACE	No dependencies	n.a.
FIA_UAU.6/EAC	No dependencies	n.a.
FIA_API.1	No dependencies	n.a.
FDP_RIP.1	No dependencies	n.a.
FDP_UCT.1/TRM	[FTP_ITC.1 Inter-TSF trusted channel, or FTP_TRP.1 Trusted path]	Fulfilled by FTP_ITC.1/PACE
	[FDP_ACC.1 Subset access control, or FDP_IFC.1 Subset information flow control]	Fulfilled by FDP_ACC.1/TRM
FDP_UIT.1/TRM	[FTP_ITC.1 Inter-TSF trusted channel, or FTP_TRP.1 Trusted path]	Fulfilled by FTP_ITC.1/PACE
	[FDP_ACC.1 Subset access control, or FDP_IFC.1 Subset information flow control]	Fulfilled by FDP_ACC.1/TRM
FDP_ACC.1/TRM	FDP_ACF.1 Security attribute based access control	Fulfilled by FDP_ACF.1/TRM
FDP_ACF.1/TRM	FDP_ACC.1 Subset access control	Fulfilled by FDP_ACC.1/TRM
	FMT_MSA.3 Static attribute initialization	Justification 1 for non-satisfied dependencies
FMT_SMF.1	No dependencies	n.a.
FMT_SMR.1/PACE	FIA_UID.1 Timing of identification	Fulfilled by FIA_UID.1/PACE
FMT_LIM.1	FMT_LIM.2 Limited availability	Fulfilled by FMT_LIM.2
FMT_LIM.2	FMT_LIM.1 Limited capabilities	Fulfilled by FMT_LIM.1
FMT_MTD.1/INI_ENA	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/INI_DIS	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/PA	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1

SFR	Dependencies	Support of the Dependencies
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/CVCA_INI	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/CVCA_UPD	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/DATE	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/CAPK	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/AA	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.1/KEY_READ	FMT_SMF.1 Specification of management functions	Fulfilled by FMT_SMF.1
	FMT_SMR.1 Security roles	Fulfilled by FMT_SMR.1/PACE
FMT_MTD.3	FMT_MTD.1 Management of TSF data	Fulfilled by FMT_MTD.1/CVCA_INI and FMT_MTD.1/CVCA_UPD
FTP_ITC.1/PACE	No dependencies	n.a.
FPT_EMS.1	No dependencies	n.a.
FPT_FLS.1	No dependencies	n.a.
FPT_TSF.1	No dependencies	n.a.
FPT_PHP.3	No dependencies	n.a.

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

No. 1: The access control TSF according to FDP_ACF.1/TRM uses security attributes which are defined during the personalisation and are fixed over the whole lifetime of the TOE. No management of these security attributes (i.e. SFR FMT_MSA.1 and FMT_MSA.3) is necessary here.

11.10.4 Security Assurance Requirements Rationale

The EAL5+ was chosen to permit a developer to gain maximum assurance from positive security engineering based on good commercial development practices which, through rigorous, do not require substantial specialist knowledge, skills, and other resources. EAL5+ is the highest level at which it is likely to be economically feasible to retrofit to an existing product line. EAL5+ is applicable in those circumstances where developers or users require a moderate to high level of independently assured security in conventional commodity TOEs and are prepared to incur sensitive security specific engineering costs.

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

The component ALC_DVS.2 has no dependencies.

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

The component AVA_VAN.5 has the following dependencies:

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

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

11.10.5 Security Requirements – Mutual Support and Internal Consistency

The following part of the security requirements rationale shows that the set of security requirements for the TOE consisting of the security functional requirements (SFRs) and the security assurance requirements (SARs) together form a mutually supportive and internally consistent whole.

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

The dependency analysis in section 11.10.3 Dependency Rationale for the security functional requirements shows that the basis for mutual support and internal consistency between all defined functional requirements is satisfied. All dependencies between the chosen functional components are analysed, and non-satisfied dependencies are appropriately explained.

All subjects and objects addressed by more than one SFR in sec. 11 are also treated in a consistent way: the SFRs impacting them do not require any contradictory property and behavior of these 'shared' items.

The assurance class EAL5+ is an established set of mutually supportive and internally consistent assurance requirements. The dependency analysis for the sensitive assurance components in section 11.10 Security Assurance Requirements Rationale shows that the assurance requirements are mutually supportive and internally consistent as all (sensitive) dependencies are satisfied, and no inconsistency appears.

Inconsistency between functional and assurance requirements could only arise if there are functional-assurance dependencies which are not met, a possibility which has been shown not to arise in sections 11.10.3 Dependency Rationale and 11.10 Security Assurance Requirements Rationale. Furthermore, as also discussed in section 11.10 Security Assurance Requirements Rationale, the chosen assurance components are adequate for the functionality of the TOE. So, the assurance requirements and security functional requirements support

each other and there are no inconsistencies between the goals of these two groups of security requirements.

12 TOE Security Functions (TSFs)

The TOE provides the following TOE security functionality, which comply to EAC PP [PP-0056]:

- Personalization Agent Authentication
- PACE
- EAC
- Active Authentication
- Secure Messaging
- Access Control
- Cryptographic Support
- Data Protection

These Security Functions are implemented by the realisation of the Security Functional requirements, according to chap. 11. The details of the implementation of this TOE security functionality are provided in the following sections.

12.1 SF_AUTH – Personalization Agent Authentication

The TOE implements security mechanisms to authenticate external entities and assign roles and rights.

The authentication mechanism is based on challenge-response protocol according to [ICAO_9303] using the AES algorithm and key length of 128 bits, as selected for the SFRs FCS_COP.1/CA_ENC, FCS_COP.1/CA_MAC and FCS_RND.1.

The purpose of the TSF SF_AUTH is to authenticate the roles of “Personalization Agent” when the TOE is in the life cycle phase 3 “TOE Personalization” (FIA_UAU.4, FIA_UAU.5). After a successful authentication, the “Personalization Agent” takes control of the TOE, executes the steps and operations as described in the life cycle Phase 3 “TOE Personalization”, and initiates the Logical Data Structure (LDS).

The Personalization Agent Authentication Key(s) are pre-loaded in the TOE at the end of phase 2 “TOE Manufacturing”. After a successful authentication the “Personalization Agent” takes control of the TOE, executes the steps and operations as described in the life cycle phase 3 “TOE Personalization”, and initiates the Logical Data Structure (LDS) (FDP_ACC.1, FDP_ACF.1).

The Personalization Agent Authentication algorithm is detailed in the Preparative User Guidance of this TOE [AGD_PRE].

12.2 SF_PACE – PACE Protocol

The TOE implements the PACE protocol with negotiation of session keys (FCS_CKM.1/DH-PACE-3DES, FCS_CKM.1/DH-PACE-AES, FCS_CKM.1/ECDH-PACE-3DES, FCS_CKM.1/ECDH-PACE-AES). This protocol provides key component (FCS_COP.1/PACE_ENC, FCS_COP.1/PACE_MAC) to set up a secured channel (FTP_ITC.1/PACE) and to ensure a secure key exchange between the TOE and a terminal. This protocol provides authentication mechanisms implementing the SFRs FIA_UID.1/PACE, FIA_UAU.1/PACE, FIA_UAU.4/PACE, FIA_UAU.5/PACE, FIA_UAU.6/PACE,

FMT_SMR.1/PACE. The implementation of PACE considers the SFR FIA_AFL.1/PACE requirement to prevent hacker attacks. The negotiated session keys are used to establish secure channels to protect data confidentiality and integrity during communication implementing the SFR FTP_ITC.1/PACE.

12.3 SF_EAC – Extended Access Control

The TOE implements the Extended Access Control (EAC) mechanism to protect and restrict access to sensitive user data (see 8.1.3) contained in the TOE chip. In contrast to common personal data (like the bearer's photograph, names, date of birth, etc.) which can be protected by basic mechanisms, more sensitive data (like fingerprints or iris images) must be protected further for preventing unauthorized access and skimming (FDP_UCT.1/TRM, FDP_UIT.1/TRM). The TOE chip protected by EAC will allow this sensitive data to be read (through an encrypted channel) only by an authorized passport inspection system (FDP_ACF.1/TRM).

The Extended Access Control is a mutual device authentication mechanism defined in [TR-03110-1] and [ICAO_9303]. More precisely, the composition of the Terminal Authentication v.1 protocol and the Chip Authentication v.1 protocol allows mutual authentication between a terminal and a chip and the establishment of an authenticated and encrypted connection between the TOE and the Inspection System (FIA_UID.1/PACE, FIA_UAU.1/PACE, FIA_UAU.5/PACE, FIA_API.1, FMT.MTD.3).

The TOE checks by secure messaging in MAC_ENC mode each command whether it was sent by the successfully authenticated terminal (FIA_UAU.6/EAC)

The authentication mechanisms as part of EAC Mechanism include the key agreement for the encryption and the message authentication key to be used for secure messaging (FTP_ITC.1/PACE).

12.4 SF_AA – Active Authentication

The TOE implements the Active Authentication (AA) mechanism to proof the travel document chip authenticity according to [ICAO_9303].

The Active Authentication cryptographic algorithm, key length and standards are defined by SFR FCS_COP.1/AA.

The RSA algorithm is supported with RSA CRT key long 1024, 2048, 3072, and 4096 bits. The ECDSA algorithm is supported with EC key long 192, 224, 256, 320, 384, 512, and 521 bits. For both the algorithms, the following hashing algorithms are supported: SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512.

The Active Authentication cryptographic key is imported in the TOE by the personalization agent according to the SFR FMT_MTD.1/AA

12.5 SF_SM – Secure Messaging

The TOE implements a trusted channel providing confidentiality and integrity of transferred data according to the FTP.ITC.1/PACE, FIA_UAU.5/PACE, FDP_UCT.1/TRM and FDP_UIT.1/TRM requirements. The trusted channel is using AES and 3DES cipher for encryption in CBC mode and cryptographic key sizes 112, 128, 192 and 256 bits as selected and defined in the SFRs FCS_COP.1/PACE_ENC and FCS_COP.1/CA_ENC. The trusted channel is using a message authentication code generation in CMAC and Retail-MAC mode and cryptographic key sizes 112, 128, 192 and 256 bits as selected and defined in the SFRs

FCS_COP.1/PACE_MAC and FCS_COP.1/CA_MAC. The TSF SF_SM uses new fresh random (FCS_RND.1) at each set up of the trusted channel between TOE and terminal.

12.6 SF_AC – Access Control

The TOE operates in accordance to the access policies according to FDP_ACC.1/TRM, FDP_ACF.1/TRM and considers the management functions and user roles as defined in FMT_SMF.1 and FMT_SMR.1/PACE respectively.

This TSF checks that for each operation initiated by a subject on data (EF.COM, EF.SOD, EF.DG1 to EF.DG16 of the logical travel document) and keys (Personalization agent key), the security attributes for that roles authorization are satisfied. The function covers the management, writing, update and read of stored keys and data as defined in FMT_MTD.1/INI_ENA, FMT_MTD.1/INI_DIS, FMT_MTD.1/CVCA_INI, FMT_MTD.1/CVCA_UPD, FMT_MTD.1/DATE, FMT_MTD.1/CAPK, FMT_MTD.1/PA and FMT_MTD.1/KEY_READ.

The TSF SF_AC access control allows the user in the role “TOE Manufacturer” during the Phase 2 “TOE Manufacturing” to write the “Initialization Data”, which includes but are not limited to the “IC Identification data” and/or “Pre-personalization Data” as required by FAU_SAS.1, to write these data only once.

The TSF SF_AC access control allows the users in role Personalisation Agent during the Phase 3 “Personalisation of the travel document” to write in TOE final and genuine personalisation data.

12.7 SF_CRY – Cryptographic Support

This TOE Security Function is responsible for providing cryptographic support to all the other TOE Security Functions including secure key generation and operations on data such as signature generation/verification (FCS_COP.1/SIG_VER), encrypt, decryption, hashing, MAC generation/verification and random number generation:

- The TSF provides the secure generation of symmetric Key for secure messaging (FCS_CKM.1/DH-PACE-3DES, FCS_CKM.1/ECDH-PACE-3DES, FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-ECDH-3DES). The TSF produces agreed parameters to generate the 3DES key and the Retail-MAC message authentication keys for secure messaging by the algorithm in [ICAO_9303], Normative appendix A5.1. The algorithm uses the random number generated by TSF as required by FCS_RND.1.
- The TSF provides the secure generation of symmetric Key for secure messaging (FCS_CKM.1/DH-PACE-AES, FCS_CKM.1/ECDH-PACE-AES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-AES). The TSF produces agreed parameters to generate the AES key and the CMAC message authentication keys for secure messaging by the algorithm in [TR-03110-1] and [ICAO_9303]. The algorithm uses the random number generated by TSF as required by FCS_RND.1
- The TSF provides high quality Random Number Generator (FCS_RND.1) compliant with the [AIS31/20]. This generator is a deterministic RNG of level DRG.3 according to supporting enhanced backward and forward secrecy.
- The TSF provides Hashing Cryptographic operations SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512 for key generation and digital signature generation/verification

- The TSF provides 3DES cipher for encryption/decryption in CBC mode and 112-bits cryptographic key (FCS_COP.1/PACE_ENC, FCS_COP.1/CA_ENC)
- The TSF provides AES cipher for encryption/decryption in CBC mode and 128-, 192- and 256-bits cryptographic key (FCS_COP.1/PACE_ENC, FCS_COP.1/CA_ENC)
- The TSF provides message authentication based on Retail-MAC and 112-bits cryptographic key (FCS_COP.1/PACE_MAC, FCS_COP.1/CA_MAC)
- The TSF provides message authentication based on CMAC and 128-, 192- and 256-bits cryptographic key (FCS_COP.1/PACE_MAC, FCS_COP.1/CA_MAC)
- The TSF provides all the cryptographic basic mechanisms to implement the PACE DH, with Generic Mapping, static or dynamic binding, based on DES keys and 128-, 192-, and 256-bits AES keys derived from MRZ and CAN
- The TSF provides all the cryptographic basic mechanisms to implement the PACE ECDH, with Generic Mapping, static or dynamic binding, based on DES keys and 128-, 192-, and 256-bits AES keys derived from MRZ and CAN.
- The TSF provides support for secure destruction of cryptographic key secret or private material (FCS_CKM.4)
- The TSF provides all the cryptographic basic mechanisms to implement the EAC protocol Terminal authentication v.1 (FCS_COP.1/SIG_VER):
    - EAC RSA, with 1024-, 2048-, 3072-, and 4096-bits RSA key, v1.5 and PSS
    - EAC RSA, with SHA-1, SHA-256, and SHA-512
    - EAC ECDSA with 192-, 224-, 256-, 320-, 384-, 512-, and 521-bits EC Key
    - EAC ECDSA with SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512
- The TSF provides all the cryptographic basic mechanisms to implement the Chip authentication v.1:
    - DH, with 1024- and 2048-bits DSA key
    - DH, with secure messaging based on DES keys and 128, 192, and 256 bits AES keys
    - ECDH, with 192, 224, 256, 320, 384, 512, and 521 bits EC Key
    - ECDH, with secure messaging based on DES keys and 128, 192, and 256 bits AES keys

12.8 SF_PRO – Data Protection

This TOE Security Function is responsible for protection of the TSF data, user data, and TSF functionality. The TSF SF_RPO Data Protection is composed of software implementations of test and security functions including:

- Performing self-tests of the TOE at each power-up including a set of tests to verify that the underlying cryptographic algorithms are operating correctly (FPT_TST.1)
- Initializing memory after reset
- Initializing memory of de-allocated data and secure destruction of cryptographic key, secrets and private material (FCS_CKM.4, FDP_RIP.1)

- Preserving the TOE lifecycle state integrity to ensure that the testing/debugging features used during development remain irreversibly deactivated for deployment in order to ensure User and TSF Data confidentiality (FMT_LIM.1, FMT_LIM.2).
- Protecting the integrity of all stored cryptographic keys before use and preventing use of corrupted data by stopping the operation involved and setting an error (FCS_CKM.4, FDP_RIP.1)
- Preventing electromagnetic and power emissions or associated information like timing behaviour, in order to preserve the confidentiality of stored keys or residual key material information (FPT_EMS.1)
- Preserving secure state after sensitive processing failure (RNG, power loss, memory or functional failure) or potential physical tampering or intrusion detection (FPT_FLS.1, FPT_PHP.3)

This TSF prevents re-activation of de-activated or disabled or terminated mechanisms: the code area and data area are protected (FMT_LIM.1, FMT_LIM.2).

This TSF enforces protection of Key material during cryptographic functions processing and Key Generation, against state-of-the-art attacks, including IC power consumption analysis (FPT_EMS.1).

12.9 SF_OSPlat – Java Platform and OS

This TSF is implemented at SW layer JCS and OS Kernel. Here the TSF is described as a single and cumulative security function representing the following sub-functions which services and characteristics are reported below in the description: **SECURE_MANAGEMENT, CRYPTO_KEY, CRYPTO_OP, TRANSACTION,** and **OBJECT_DELETION**. The TSF provides optimized services for data integrity, memory management, I/O functions, atomic data transaction, cryptographic support, test and management of HW peripheral of Integrated Circuit ST31N600 including crypto library NESLIB V.6.2.1.

The TSF provide and manages the following functionalities:

- Secure Management functionalities (SECURE_MANAGEMENT) such as:
  - Memory cleaning upon: allocation of class instances, arrays, and APDU buffer, and de-allocation of array object, any transient object, any reference to an object instance created during an aborted transaction.
  - Unobservability: operations on secret keys are not observable by other subjects by observation of variations in power consumption or timing analysis, (supporting fulfilment of, FPT_EMS.1).
  - Preservation of a secure state when the following types of failures occur: loss of power or card tearing, NVRAM memory wear-out, failed checksum verification on sensitive data (Supporting fulfilment of FPT_FLS.1).
  - Monitor events related to TOE security and to preserve a TOE secure state, auditable events are: card tearing, power failure, abnormal environmental operating conditions (frequency, voltage, and temperature), physical tampering and NVRAM consistency/integrity check failure (Supporting fulfilment of FPT_PHP.3).
  - Exception handling: This function addresses the TOE exception management. The reasons of these exceptions are: range of operating conditions, integrity errors, life cycle and TOE internal audit failure. Upon detection of exception and depending on exception severity the TOE may end the working session entering a state were the TOE becomes

irresponsive or, in case of major severity, may change its life cycle state entering the “end of use” state.

- Testing: This function ensures the tests of TOE functionalities. It includes the test of Integrated Circuit ST31N600 hardware components and its environmental operating conditions such as temperature, voltage and clock frequency. Depending on the typology and on the operation to be performed, the test is executed at power-up or before/after sensitive operation e.g. digital signature or cryptographic computation. Upon detection of an anomaly and depending on anomaly severity the TOE may end the working session entering a state becoming irresponsive or, in case of major severity, may change its life cycle state entering the “end of use” state (Supporting fulfilment of FPT_TST.1).

- Crypto Key management functionalities (CRYPTO_KEY) such as:
  - key generation
  - key destruction (supporting the fulfilment of SFRs: FCS_CKM.4)
  - Integrity and the unobservability of the keys.
- **Crypto Operation (CRYPTO_OP):** functionalities of encryption/decryption and signature creation/verification with the support of the following algorithms:
  - DES ECB and CBC
  - Triple DES ECB and CBC with 16, 24 bytes of key
  - AES ECB and CBC with 128, 256 bits of key
  - RSA CRT with key length 1024-, 2048-, 3072- and 4096-bits
  - ECC (ECDSA, ECKA) with key length up to 521 bits
  - Hashing (SHA-1, SHA-256, SHA-384, SHA-512)
  - Deterministic Random Number Generation

Supporting the fulfilment of SFRs: FCS_CKM.1/DH-PACE-3DES, FCS_CKM.1/DH-PACE-AES, FCS_CKM.1/ECDH-PACE-3DES, FCS_CKM.1/ECDH-PACE-AES, FCS_CKM.1/CA-DH-3DES, FCS_CKM.1/CA-DH-AES, FCS_CKM.1/CA-ECDH-3DES, FCS_CKM.1/CA-ECDH-AES, FCS_COP.1/PACE_ENC, FCS_COP.1/CA_ENC, FCS_COP.1/PACE_MAC, FCS_COP.1/CA_MAC, FCS_COP.1/SIG_VER, FCS_COP.1/AA, FCS_RND.1.

- **Data Transaction management (SF.TRANSACTION):** functionalities concerning NVRAM changes in order to assure the coherence of the data if a failure or power interruption occurs during their update
- **Secure data deletion (OBJECT_DELETION):** de-allocation of memory resources of data no longer accessible. The security functionality also guarantees that the information content of unreachable data cannot be retrieved anymore (supporting the fulfilment of SFRs: FCS_CKM.4).

12.10 Coverage of the SFRs

The following table provides the coverage of the SFRs by the TSFs of the TOE.

Table 15: SFR vs TSF rationale

SFR \ TSF	SF_EAC – Extended Access Control	SF_PACE - PACE Protocol	SF-AA – Active Authentication	SF_AUTH - Authentication	SF_SM – Secure Messaging	SF_AC – Access Control	SF_CRY – Cryptographic Support	SF_PRO – Data Protection	SF_OSPlat Java Platform and OS
FAU_SAS.1						x			
FCS_CKM.1/DH-PACE-3DES		x					x		x
FCS_CKM.1/DH-PACE-AES		x					x		x
FCS_CKM.1/ECDH-PACE-3DES		x					x		x
FCS_CKM.1/ECDH-PACE-AES		x					x		x
FCS_CKM.1/CA-DH-3DES							x		x
FCS_CKM.1/CA-DH-AES							x		x
FCS_CKM.1/CA-ECDH-3DES							x		x
FCS_CKM.1/CA-ECDH-AES							x		x
FCS_CKM.4							x	x	x
FCS_COP.1/PACE_ENC		x			x		x		x
FCS_COP.1/CA_ENC					x		x		x
FCS_COP.1/PACE_MAC		x			x		x		x
FCS_COP.1/CA_MAC					x		x		x
FCS_COP.1/SIG_VER							x		x
FCS_COP.1/AA			x						x
FCS_RND.1					x		x		x
FIA_AFL.1/PACE		x							
FIA_UID.1/PACE	x	x							
FIA_UAU.1/PACE	x	x							
FIA_UAU.4/PACE		x		x					
FIA_UAU.5/PACE	x	x		x	x				
FIA_UAU.6/PACE		x							
FIA_UAU.6/EAC	x								
FIA_API.1	x								
FDP_ACC.1/TRM						x			
FDP_ACF.1/TRM	x					x			
FDP_RIP.1								x	
FDP_UCT.1/TRM	x				x				
FDP_UIT.1/TRM	x				x				
FMT_SMF.1						x			
FMT_SMR.1/PACE		x				x			
FMT_LIM.1								x	
FMT_LIM.2								x	
FMT_MTD.1/INI_ENA						x			
FMT_MTD.1/INI_DIS						x			
FMT_MTD.1/CVCA_INI						x			
FMT_MTD.1/CVCA_UPD						x			

FMT_MTD.1/DATE						x			
FMT_MTD.1/CAPK						x			
FMT_MTD.1/AA			x						
FMT_MTD.1/PA						x			
FMT_MTD.1/KEY_READ						x			
FMT_MTD.3	x								
FPT_EMS.1								x	x
FPT_TST.1								x	x
FPT_FLS.1								x	x
FPT_PHP.3								x	x
FTP_ITC.1/PACE	x	x			x				

13 Statement of Compatibility

This is a Statement of Compatibility between this Security Target of the composite TOE and the Security Target of the underlying STeID JC Open OS platform [ST_SteidJCOS].

The following tables show the mapping between SARs, SFRs, and Objectives of the platform ST and this ST, demonstrating the compatibility between the two STs.

13.1 Security Assurance Requirements (SARs) mapping

The following table shows the mapping between the STeID JC Open OS platform SARs and this composite TOE SARs. The platform is certified EAL6 augmented with ALC_FLR.2. The composite TOE is certified EAL5 augmented with ALC_DVS.2 and AVA_VAN.5. There is no conflict regarding the Security Assurance Requirements (SARs) because the composite TOE SARs represent a subset of the platform SARs.

Table 16: Platform SARs vs composite TOE SARs

STeID JC Open OS platform SARs (EAL6 augmented with ALC_FLR.2)	Composite TOE SARs (EAL5 augmented with ALC_DVS.2 and AVA_VAN.5)
ADV_ARC.1	ADV_ARC.1
ADV_FSP.5	ADV_FSP.5
ADV_IMP.2	ADV_IMP.1
ADV.INT.3	ADV.INT.2
ADV_SPM.1	-
ADV_TDS.5	ADV_TDS.4
AGD_OPE.1	AGD_OPE.1
AGD_PRE.1	AGD_PRE.1
ALC_CMC.5	ALC_CMC.4
ALC_CMS.5	ALC_CMS.5
ALC_DEL.1	ALC_DEL.1
ALC_DVS.2	ALC_DVS.2 (augmentation)
ALC_FLR.2 (augmentation)	-
ALC_LCD.1	ALC_LCD.1
ALC_TAT.3	ALC_TAT.2
ASE_CCL.1	ASE_CCL.1
ASE_ECD.1	ASE_ECD.1
ASE_INT.1	ASE_INT.1
ASE_OBJ.2	ASE_OBJ.2
ASE_REQ.2	ASE_REQ.2
ASE_SPD.1	ASE_SPD.1
ASE_TSS.1	ASE_TSS.1
ATE_COV.3	ATE_COV.2
ATE_DPT.3	ATE_DPT.3
ATE_FUN.2	ATE_FUN.1
ATE_IND.2	ATE_IND.2
AVA_VAN.5	AVA_VAN.5 (augmentation)

13.2 Threats compatibility

The following table shows the compatibility between the STeID JC Open OS platform Threats and this composite TOE Threats.

Table 17: Compatibility between Platform and composite TOE Threats

STeID JC Open OS platform Threats	Rationale
T.CONFID-APPLI-DATA	The attacker executes an application to disclose data belonging to another application. Threat considered in the composite TOE.
T.CONFID-JCS-CODE	The attacker executes an application to disclose the Java Card System code. Threat covered by the platform evaluation.
T.CONFID-JCS-DATA	The attacker executes an application to disclose data belonging to the Java Card System. Threat covered by the platform evaluation.
T.INTEG-APPLI-CODE	The attacker executes an application to alter (part of) its own code or another application's code. Threat considered in the composite TOE.
T.INTEG-APPLI-CODE.LOAD	The attacker modifies (part of) its own or another application code when an application package is transmitted to the card for installation. Threat considered in the composite TOE.
T.INTEG-APPLI-DATA	The attacker executes an application to alter (part of) another application's data. Threat considered in the composite TOE.
T.INTEG-APPLI-DATA.LOAD	The attacker modifies (part of) the initialization data contained in an application package when the package is transmitted to the card for installation. The threat has been considered in the composite TOE.
T.INTEG-JCS-CODE	The attacker executes an application to alter (part of) the Java Card System code. Threat covered by the platform evaluation.
T.INTEG-JCS.DATA	The attacker executes an application to alter (part of) Java Card System or API data. Threat covered by the platform evaluation.
T.SID.1	An applet impersonates another application, or even the Java Card RE, in order to gain illegal access to some resources of the card or with respect to the end user or the terminal. Threat considered in the composite TOE.
T.SID.2	The attacker modifies the TOE's attribution of a privileged role (e.g. default applet and currently selected applet), which allows illegal impersonation of this role. Threat considered in the composite TOE.
T.EXE-CODE.1	An applet performs an unauthorized execution of a method. Threat considered in the composite TOE.
T.EXE-CODE.2	An applet performs an execution of a method fragment or arbitrary data. Threat considered in the composite TOE.
T.NATIVE	An applet executes a native method to bypass a TOE Security Function such as the firewall. Threat covered by the platform evaluation.

T.RESOURCES	An attacker prevents correct operation of the Java Card System through consumption of some resources of the card: RAM or NVRAM. Threat covered by the platform evaluation.
T.DELETION	The attacker deletes an applet or a package already in use on the card, or uses the deletion functions to pave the way for further attacks (putting the TOE in an insecure state). Threat covered by the platform evaluation.
T.INSTALL	The attacker fraudulently installs post-issuance of an applet on the card. This concerns either the installation of an unverified applet or an attempt to induce a malfunction in the TOE through the installation process). Threat covered by the platform evaluation.
T.OBJ-DELETION	The attacker keeps a reference to a garbage collected object in order to force the TOE to execute an unavailable method, to make it to crash, or to gain access to a memory containing data that is now being used by another application. Threat covered by the platform evaluation.
T.PHYSICAL	The attacker discloses or modifies the design of the TOE, its sensitive data or application code by physical (opposed to logical) tampering means. This threat includes IC failure analysis, electrical probing, unexpected tearing, and DPA. That also includes the modification of the runtime execution of Java Card System or SCP software through alteration of the intended execution order of (set of) instructions through physical tampering techniques. Threat covered by the platform evaluation.
T.LOADER_MISUSE	The attacker performs unauthorised use of the software loader functionality to upload a modified or malicious software version. Threat covered by the platform evaluation.

13.3 Assumptions compatibility

The following table shows the compatibility between the STeID JC Open OS platform Assumptions and this composite TOE Assumptions.

Table 18: Compatibility between Platform and composite TOE Assumptions

STeID JC Open OS platform Assumptions	Rationale
A.CAP_FILE	CAP files loaded post-issuance do not contain native methods. Assumption covered by ADV_IMP.1 of the composite TOE.
A.DELETION	Deletion of applets through the card manager is secure. Assumption not related to the composite TOE.
A.VERIFICATION	All the bytecodes are verified at least once, before the loading, before the installation or before the execution, depending on the card capabilities, in order to ensure that each bytecode is valid at execution time. Assumption ensured by ALC_DVS.2 of the composite TOE.

13.4 Objectives compatibility

The following table shows the compatibility between the STeID JC Open OS platform Objectives and this composite TOE Objectives.

Table 19: Platform Objectives vs composite TOE Objectives

STeID Open JCOS Objectives	Rationale
O.SID	Objective covered by the platform evaluation
O.FIREWALL	Objective covered by the platform evaluation
O.GLOBAL_ARRAYS_CONFID	Objective covered by the platform evaluation
O.GLOBAL_ARRAYS_INTEG	Objective covered by the platform evaluation
O.NATIVE	Objective covered by the platform evaluation
O.OPERATE	Objective covered by the platform evaluation
O.REALLOCATION	Objective covered by the platform evaluation
O.RESOURCES	Objective covered by the platform evaluation
O.ALARM	Objective also covered by the composite TOE
O.CIPHER	Objective also covered by the composite TOE
O.RNG	Objective covered by platform evaluation
O.KEY-MNGT	Objective also covered by the composite TOE
O.PIN-MNGT	Objective also covered by the composite TOE
O.TRANSACTION	Objective covered by the platform evaluation
O.OBJ-DELETION	Objective covered by the platform evaluation
O.DELETION	Objective covered by the platform evaluation
O.LOAD	Objective covered by the platform evaluation
O.INSTALL	Objective covered by the platform evaluation
O.SENSITIVE_RESULTS_INTEG	Objective covered by the platform evaluation
O.CARD-MANAGEMENT	Objective covered by the platform evaluation
O.SCP.RECOVERY	Objective also covered by the composite TOE
O.SCP.SUPPORT	Objective also covered by the composite TOE
O.SCP.IC	Objective covered by the platform evaluation
OT.ACCESS_CONTROL	Objective covered by the platform evaluation

13.5 Security objectives for the environment (OEs) compatibility

The following table shows the compatibility between the STeID JC Open OS platform OEs and this composite TOE OEs.

Table 20: Platform OEs vs composite TOE OEs

STeID JC Open OS platform OEs	Rationale
OE.CAP_FILE	No applet loaded post-issuance shall contain native methods. This security objective is still relevant for the composite TOE and must be taken into account by the TOE user during the loading of additional applets.
OE.VERIFICATION	All the bytecodes shall be verified at least once, before the loading, before the installation or before the execution, depending on the card capabilities, in order to ensure that each bytecode is valid at execution time. Additionally, the applet shall follow all the recommendations, if any, mandated in the platform guidance for maintaining the isolation property of the platform. This security objective is still relevant for the composite TOE and must be taken into account by the TOE user during the loading of additional applets.
OE.CODE-EVIDENCE	For application code loaded pre-issuance, evaluated technical measures implemented by the TOE or audited organizational measures must ensure that loaded application has not been changed since the code verifications required in OE.VERIFICATION. This security objective is still relevant for the composite TOE and must be taken into account by the TOE user during the loading of additional applets.
OE.KEY_PERSO	When the TOE life cycle is in manufacturing state, and before it is set to release state, all the default keys in the TOE are updated with final usage phase keys, FW authentication keys and the content loading keys. Objective covered by the platform evaluation.

13.6 Organizational security policies (OSPs) compatibility

The following table shows the compatibility between the STeID JC Open OS platform OSPs and this composite TOE OSPs.

STeID JC Open OS platform OSPs	Rationale
OSP.VERIFICATION	This policy shall ensure the consistency between the export files used in the verification and those used for installing the verified file. The policy must also ensure that no modification of the file is performed in between its verification and the signing by the verification authority. Policy covered by the platform evaluation

13.7 Compatibility between SFRs

The following table shows the compatibility between the STeID JC Open OS platform SFRs and this composite TOE SFRs. STeID JC Open OS platform SFRs are separated in the following groups as defined in [SOGIS-COMP]:

- IP_SFR: irrelevant Platform SFR not being used by the composite TOE
- RP_SFR-MECH: relevant Platform SFR being used by the composite TOE because its security properties providing protection attacks to the composite TOE

- RP_SFR-SERV: relevant Platform SFR being used by the composite TOE to implement a security service with associated TSFI

Table 21: Platform SFRs vs composite TOE SFRs

STeID JC Open OS platform SFRs	Rationale
FDP_ACC.2/FIREWALL	FIREWALL access control. RP_SFR-MECH
FDP_ACF.1/FIREWALL	FIREWALL access control. RP_SFR-MECH
FDP_IFC.1/JCVM	JCVM information flow control. RP_SFR-MECH
FDP_IFF.1/JCVM	JCVM information flow control. RP_SFR-MECH
FDP_RIP.1/OBJECTS	Any previous information content of a resource is made unavailable upon the allocation of the resource. RP_SFR-MECH
FMT_MSA.1/JCRE	FIREWALL access control. RP_SFR-MECH
FMT_MSA.1/JCVM	FIREWALL access control and JCVM information flow control. RP_SFR-MECH
FMT_MSA.2/FIREWALL_JCVM	FIREWALL access control and JCVM information flow control. RP_SFR-MECH
FMT_MSA.3/FIREWALL	FIREWALL access control. RP_SFR-MECH
FMT_MSA.3/JCVM	JCVM information flow control. RP_SFR-MECH
FMT_SMF.1/CM	Management Functions. RP_SFR-MECH
FMT_SMR.1/CM	Security roles. RP_SFR-MECH
FCS_CKM.1	Cryptographic key generation. RP_SFR-SERV
FCS_CKM.4	Cryptographic key destruction. RP_SFR-SERV
FCS_COP.1	Cryptographic operation. RP_SFR-SERV
FCS_RNG.1/IC	Random number generation. RP_SFR-SERV
FCS_RNG.1/DRBG	Random number generation. RP_SFR-SERV
FDP_RIP.1/ABORT	Subset residual information protection. RP_SFR-MECH
FDP_RIP.1/APDU	Subset residual information protection. RP_SFR-MECH
FDP_RIP.1/bArray	Subset residual information protection. RP_SFR-MECH
FDP_RIP.1/GlobalArray	Subset residual information protection. RP_SFR-MECH
FDP_RIP.1/KEYS	Subset residual information protection. RP_SFR-MECH
FDP_RIP.1/TRANSIENT	Subset residual information protection. RP_SFR-MECH
FDP_ROL.1/FIREWALL	Basic rollback. RP_SFR-MECH
FAU_ARP.1	Security alarms. RP_SFR-MECH
FDP_SDI.2/DATA	Stored data integrity monitoring and action. RP_SFR-MECH
FPR_UNO.1	Unobservability. RP_SFR-MECH
FPT_FLS.1	Failure with preservation of secure state. RP_SFR-MECH
FPT_TDC.1	Inter-TSF basic TSF data consistency. RP_SFR-MECH
FIA_ATD.1/AID	User attribute definition. RP_SFR-MECH
FIA_UID.2/AID	User identification before any action. RP_SFR-MECH
FIA_USB.1/AID	User-subject binding. RP_SFR-MECH
FMT_MTD.1/JCRE	Management of TSF data. RP_SFR-MECH
FMT_MTD.3/JCRE	Secure TSF data. RP_SFR-MECH
FDP_ITC.2/Installer	Import of user data with security attributes. RP_SFR-MECH
FMT_SMR.1/Installer	Security roles. RP_SFR-MECH
FPT_FLS.1/Installer	Failure with preservation of secure state. RP_SFR-MECH
FPT_RCV.3/Installer	Automated recovery without undue loss. RP_SFR-MECH
FDP_ACC.2/ADEL	Complete access control by Applet deletion manager. RP_SFR-MECH
FDP_ACF.1/ADEL	Security attribute based access control of the Applet deletion manager. RP_SFR-MECH
FDP_RIP.1/ADEL	Subset residual information protection by Applet deletion manager. RP_SFR-MECH
FMT_MSA.1/ADEL	Management of security attributes by Applet deletion manager. RP_SFR-MECH

FMT_MSA.3/ADEL	Static attribute initialisation by Applet deletion manager. RP_SFR-MECH
FMT_SMF.1/ADEL	Management Functions of the Applet deletion manager. RP_SFR-MECH
FMT_SMR.1/ADEL	Security roles of the Applet deletion manager. RP_SFR-MECH
FPT_FLS.1/ADEL	Failure with preservation of secure state by Applet deletion manager. RP_SFR-MECH
FDP_RIP.1/ODEL	Subset residual information protection of the object deletion. RP_SFR-MECH
FPT_FLS.1/ODEL	Failure with preservation of secure state of the object deletion. RP_SFR-MECH
FCO_NRO.2/CM	Enforced proof of origin of package loading. RP_SFR-MECH
FDP_IFC.2/CM	Complete information flow control of package loading. RP_SFR-MECH
FDP_IFF.1/CM	Simple security attributes of package loading. RP_SFR-MECH
FDP_UIT.1/CM	Data exchange integrity of package loading. RP_SFR-MECH
FIA_UID.1/CM	Timing of identification of package loading. RP_SFR-MECH
FMT_MSA.1/CM	Management of security attributes of package loading. RP_SFR-MECH
FMT_MSA.3/CM	Static attribute initialisation of package loading. RP_SFR-MECH
FMT_SMF.1/CM	Specification of Management Functions. RP_SFR-MECH
FMT_SMR.1/CM	Security roles. RP_SFR-MECH
FTP_ITC.1/CM	Inter-TSF trusted channel. RP_SFR-MECH
FDP_SDI.2/RESULT	Integrity_Sensitive_Result. RP_SFR-MECH
FPT_TST.1	TSF Testing. RP_SFR-MECH
FTP_ITC.1/Loader	Inter-TSF trusted channel of the flash loader. IP_SFR
FDP_UIT.1	Data exchange integrity of the flash loader. IP_SFR
FDP_ACC.1/Loader	Subset access control of the flash loader. IP_SFR
FDP_ACF.1/Loader	Security attribute based access control of the flash loader. IP_SFR

13.8 Conclusion

There are no contradictions between the ST of this composite TOE and the ST of the underlying STeID JC Open OS platform [ST_SteidJCOS].

14 Annex A – Crypto disclaimer

The following cryptographic algorithms are used by the TOE to enforce its security policy:

Purpose	Cryptographic mechanism	Standard of Implementation	Key size in bits
Authentication	AES in CBC mode	[FIPS_PUB_197] (AES), [ISO 10116] (CBC) [ICAO_9303] chap. 4.3	128, 192, 256
	RSA in CRT	[ISO_9796-2]	1024, 2048, 3072, 4096
	ECDSA	[TR-03111]	192, 224, 256, 320, 384, 512, 521
Key Agreement	Session key established with: - PACE protocol - EAC Chip Authentication protocol v.1 - EAC Terminal Authentication protocol v.1	[ICAO_9303] [TR-03110-1]	112, 128, 192, 256
Confidentiality	3DES in CBC mode	[FIPS_46_3] and [ICAO_9303] normative appendix 5, A5.3	112
	AES in CBC mode	[FIPS_PUB_197] (AES), [ISO 10116] (CBC)	128, 192, 256
Integrity	Symmetric: Retail-MAC, CMAC	[ISO_9797-1] (MAC algorithm 3, block cipher DES, Sequence Message Counter, padding mode 2) [SP800-22] [RFC4493]	112 for retail-MAC 128, 192, 256 for CMAC
	Asymmetric: RSA, ECDSA	[PKCS1_v1_5] [RFC3447] [ANSI_X9.62] [TR-03111]	1024, 2048, 3072, 4096 for RSA keys 192, 224, 256, 320, 384, 512, 521 for ECDSA keys
Trusted Channel	Secure messaging in ENC_MAC mode and key established with EAC protocol	[ICAO_9303]	112, 128, 192, 256
RNG	True Random Generator (TRNG) class PTG.2 Deterministic Random Generator (DRBG) class RNG DRG.3	[AIS31/20]	N.A.
Hashing	SHA-1, SHA-224, SHA-256, SHA-384, SHA-512	[FIPS_180-2]	N.A.

15 Safety requirements

N/A

16 Environmental requirements

STMicroelectronics recommends viewing documents on the screen rather than printing to limit paper consumption.

17 Revision history

Date	Revision	Changes
October 22, 2025	A	Initial release
October 31, 2025	B	TOE physical scope includes platform guidance
December 22, 2025	C	Add CC certificate platform reference Updated the versions of the ST and AGD OPE of the platform

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