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Personal identification — Recommendations for using biometrics in European Automated Border Control

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Persönliche Identifikation - Empfehlungen für den Einsatz von Biometrie bei der automatisierten Grenzübergangskontrolle in Europa

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Foreword

This document (CEN/TS 16634:2014) has been prepared by Technical Committee CEN/TC 224 “Personal identification, electronic signature and cards and their related systems and operations”, the secretariat of which is held by AFNOR.

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Introduction

European countries are increasingly deploying technological solutions to support border guard officers in fulfilling their duties. Such solutions can consist of inspection systems that directly assist the officers in screening travellers or of electronic kiosk and gates offering various degrees of automation.

Electronic Machine Readable Travel Documents (eMRTD) as defined in ICAO Document 9303 [27] can contribute to a high degree of border automation. Under Council Regulation (EC) No 2252/2004 [21], EU Member States nowadays issue electronic passports containing biometric data (facial image, two fingerprint images). Ireland and UK are not bound by the Regulation and issue ePassports storing only the facial image of the holder. Currently a number of European countries have deployed ABC systems which automate border checks for EU citizens in possession of an electronic passport. The upcoming “Smart Borders Package” will foresee the introduction of an EU Registered Traveller Programme [23]. This would allow certain groups of frequent travellers (i.e. business travellers, family members, etc.) from third countries to enter the EU, subject to appropriate pre-screening, using simplified border checks at ABC systems. The European Commission proposes that this RTP makes maximum use of existing systems and tools, such as the Biometric Matching System which underpins the Visa Information System (VIS) and the fingerprint scanners which are used for this system.

There is a need to harmonize processes containing biometric elements, biometric technology tests and reporting frameworks (in accordance with Bibliographical Entries [11], [12], [13]) and to link biometric characteristics with supervision requirements.

This Technical Specification focuses on automated systems that can be supervised by an operator, but such supervision is not a requirement for the biometric comparison subsystem. The level of supervision is an operational decision that can be changed according to the needs of the operating authorities.

ABC systems can be classified into four profiles based on their document requirements:

- eMRTD based,
- MRTD based,
- Token other than MRTD - physical and logical, transferable,
- Tokenless.

Regarding the location of the eligibility check, ABC systems can be implemented as:

- One-Step Process,
- Integrated Two-Step Process,
- Segregated Two-Step Process.

This document has been drafted with the contribution of the European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union (Frontex) and was adopted by CEN after public enquiry and formal vote according to the CEN Rules of Procedure.

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1 Scope

This Technical Specification primarily focuses on biometric aspects of Automated Border Control (ABC) systems. Drawing on the first European and international ABC deployments, it aims to disseminate best practice experiences with a view to ensure consistent security levels in European ABC deployments. Furthermore, the best practice recommendations given here shall help make border control authorities' processes more efficient, speeding up border clearance, and delivering an improved experience to travellers.

ISO/IEC JTC1/SC 37 has published a series of standards dealing with biometric data coding, interfaces, performance tests as well as compliance tests. In order to promote global interoperability it is essential that all these standards are applied in European deployments. However, these standards do not consider national or regional characteristics; in particular, they do not consider European Union privacy and data protection regulation as well as European accessibility and usability requirements [22]. Thus, this Technical Specification amends the ISO standards with respect to special European conditions and constraints.

The Technical Specification systematically discusses issues to be considered when planning and deploying biometric systems for ABC and gives best practice recommendations for those types of systems that are or will be in use in Europe. The document deals with personal identification including ergonomic aspects that have an impact on the acquisition of biometric data.

Communication, infrastructure scalability and security aspects other than those related to biometrics are not considered. This document also does not consider hardware and security requirements of biometric equipment and does not recommend general border crossing procedures.

The enrolment process, e. g. for electronic passports, is out of scope of this document.

2 Terms and definitions

2.1
Automated Border Control (ABC) system
automated system which authenticates the electronic machine readable travel document or token, establishes that the passenger is the rightful holder of the document or token, queries border control records, then determines eligibility of border crossing according to the pre-defines rules

2.2
biometric capture
collection of, or attempt to collect a signal(s) from a biometric characteristic(s), or a representation(s) of a biometric characteristic(s,) and conversion of the signal(s) to a captured biometric sample set [4]

2.3
biometric verification
process of confirming a biometric claim of the holder of an eMRTD through biometric comparison

2.4
border checks
checks carried out at border crossing points, to ensure that persons, including their means of transport and the objects in their possession, may be authorized to enter the territory of the Member States or authorized to leave it [24]

Note 1 to entry: See also “Border crossing point (BCP)”.

2.5
Border Crossing Point
BCP
crossing point authorized by the competent authorities for the crossing of external borders [24]

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2.6
border guard
public official assigned, in accordance with national law, to a border crossing point or along the border or the immediate vicinity of that border who carries out, in accordance with the Schengen Borders Code and national law, border control tasks [24]

2.7
border management authority
public law enforcement institution which, in accordance with national law, is responsible for border control

2.8
database
application storing a structured set of data and allowing for the management and retrieval of such data

EXAMPLE The Schengen Information System (SIS) is a joint information system that enables the competent authorities in each Member State of the Schengen area, by means of an automated search procedure, to have access to alerts on persons and property for the purposes of border checks and other police and customs checks carried out within the country in accordance with national law and, for some specific categories of alerts (those defined in Article 96 of the Schengen Convention), for the purposes of issuing visas, residence permits and the administration of legislation on aliens in the context of the application of the provisions of the Schengen Convention relating to the movement of persons.

Note 1 to entry: See also “Schengen area” and “Watch List”.

2.9
database hit
instance of identifying an item of data which matches the requirements of a search

Note 1 to entry: See also “Database” and “Watch List”.

2.10
digital mirror
display showing the horizontally mirrored live image of the camera's capturing area

2.11
eGate
one of the components of an ABC system, consisting of a physical barrier operated by electronic means

2.12
eID
electronically enabled card that may be used as an identity document (typically compliant to ICAO Doc 9303 Part 3 [27])

2.13
ePassport
A machine readable passport (MRP) containing a contactless integrated circuit (IC) chip within which is stored data from the MRP data page, one or more biometric samples of the passport holder, and a security object to protect the data with Public Key Infrastructure (PKI) cryptographic technology, and which conforms to the specifications of ICAO Doc 9303, Part 1 [27]

2.14
EU citizen
person having the nationality of an EU Member State, within the meaning of Article 20(1) of the Treaty on the Functioning of the European Union

2.15
Frontex
European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union [29]

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2.16
impostor
subversive biometric capture subject who attempts to be matched to someone else's biometric reference [4]

2.17
Machine Readable Zone
MRZ
area on a passport containing two lines of data (three lines on a TD-1 card) that are printed using a standard format and font as explained in ICAO Doc 9303

Note 1 to entry: See also "Visual Inspection Zone (VIZ)".

2.18
member state
country which is member of the European Union

Note 1 to entry: Within the context of the present Recommendations, the term also applies to those countries that, not being EU members, take part in the Schengen area. See also "Schengen area".

2.19
Machine Readable Travel Document
MRTD
official document (e.g. passport, visa), conforming with the specifications contained in ICAO Doc 9303, issued by a State or organization which is used by the holder for international travel (e.g. passport, visa, MRTD) and which contains mandatory visual (eye readable) data and a separate mandatory data summary in a format which is capable of being read by machine

2.20
operator
border guard officer who is responsible for the remote monitoring and control of the ABC system and whose tasks typically include:

a) monitor the user interface of the application;

b) react upon any notification given by the application;

c) manage exceptions and make decisions about them;

d) communicate with the assisting personnel for the handling of exceptions at the eGates;

e) monitor and profile travellers queuing in the ABC line and using the eGates looking for suspicious behaviour in travellers; and

f) communicate with the border guards responsible for second line checks whenever their service is needed

2.21
presentation attack
person can conduct a presentation attack by using artificial or non-living biometrics [4]

2.22
Registered Traveller Programme
RTP
scheme aiming to facilitate border crossing for frequent, pre-vetted and pre-screened travellers, often making use of ABC systems

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2.23
Schengen Area
area without internal border control which encompasses 26 European countries, including all EU Member States except Bulgaria, Croatia, Cyprus, Ireland, Romania and the United Kingdom, as well as four non EU countries, namely Iceland, Lichtenstein, Norway and Switzerland, and which takes its name from the Schengen Agreement signed in Schengen, Luxembourg, in 1985 and later incorporated into the EU legal framework by the 1997 Treaty of Amsterdam

2.24
spoof attack
attack on a biometric system wherein an artefact is presented to a sensor for the purpose of being enrolled or recognized, or for the purpose of circumventing an enrolment or recognition process

2.25
third country national
person who is not an EU citizen within the meaning of Article 20(1) of the Treaty on the Functioning of the European Union and who is not a person enjoying the Union right to freedom of movement, as defined in Article 2(5) of the Schengen Borders Code

2.26
Visual Inspection Zone
VIZ
portions of the MRTD (data page in the case of an ePassport) designed for visual inspection, i.e. front and back (where applicable), not defined as the MRZ

Note 1 to entry: See also “Machine Readable Zone (MRZ)”.

2.27
watch list
list of individuals, groups, or items that require close surveillance

3 Abbreviated terms

ABC	Automated Border Control
BCP	Border Crossing Point
CEN	European Committee for Standardization
DG2	Data Group 2 (eMRTD face image)
DG3	Data Group 3 (eMRTD fingerprint image)
DET	Detection Error Trade-off
EEA	European Economic Area
eMRTD	Electronic MRTD
EU	European Union
EU/EEA/CH	European Union/European Economic Area/ Switzerland
FAR	False accept rate
FRR	False reject rate
ICAO	International Civil Aviation Organization
IR	Infrared
ISO	International Organization for Standardization
JPEG	Joint Photographic Experts Group

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JPG	JPEG compression format for images
JPG2000	JPEG 2000 compression format for images
MRTD	Machine Readable Travel Document
MRZ	Machine Readable Zone
MS	Member State of the Schengen Agreement
PC	Personal Computer
RFID	Radio Frequency Identification
RTP	Registered Traveller Programme
SC	Subcommittee
SDK	Software Development Kit
TC	Technical Committee
TCN	Third Country Nationals
TS	Technical Specification
UV	Ultraviolet
VIS	Visa Information System
VIZ	Visual Inspection Zone
WG	Working Group

4 ABC systems - an overview

4.1 Concept

An ABC system “authenticates the eMRTD, establishes that the traveller is the rightful holder of the document, queries border control records, then automatically determines eligibility for border crossing according to pre-defined rules” [28].

An ABC solution checks the authenticity of the travel document presented by a traveller and the traveller's ownership of that document using his/her biometric data. An eMRTD based ABC system may make use of all the biometric modalities recommended by ICAO, i.e. face, finger and iris. While other biometric modalities could be used for ABC, this TS concentrates on the ones approved by ICAO.

As ABC systems might also be based on another token than an eMRTD or might be tokenless, the authenticity check of the travel document might have been done at the time of enrolment for the system.

An important issue concerns the need for clearly defined protocols when failures appear in a fully automatic system (without human supervision). Failures can lead to genuine user rejection or problems with outliers (i.e. people that have difficulty in fully showing their face due to cultural reasons). In such situations, and in order to avoid raising acceptance issues, an alternative procedure can be needed. Such an alternative procedure can consist of performing border checks in a dedicated, assisted border control booth. The definition of these protocols is out of scope of this Technical Specification.

4.2 Biometric references

The use of biometric data is the key for ensuring a close binding between the person and the document.

As described in [26] two general types of ABC systems can be identified in relation to their use of biometric references, token-based or tokenless:

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- Token based systems require the traveller to present a token (eMRTD, MRTD or any other issued or approved token) to the system, in order to provide additional authentication information or biometric references.

- If local legislation does not require the presentation of a travel document for border crossing, it is possible to rely only on live biometrics capture of pre-enrolled qualified (vetted) travellers at the time of the border crossing. In this case immediate (1:N) comparison against an up-to-date list of authorized travellers would take place without any document inspection during the ABC process. Legislation might require that travellers carry a valid travel document even if this document does not have to be presented for inspection.

This document focuses on the biometric aspects of both types of ABC solutions.

4.3 Types of travel documents

4.3.1 General

Usually, travellers wishing to enter the European Union are required to carry a passport as a travel document compliant with the ICAO Doc 9303 attesting the holders' nationality and their demographic data. Personal identification information is available both in printed form on the data page of the document, as well as stored in the RFID chip (ISO/IEC 14443 [6]) complying with the ICAO Doc 9303 for national identity documents. It therefore carries the capabilities for biometric identification using a facial comparison system external to the document itself. The following travel ID documents are currently in use or could be used in the future for ABC in the Member States:

- ePassports issued to EU/EEA/CH citizens;

- National ID cards (in Germany and Spain for their own citizens).

In the future, if legislation and technical means allow it, other documents e.g. ePassports of third country nationals (visa waiver), registered traveller cards and Schengen visa could also be used.

4.3.2 National identity cards

Electronic national identity cards are used in a number of countries including the EU/EEA/CH. Such cards identify physically and/or electronically a person as a national of the issuing country, and accredit the biographic data of that person. They store personal identification information both in the VIZ of the document as well as in the MRZ according to ICAO Doc 9303 Part 3. National ID cards issued by the Member States are accepted as travel documents entitling the holder to cross the external borders in the EU/Schengen context.

Some national ID cards provide eID capabilities using biometric functionality for "comparison-on-card" as well as for "comparison-off-card" in accordance with the standards for 2nd generation electronic passports. CEN/TS 15480 (all parts) standardizes these documents [2].

Currently, national eID cards can be used only in a limited number of ABC systems and by own citizens of the deploying country although greater interoperability may be achieved in the future.

4.3.3 Biometric passports

Such passports are travel documents compliant with ICAO Doc 9303 Part 1. They attest the nationality and the biographic data of a certain person. Personal identification information is stored in the VIZ and in the MRZ of the document, as well as in the RFID chip complying with ICAO Doc 9303. Biometric passports carry reference data for two types of biometric identification:

- a facial image is stored in all biometric passports.

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