



Consortium for Robust Official Credentials (CROC™)

First document system developed with
challenging environments in focus



More information and resources online:
<https://croc.secoia.ltd>

Introduction



Every individual has the right to have a certified identity. Governmental bodies and IGOs/NGOs have the task and challenge to provide for well-managed processes and find suitable solutions adapted to the various situations such documents are to be issued in. SECOIA and its solution partners have developed a comprehensive system capable to perform in very challenging environments.

The situation

Identity and travel documents are, depending on where you operate, issued in clean, well connected offices. And the document bearers will be able to take care of them during the regulated service life.

However, this often isn't the case. A vast number of issuing bodies and their depending population cannot rely on such ideal circumstances. When it comes to forced migrants and disaster management, the time and supply component become even more challenging. Conventional approaches are highly reputable, but often are not truly suitable:

The environmental situation, the logistical and issuance challenges as well as budget constraints require a better solution than the conventional.

Traditional solutions

Paper based documents are, in most cases, either printed on office paper (non-secure, non-durable), security paper (better security, better durability), and sometimes on plastic sheets (non-secure, durable). For use-cases that need to be both secure and very robust, the most popular choice is moving onto a card.

This has an impact on most of your workflow, starting with a multitude of consumables (ie. cards, print ribbons, holopatches etc.), and the infrastructure for issuance. In the last few years, various cases have emerged where the system requirements and the budget involved were underestimated. As a result, both goals of longevity and security are often missed when the budget is to limited to do it right.

Key Requirements fulfilled

Environmental

- Operational with unreliable power-supply
- Issuance capable to operate with limited or no WAN-communication
- Documents need to be resilient to extreme dirt & humidity as well as severe means of carrying.
- Consumables need to be forgiving under challenging storage & operation conditions

Issuance process

- Key secure component need to be split and separately stored
- Issuance process needs to be managed, separating competences and authorities
- Capable to handle clans as well as individuals in various stages of identification

Budget

- Balancing Budget limitations and making sure objectives are being met

The CROC™-system: the solution for many cases

The CROC™-system consists of a polymeric paper, mixing synthetic fibres with pulp and then processing it on actual paper machines by adding embedded security features.

Security features as you would expect from secure document paper combined with robustness in most severe conditions are serious characteristics. For the printing you most likely can rely on your current security printing infrastructure.

Specific inkjet printers are now available, capable of deeply linking with the substrate. The data ranges from the typical visual data to machine readable encrypted QR codes. Select solutions offer to print the data additionally in UV fluorescent ink, adding additional layers of security. Where needed, the issuance infrastructure is complemented by buffering power supplies, allowing for continued production during a power failure of several hours.

An important aspect to consider is the logistical security: how can stocks be secured and how can the issuance process be protected from single points of infiltration. Avoiding having blank documents already carrying most security features, these should be spread out into various phases of issuance, both physically and by authorisation to access and use. Thus, only the combination of multicomponent physical and digital elements will finally constitute a rightful document. Replacing the widespread chops or stamps by highly secured and trackable security seals rounds off such a concept.

ADVANTAGES

- | | |
|--|---|
| ✓ High-security concept in the basic configuration | ✓ Not requiring constant WAN-connectivity |
| ✓ Extraordinary robustness of personalized document | ✓ Power-supply independence up to 10 hours |
| ✓ Biometric-enhanced | ✓ Secured issuance process |
| ✓ Flexible formfactor, expandable to specific use case | ✓ Highly competitive versus card-based issuance |

1. Registration

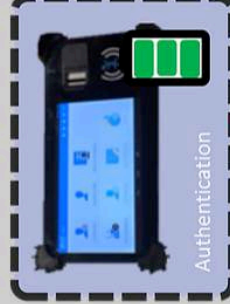
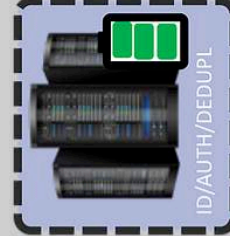
Collection of data as required for further processing, highly independent of powersupply. Datasources: Biometrics, personal data, supplied documents

2. ID/Authentication / Deduplication

Processing of personal data with the objective of uniquely identifying, authenticating the individuals, and deduplicating any applications

3. Personalization

Generation of personal datasecurity sets. Personalization of data on document, comprising various individual security features



4. Substrates

High performance substrate warrants for high longevity. Tested to extreme conditions

5. Issuance

Issuance authority is separated by tracked issuance security seals.

6. Authentication

After issuance the identity of the document holder and the authenticity of the document are verified

CROC™ -System

Data capturing and Enrolment - flexible

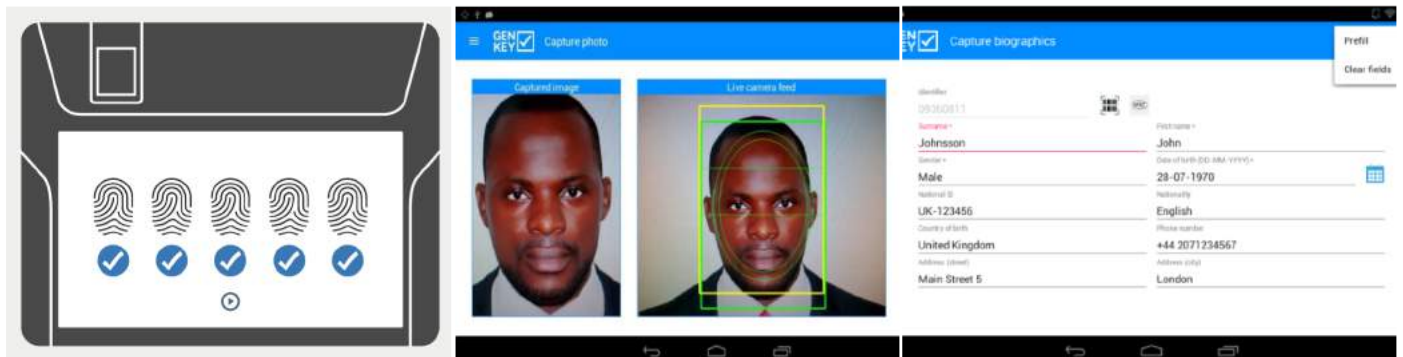
Reliable, versatile and flexible data capturing is essential for getting the document issuance process off to a good start. The CROC™-data capturing module is designed to securely capture and verify identity information, even for large populations using multiple biometric modalities and biographic data.

The CROC™-data capturing and enrolment system is grounded on a highly portable and independent device, capable of capturing a multitude of data related to the individual or to a clan. The solution can work with both on-line and off-line setup where in the latter case, the collected registration data is uploaded to the central system when the device is on line.

The versatility of the software and its biometric engine allows for fast and incremental registration, adapting to various grades of situations.

The CROC™-Data capturing device can capture biographical data, portraits, fingerprints, and data from documents. In the course of an identification exercise, the load between enrolment and verification might shift. The solution adapts to this flexibly: The devices can be dynamically allocated to various exercises and thus ensure that your budget is invested in a highly efficient, performant way.

The CROC™-Data capturing uses a flexible and cost-effective hash function to secure biometric templates which complies with the ISO/IEC 24745 standard for Biometric Information Protection, providing benefits for secure storage, verification, and authentication. This hash function allows storing the information in a standard 2D barcodes or QR codes.



Sample data capturing device

Facial capturing

Automatic questionnaire and registration slip

ADVANTAGES

- ✓ Highly rugged solution
- ✓ Field-proven
- ✓ Flexibly scalable
- ✓ Devices usable for capturing and verification
- ✓ Not requiring constant WAN-connectivity
- ✓ Power-supply independence with battery-packs
- ✓ Secured issuance process

DATA CAPTURING

- ✓ OCR-Data capturing from documents
- ✓ Manual data capturing / Data entry
- ✓ Fingerprint Biometrics
- ✓ Iris data capturing (optional)
- ✓ Contactless chip data reading
- ✓ Photo capture
- ✓ Vital data recording (optional)

SOFTWARE

- ✓ Security: Secure data transfer to central site
- ✓ Operating system: Windows, Android
- ✓ System: Market leading supplier for large-scale registration in challenging environments

DEVICE

- ✓ Power-Supply: Changeable long-life battery, or integrated, rechargeable power packs
- ✓ Build: Ruggedized, IP67 compliant, biometric registration device
- ✓ Connectivity: USB, Micro USB, Bluetooth, NFC (optional)
- ✓ Camera: HD camera, 1D/2D and QR barcode reading
- ✓ Communication: WLAN, GSM, SatLink, SIM card, GPS



CROC™ -System Identity Management Platform

The CROC-Identity Management Platform is a collection of data management and data storage services. It processes the biographic and biometric data captured at the time of registration and creates a unique identity for each individual, which is, irrespective of the content.

CROC-Identity Management Platform is a central repository of identity information of individuals containing biographic data such as name, address, gender, age, and biometric data such as the fingerprints, Iris and face. It's the central hub that ensures data is held securely and can be retrieved, updated and maintained efficiently.

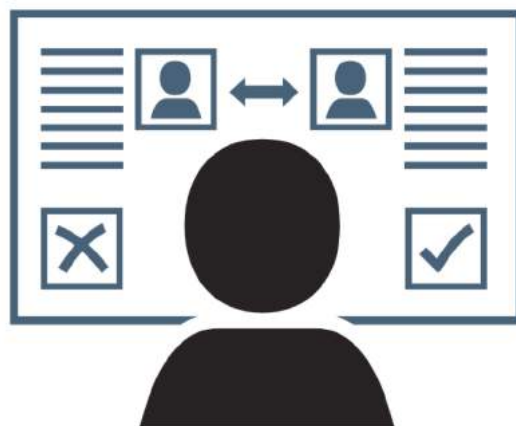
The CROC-Identity Management Platform closely interacts with the Registration and Authentication Solution, ABIS for Biometric Deduplication of registrations and Adjudication for administrating biometric duplicates.

Once the situation allows and actual identities are to be issued, the datasets can be deduplicated, using an Automated Biometric Identification Systems (ABIS). A secure and reliable high performance system which ensures that every identity registered is unique

The system addresses three core functions:

- Deduplication (N:N). Checking for duplicate identities while new subjects are added
- Identification (1:N). Searching for an identity
- Verification (1:1). Verifying a claimed identity and delivering results in real-time

The Adjudication solution is a web-based software application that facilitates the manual duplicate reviewing process. The adjudication officers use this application to decide whether it concerns two different persons or an actual duplicate record that needs to be passed on for further handling.



ADVANTAGES

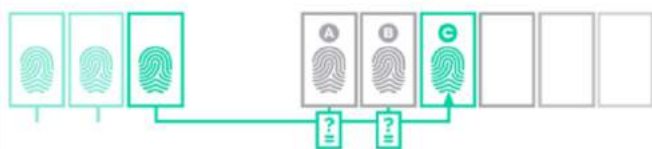
- | | |
|---|--|
| ✓ Ultra-fast (1 billion fingerprint matches per second) | ✓ Easy to integrate, using REST-interfaces |
| ✓ Low cost solution using COTS-components | ✓ User friendly interface |
| ✓ Updatable, without delay or rebooting | ✓ Flexible setup (Centralized or hierarchical level) |
| ✓ Compatible system, using standard protocols | ✓ Lower maintenance |

FUNCTIONALITY

- | | |
|------------------------------|---|
| ✓ Deduplication (N:N) | ✓ Multi-modal (Iris, vein, fingerprint) – Optional |
| ✓ Identification (1:N) | ✓ Extension Management-interaction with 3 rd party tools |
| ✓ Verification (1:1) | ✓ Web-based application |
| ✓ Label independent matching | ✓ Quick restart and full disaster recovery |

Deduplication (N:N)

Checks for duplicate identities while new subjects are added.



Identification (1:N)

Searches for an identity.



Verification (1:1)

Verifies a claimed identity and delivers results in real time, anywhere.



CROC™ -System

High-performance substrate neobond®

Security Documents need to be appropriate for their respective use-case. Travel documents, Personal-IDs, Camp-management, Land titles, vital records etc. In many cases the documents are exposed to severe use. On one hand due to exposure to the elements. On the other hand due to the way the documents are stored or carried.

The material used for the CROC-system is based on paper made of synthetic fibres. It resembles in the make traditional security papers. However, it's robustness to the elements compares more to plastic films.

The advantage over the plastic films is evident: It integrates essential security features as required in the minimum-security standards stipulated by international organizations.

The CROC substrate combines the best characteristics of security paper, plastic card films and nonwoven textiles.

The CROC-substrate is long-time proven, with its original formulation ranging back over 50 years and having been applied in numerous governmental use-cases. The new generation has been further improved for performance, personalization, security.



- ① Watermark
- ② Multi-colour security fibres
- ③ Pre-coloured material
- ④ Chemical markers (reacted)
- ⑤ Planchets
- ⑥ UV Security Fibres, multicoloured

ADVANTAGES

- ✓ Extraordinary dirt and humidity robustness
- ✓ Full security paper pre-configuration
- ✓ Optional bespoke watermark
- ✓ Flexible formfactor, expandable to specific usecase
- ✓ Combining advantages of paper and plastic documents
- ✓ flexible sizing and configuration
- ✓ Long trackrecord
- ✓ Made in Europe

SECURITY CONFIGURATION

- ✓ Custom watermark
- ✓ UV-dull material
- ✓ Visible security fibres
- ✓ UV-fibres
- ✓ 3rd level features
- ✓ Planchettes
- ✓ Chemical markers
- ✓ IR reactive pigments

PROCESSING

- ✓ Offset, Silk-Screen, Intaglio, Letterpress
- ✓ Toner-Laser, Ink-Jet, ballpoint, stamps (dep. on config)
- ✓ Hot stamping OVDs
- ✓ Dye-cutting, dye-punching, sowing

PARAMETERS

- ✓ Weight: 150g/m2 (100 - 300 g/m2 possible)
- ✓ Substrate colour: off-white (other colours possible)
- ✓ Ageing: Certified to ISO/IEC 9706; DIN 6738 lifespan class 24-85
- ✓ Tear-strength: up to 2000mN (with 300g/m2: up to 5000mN)



CROC™ -System

Personalization and individual structures

Security documents need personalization and layered security, added at the point of issue, to truly combat document fraud and data misuse. The CROC-system adds securely generated verification structures and personalized data (including biometrical data) which prints via inkjet securely to the document.

Every individual has the right to have a certified identity. Governmental bodies and NGOs face the task of providing well-managed processes and find suitable solutions adapted to meet the challenges of document issuance environments. SECOIA and our solution partners have developed a comprehensive, document security system capable of performing in these challenging environments.

The CROC-Personalization system delivers a total solution to prevent forgery, falsification, and fraudulent alteration of high security documents. Unique features make it easy to add personalized, invisible UV data for covert security (highlighted below in the fluorescing images). Digital authentication features (QR code) support document verification and audit traceability to quickly verify originality and combat fraud.



- 1 Information display
- 2 Lockable paper-tray
- 3 Multi-cartouche tray
- 4 Barcodes & QR-Codes
- 5 Text data
- 6 Photographic portraits
- 7 UV-Ghost Image
- 8 Personal data background
- 9 Anti-copy patterns

ADVANTAGES

- ✓ High quality colour portraits
- ✓ Adjusted printing for CROC-substrate
- ✓ Fast document production
- ✓ Substantially lower power consumption versus D2T2-printers
- ✓ Scalable for various project topologies
- ✓ No additional security foils required
- ✓ UV 365nm personalization in one run
- ✓ Global Hewlett Packard (HP) - support network

SECURITY-CONFIGURATION

- ✓ Inkjet personalization adapted to the CROC-substrate
- ✓ Biometric data storage for offline verification
- ✓ UV 365nm-fluorescent, invisible print
- ✓ UV-Ghost image of portrait or other image
- ✓ Encrypted QR-code
- ✓ 3rd level security feature
- ✓ Anti-copy pattern
- ✓ Optional security taggants

STRUCTURES

- ✓ Digital QR-code authentication
- ✓ Invisible, fluorescing digital watermarks and images
- ✓ Anti-copy pattern
- ✓ Personalized microprint

PRINTER

- ✓ Colours / Printing Resolution: Typically CMK-UV (4 ink tanks) / 1200 dpi
- ✓ Type of personalization Inkjet, decentralized (over-the-desk)
- ✓ Speed Up to 55 pages per minute
- ✓ Volume per printer (pages per month) Volume: 7'500 / Duty cycle: up to 80'000



CROC™ -System

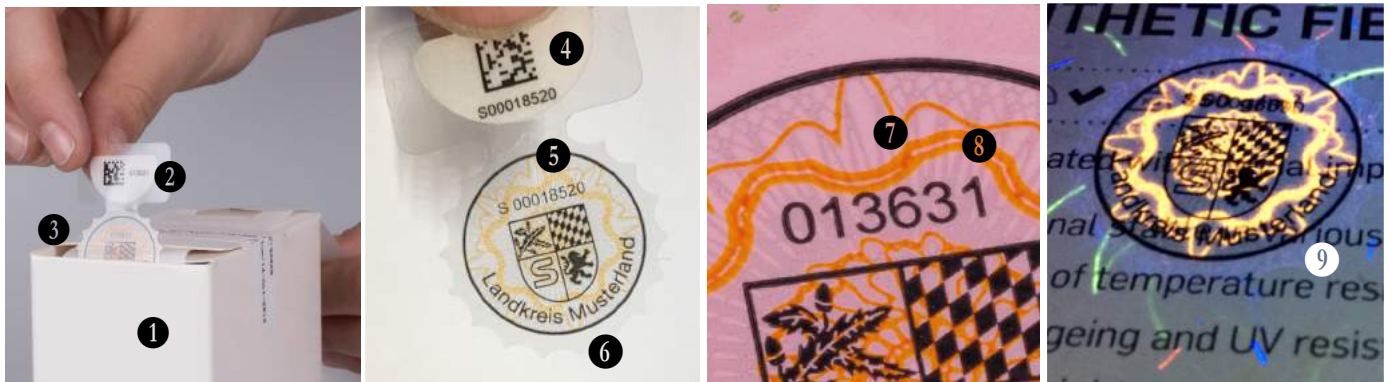
Issuance secured by Security-Seals

An essential element in the production of secure documents is the actual step of issuance. The CFD-system offers the possibility to segregate the last phase from the previous, making the system more robust against unauthorized document production and issuance.

For the CROC-system each security feature and each investment must perform to its maximum. During the issuance process a security seal is applied by the authorized officer. Compared to traditional dry or wet-stamps this CROC-Security Seal contributes strongly to the overall security. For one it is a uniquely identified, numbered element offering a full audit-trail and should be stored separately from any other systems component.

For two, it adds to the overall security of the document and the personalization. Due to the translucent make, it can be applied late in the process and protect key data. As such it exceeds any pre-applied element in its functionality.

"Security-printer in-a-box": The security seals come in practical dispenser-boxes and are applied without any carrier to the document.



- ① Dispenser box
- ② Release Tab of seal
- ③ Security seal
- ④ QR-Code
- ⑤ Serial number
- ⑥ Unique seal contours
- ⑦ Multi-colour security structures
- ⑧ Phosphorescent print
- ⑨ UV fluorescence

ADVANTAGES

- ✓ Completely power-independent
- ✓ Full audit-trail
- ✓ Transfer without any carrier
- ✓ Securing process, document and key-data
- ✓ "Security printer in-a-box"
- ✓ Configurable to requirement
- ✓ Linkable to commercial work-flows

SECURITY-CONFIGURATION

- ✓ Individual numbering, QR-code on release latch
- ✓ UV fluorescent print
- ✓ Phosphorescent print
- ✓ Thermo-chromic print
- ✓ Carrier-free transfer
- ✓ Machine readable LaserSecure pigments
- ✓ Colour-shifting ink
- ✓ IR reactive pigments

APPLICATION

- ✓ Digital QR-code authentication
- ✓ Anti-copy pattern
- ✓ Invisible, fluorescing digital watermarks and images
- ✓ Personalized microprint

TECHNICAL PARAMETERS

- ✓ Size of seal: Circular, 25mm (shape and size configurable)
- ✓ Substrate colour: transparent
- ✓ Quantity in application box: 200 – 250 (depending on size of seal)
- ✓ Power-Requirement: none



CROC™ -System

Substrate and Data secured by security taggants

Perfectly invisible to the naked eye, CROC™ uses ValiMark® security features which can be applied either to paper pulp/coating or distributed within printing inks. Then marked documents can subsequently be authenticated through the use of generic or tailor-made verifiers.

Within the CROC™-System, traditional security ingredients can be applied together with ValiMark® unique features. For instance IR upconverter pigments can be effectively and powerfully combined with secure luminescent microparticles.

Standardized IR upconverter pigments can be added to security substrates. They can be detected by readers equipped with IR emitters and IR sensors. The verification feedback can be as simple as a beep.

ValiMark® microparticles are polymeric particles labeled with invisible luminescent dyes. They are primarily microscopic, perfectly spherical and synthesized in repeatable diameters. The particles are

not detectable through traditional UV illumination systems frequently used in the authentication of security documents. The luminescent label introduced into the polymeric particles (or naturally emitting from certain minerals) has an excitation/emission curve located within the visible spectrum of the wavelength.

The above unique dyes can be introduced into the solvent system of printing inks and thereby create the use of a unique invisible **ValiMark® printing system**, featuring the same high security characteristics. The use of contactless printing techniques such as inkjet with those invisible inks permits users to secure any traceability scheme applied to documents, including QR- and barcodes.



IR upconverter verifier



ValiMark® luminescent ink applied by inkjet



One of the compact, hand-held verifier models for the ValiMark® luminescent materials

ADVANTAGES

- ✓ Secures substrate, data, supply-chain
- ✓ Multi-level security feature for layered verification concepts
- ✓ Highly flexible to specific project requirements
- ✓ Very high longevity
- ✓ Very high luminescence power
- ✓ Very high light fastness
- ✓ Unique, secure product source

SECURITY ASSETS

- ✓ Totally covert marking system
- ✓ Marker detectable with a simple, hand-held optical detector
- ✓ Undetectable under traditional UV emissions
- ✓ High luminescence power even in very low concentrations
- ✓ No modification of appearance of marked items

PRODUCTION ASSETS

- ✓ No interference with paper printability
- ✓ No impact on production speed (material, printing)
- ✓ Formulations available for vast majority of industrial printing techniques
- ✓ Complies with security printing standard tests
- ✓ Simple use of additives into existing printing/manufacturing mediums
- ✓ Large number of inks and varnishes compatible

TECHNICAL ASSETS

- ✓ Documented strong level of photo-stability
- ✓ Only low final concentrations required
- ✓ Integrable into paper, inks or coatings
- ✓ Various specifications available (diameters, bases, luminesce)
- ✓ Totally inert and non-toxic marker



Concept presented by SECOIA Executive Consultants Ltd.

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