Border Control Entry-Exit System - the New Way of Secure Travelling

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Abstract

In a world constantly changing and citizens with more and more access to travel, the way of regulating border crossing must be taken into discussion. Not far from the date this article is published, European Commission announced the entry in operation of the Entry-Exit System (EES). A system that will shape the way we travel, modernizing the border checks, making them more efficient, easier and faster. The aim is to secure borders in the Schengen area, preventing irregular migration and adding a new level of trust between EU institutions and its citizens. This new system is replacing the traditional passport stamps with digitally record of travelers who enters and exit coming from non-EU countries. It is aimed to increase security of the Schengen area citizens and to prevent overstay or irregular migration or, even worse, fraud and fake identities. The 'stamping' will include also the biometrics of the person entering (face and fingerprints) making it almost impossible to trick the system. This way, criminality and terrorist attacks can be mitigated easier, making Europe a safer place.

Index terms: border control, cyberattacks, cybercrime, personal data protection, security

1. Introduction

For decades, border management relied heavily on manual checks, paper trails, and the judgement of individual officers. Travelers were identified through physical passport and inked entry stamps. This system symbolized national authority, but often fell short in terms of efficiency and reliability. Under this traditional approach, migration records were only as accurate as the eagerness of the border agents and the authenticity of the documents presented. As global mobility surged and cross border traffic reached record levels, the shortcomings of these methods became impossible to ignore.

The rise of digital technologies and biometric tools dramatically changed how nations approach border security. In the European Union, this shift is embodied by the EES, a centralized, automated platform that records the movements of travelers from non-EU countries entering or leaving the Schengen Area [1]. Unlike the traditional practice of stamping passports, EES captures each crossing digitally, storing both personal details and biometric identifiers to ensure precision, transparency, and accountability. This marks a transition from reactive border check to proactive management, where date driven insights and system interoperability become essential instruments of governance.
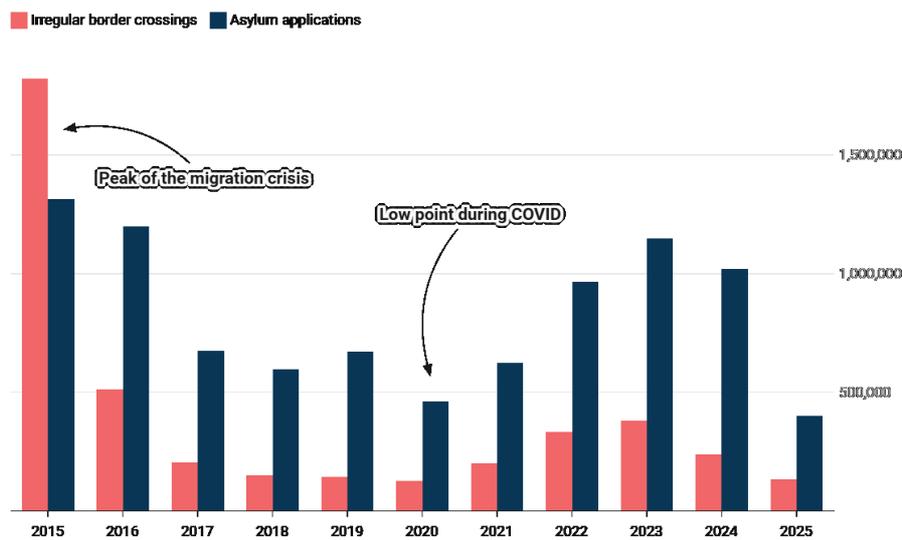
Fig. 1. Ten Years of movement [2]

In technical words, this is the first time a solution has been spread around all Europe borders, using National User Interfaces, which connects each member state to the centralized system. So data collection and privacy to be assured in a way that it's relevant and answer to the need of controlling the migration phenomenon.

The adoption of EES is more than a technological upgrade. It signals a fundamental shift in the philosophy of border control. What once relied on manual observation and paper record, now operates through algorithmic accuracy and real time data exchange. This evolution not only improves operational efficiency by reducing wait times and minimizing errors, but also strengthens security measures, enabling authorities to detect overstays, prevent identity fraud and maintain a clearer picture of migration flows.

Viewed broadly, EES reflects the delicate balance between facilitating legitimate travel and safeguarding borders. It illustrates how innovation can serve both mobility and security, provided that data protection and fundamental rights remain central to its implementation. In this sense, the move from inked passport stamps to biometric registration is not just a procedural change, it is a redefinition of how Europe envision border governance in the digital era.

The way border control has evolved over recent decades mirrors both technological progress and shifting geopolitical dynamics. Traditionally, checks at European and other international borders relied on physical passports, manual stamps, and visual verification by officers. Records of entries and exists were kept through paper logs or simple stamping system, leaving migration data fragmented and poorly integrated. As global travel expanded, driven by rising air traffic, cross border commuting, tourism, and trade, the limitation of this manual approach became increasingly clearer. It simply could not keep pace with the growing volume and complexity of movement.

Whiting the framework of the European Border and Coast Guard Agency (Frontex) and the Schengen system, mounting concerns over identity fraud, terrorism, and the need for accurate migration statistics highlighted the urgency for systemic reform. Manual processes were slow to detect overstays, lacked interoperability between national authorities, and offered little capacity for real-time risk assessments.

The EU's decision to implement EES reflects a broader transformation. From isolated national border operations to a unified, data-driven model that leverages biometrics, centralized databases, automation, and inter agency coordination. According to the European Union Agency for Fundamental Rights, the EES 'captures and stores personal data, including facial images and fingerprints ... to strengthen border management and improve the efficiency of migration control' [3].

2. Objectives and Mechanisms

The EES is designed with several key objectives:
- Accurately and automatically record each entry and exit of short stay travelers from non-EU countries at Schengen's external borders, replacing the outdated manual passport stamping process.
- Enable timely detection of overstays by electronically logging departures, ensuring better compliance monitoring.
- Integrate seamlessly with other major EU information system - Schengen information System (SIS), Visa Information System (VIS) and European travel Information and Authorization System (ETIAS).
- Supporting risk-based border management by improving data availability and strengthening analytical capabilities for authorities.

Although the system was officially launched on 12 October 2025, full operational capability is expected by 10 April 2026. Once active, non-EU travelers entering the Schengen Area, will have their travel document details, biometric identifiers (facial image and fingerprints), and time of entry recorded. Upon departure, the system will capture the time and location of exit, creating a complete record of short stay movements. This approach contrasts with previous practice, where exits were rarely tracked systematically, making overstays difficult to identify. According to European Union Agency for Fundamental Rights, the Commission estimates that under full operation, the EES will log approximately 300 million border crossing by non-EU nationals each year.

3. The Shift in Border Control Philosophy

The implementation of EES represents more than a technical upgrade. It signals a profound change in how states see and manage borders.

Traditionally, a border was a physical checkpoint, a moment in time where an officer stamped a passport and granted entry. Today, that notion is evolving into a dynamic, data driven model. In this new paradigm, the border is not just a gate, but a node within continuous information network. It generates alerts, updates traveler profiles, and feeds into a broader governance system for migration and security.

The shift is significant for several reasons:
- From reactive to proactive: Traditional systems merely documented events like arrivals, manual checks, and passport stamps after they occurred. The EES introduces a proactive approach, using digital tracking and real-time data comparison to identify overstays and irregularities before they become problems.
- From isolated national control to coordinated governance: Previously, border management operated withing national silos. With EES and interconnected platforms, data now flows across the Schengen network and beyond enabling shared intelligence and collaborative decision making.
- From manual and analog to automated and biometric: Paper logs and visual inspections are giving way to fingerprint and facial recognition, digital records, and automated verification, reducing human error and speeding up procedures.
- From broad oversight to targeted risk management: Rich, structured dataset allow authorities to allocate resources strategically focusing on high risk or high volume movements rather than applying uniform checks to all travelers.

To conclude, the transition from manual stamping and labor-intensive checks to an integrated biometric system represents far more than a technological upgrade. It signals a fundamental

redefinition of border control, leveraging advanced tools to manage mobility in an era marked by unprecedented travel, complex migration patterns and evolving security challenges.

4. Ethical, Legal and Practical Considerations

The rollout of the EES brings forward a series of ethical, legal, and operational considerations that are critical for its legitimacy and public trust. Key areas of debate include:

- Data protection and privacy: 'The collection of biometric data and the central storage of travel data trigger obligations under EU data protection law - General Data Protection Regulation (GDPR). Ensuring that the system operates in compliance with fundamental rights is imperative. The EES complies fully with the EU's strict privacy laws.' [4].
- Balancing overstays control with freedom of movement: While the system aims to identify overstays efficiently, it must avoid creating unnecessary barriers for legitimate travelers or fostering discriminatory practices against non-EU nationals.
- Accuracy, fairness: Biometric technologies must deliver reliable results and remain free from bias to prevent disproportionate impacts on certain nationalities or demographic groups, to avoid disproportionate impact on particular nationalities or groups.
- Interoperability and sovereignty: As a supranational system, EES requires member states to harmonize national border policies with a shared data structures, governance roles and responsibilities.
- Operational readiness: Implementation depends on robust infrastructure, trained personnel, interoperable IT systems, and streamlined workflows across all external borders.

Addressing these challenges is essential to ensure that EES is not only technologically ready but also legally compliant, socially acceptable and practically sustainable.

5. Where we stand - Current Status, Volumes and Trends

Although the EES is still in the process of full deployment, recent migration statistics underscore the scale of the challenge and the urgency for advance border management tools:

- 'In 2021 the EU's external borders recorded just under 200 000 detections of illegal border crossing, an increase of 36% compared to 2019 and 57% compared with 2020' [5].
- 'In 2022 preliminary data shows around 330 000 detections of irregular border crossing, the highest number since 2016, representing a 64% year on year increase from 2021.' [5].
- 'According to a report for 2023, 385 000 irregular border crossing were detected, up to approximately 18%, compared to 2022; the European Union Agency for Asylum (EUAA) notes the Central Mediterranean route accounted for about 41% of the crossings.' [5].

These numbers highlights the complexity of migration flows, involving diverse routes, nationalities and shifting patterns. They also reinforce the rationale behind EES: the need for comprehensive entry/exit tracking and improved detection of overstays in a context where manual systems are increasingly inadequate.

Over the past decade, Schengen border dynamics have fluctuated significantly, shaped by geopolitical instability, post-pandemic recovery, and technological adaptation. According to Frontex, irregular border crossing have risen steadily since 2022, following a temporary decline during COVID-19. In 2021, detection reached 200 000, up 36% from 2019. This figure jumped to 330 000

in 2022, marking 64% increase, the highest since 2016. By 2023, detection climbed to 385 000, confirming the persistent nature of migratory pressure at Europe's borders.

According to Frontex (2021, 2022, 2023), the total number of detected irregular border crossing at the EU's external borders rise continuously since 2022, following a temporary reductions during the COVID-19 pandemic. We can assumed 17-18% annual increase and reaffirming the need of such system to regulate the cross boarding efficiently.
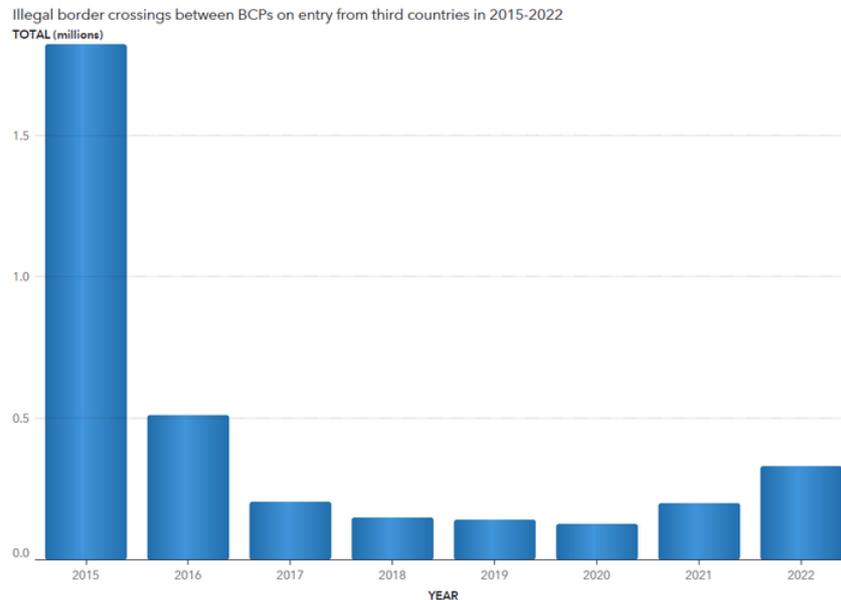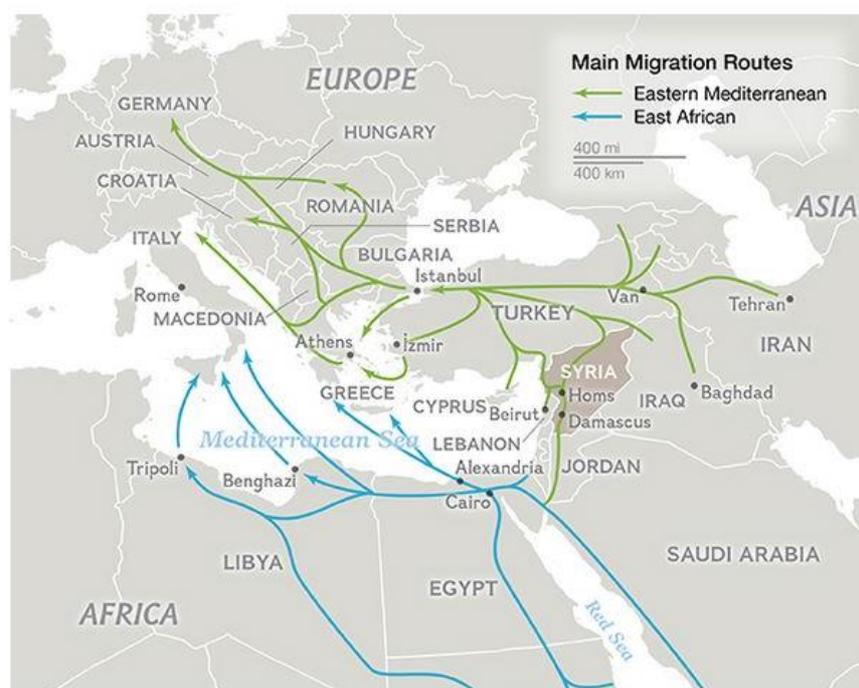

Fig. 2. Detected irregular border crossing at the EU's external borders 2015-2022 [6]

This reflects the continuous instability in North Africa and in the Middle East (Fig. 3).

Fig. 3. Migration Chart [7]

'The distribution of crossing provides further insights into operational challenges. Data from European Union Agency for Asylum shows that in 2023 the Central Mediterranean route accounted for aproximately 41% of all detections, following by Western Balkans 26% and Easters Mediterranean 16%.' [4].

The concentration of migration along a few key routes places significant pressure on Europe's external borders, particularly in Italy, Spain and the Western Balkans. This uneven distribution highlights the need for interoperable systems capable of handling real-time biometric data across multiple checkpoints. The EES was designed precisely to address these imbalances by ensuring that every crossing regardless of route or mode of travel is digitally recorded and accessible to all relevant authorities.

Recent figures illustrate shifting trends. In 2024, the irregular border crossing fell by 38%, dropping to just over 239 000 detections, the lowest level since 2021. Preliminary data for the first five months of 2025 shows approximately 63 700 detections, a further decline of about 20% compared to the same period in 2024. However, the pattern is not uniform: the Western African route saw an increase in irregular migration, while the Western Balkan and Central Mediterranean routes experienced sharp declines of 77% and 64% respectively.
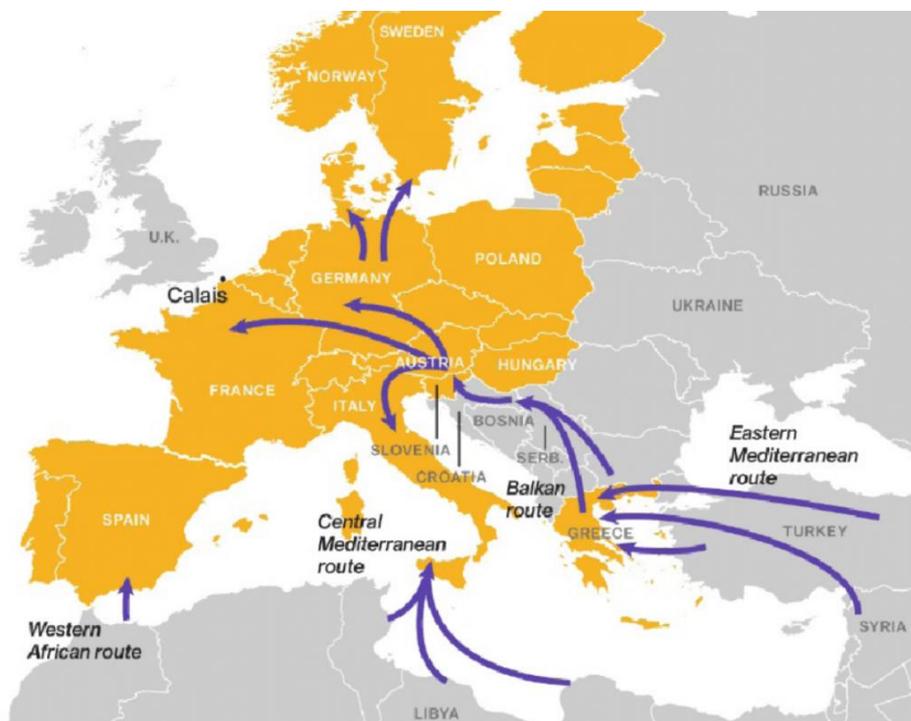
Fig. 4. Western African route taking most of the irregular cross [8]

'Irregular migration from North Africa to Europe is on the rise again. This is particularly true along the Central Mediterranean route, which connects northern African countries (mainly Libya and Tunisia) to Italy. The latest surge in irregular arrivals that Italy is experiencing (136,000 migrants disembarked in Italy in the twelve-month period between June 2022 and May 2023) is almost comparable, in magnitude, to the period of high arrivals in 2014-2017, when on average 155,000 migrants landed each year.' [9].

So there is a need of regulating the cross border passing, since the cultural differences and the economical burden has increased in the last years.

6. Conclusions

In conclusion, the shift from paper based passport stamps and manual border logs to EES marks a profound transformation in the philosophy and practices of border management. EES Is far more than a technical enhancement, it represents the transition to an era of biometric, automated and integrated systems tailored to the realities of high mobility, complex migration flows, and increased security demands. As the system becomes fully operational, its success will depend on how well it balances efficiently with fundamental rights, how effectively it performs at external borders, and how adaptable it remains in the face of evolving migration patterns. Recent trends in irregular crossing underscore both the urgency and the magnitude of this challenge, positioning EES as a cornerstone of the EU's border governance framework for the decade ahead.

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