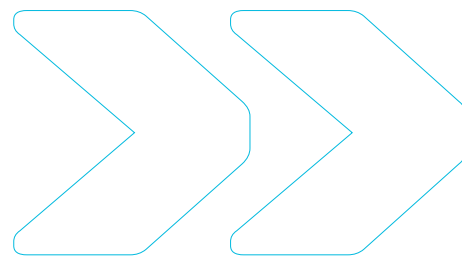




Securing the borders of tomorrow

THALES
Building a future we can all trust



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Introduction

Governments worldwide are prioritising the development of more secure border management solutions. However, as global travel returns to pre-pandemic levels, border authorities also face increasing pressure to maintain the passenger experience and minimise queues, delays, and bottlenecks.

Technologies such as biometrics and automation promise to deliver many of the answers. At the same time, the rapid pace of change is introducing new challenges. In response, next generation border management systems must be capable of adapting quickly to emerging threats and the relentless rise in traveller numbers, while ensuring rigorous protection of personal data.

This paper explores the complexities of modern border management, examining the uncertain security landscape, rising traveller expectations, and the key technologies required to build truly future-ready borders.



1 | Passenger growth and global uncertainty

Following the extraordinary disruption caused by the COVID-19 pandemic, international travel is back on track. Global passenger journeys reached 9.5 billion in 2024, surpassing 2019 levels for the first time. Passenger volumes are predicted to double between 2024 and 2045 (cf. Airports Council International).

»» Borders or bottlenecks?

The sustained uptick in global travel directly impacts border crossing points. Indeed, as passenger throughputs surge, every touchpoint within a passenger terminal has the potential to become a bottleneck, causing delays and frustration.

In many cases, facilities such as airport terminals are unable to expand significantly to accommodate this growth. Financial constraints, environmental concerns, planning regulations, or simply a lack of available land are all typical obstacles. Similarly, as governments seek to control public spending and extract better value for money for their taxpayers, few border control authorities have the luxury of boosting staff numbers. Often, the opposite is true. Most public bodies are having to achieve more with less.

»» The frontline of homeland security

Beyond rising traveller numbers, border management operations are also challenged by an increasingly uncertain and insecure world. National borders now represent the frontline of homeland security - and are key targets for malicious forces and actors.

Organised crime and state-sponsored actors pose the most serious threats to border integrity. Typically, these groups are well resourced, and perfectly capable of utilising the latest technologies to pursue their aims. Today, this includes an array of AI-driven tactics. On the near horizon, quantum computing represents another transformative change in the ability of hostile actors to penetrate and disrupt border security operations.



2 | Key threats to border security

Identity fraud

Identity fraud is the most obvious security challenge. According to the US Federal Trade Commission (FTC), **5.4 million identity theft and fraud reports were recorded in the country in 2023** - and the trend is upward.

The threat itself is nothing new. However, the forces fuelling and supporting illegal attempts to cross borders have never been stronger or more sophisticated. International criminal networks in particular are using increasingly advanced techniques to bypass security measures. What's more, the threats are no longer confined to physical documents and manual checks by border staff to ensure that travellers and their credentials are legitimate. Modern biometric systems (face, fingerprint and iris recognition) are also being tested like never before.

To counter physical forgery, the latest generation of passports incorporates an impressive collection of security features, including

polycarbonate data pages with colour portraits embedded in the structure, laser engraved ghost images of the cardholders, and complex combinations of light, movement and tactile elements. For border authorities to stay one step ahead of fraudsters, continual evolution in the use of such techniques is critical.

A similar strategy needs to be adopted for biometric-based security measures. Put simply, border authorities cannot assume such solutions are a 'silver bullet' for tackling identity fraud. In reality, criminal groups are continually attempting to undermine biometric recognition systems. To address this, a growing number of forward-thinking governments are deploying multi-modal systems at border crossing points. By combining two or more features from face, fingerprint and iris, these systems add even greater accuracy and resilience to biometric-enabled defences. Real-time verification is also increasingly important, with advanced liveness detection helping to prevent attempts to spoof biometric recognition systems.

Cyberattacks

The rise of cybercrime presents another new threat domain for border control authorities. As with identity fraud, cyberattacks are evolving continually in scale, sophistication and persistence.

The growing problem of cyberattacks comes at a time when most border authorities are pursuing digitalisation strategies to improve operational effectiveness and efficiency. Inevitably, the expansion of digital infrastructures is increasing the attack surface exposed to cybercriminals. Authorities are also taking on more responsibility for

protecting citizens' personal data. As a result, the impact of data breaches, system hacks and ransomware attacks can be wide-ranging, including disrupting operations, compromising sensitive traveller information, undermining trust, and causing significant reputational damage to governments.

In response, robust cybersecurity protocols and processes are necessary to safeguard both physical and digital assets managed by border control authorities.

Human trafficking and transnational crime

Organised crime and its role in human trafficking present further challenges. People smugglers routinely seek to exploit vulnerabilities at border points that go well beyond identity fraud. Border control authorities require not only vigilant physical inspection and checking processes, but also wider, advanced intelligence sharing networks that can pre-empt and combat these threats.

Global events

Geopolitical tensions, conflicts, humanitarian crises, disasters and pandemics all drive the movement of people across countries and continents, and in some cases motivate criminal and state-sponsored actors to target border crossing points. Migration is increasingly being monetised and weaponised. In many cases, this can lead to incredibly complex and challenging situations at the border. Governments are looking to new technologies to help manage these potentially difficult and dangerous situations.



3 | Understanding the traveller's perspective

Travellers value security too. But their expectations go much further. Speed, convenience and a painless pathway through border control are also high priorities.

Wider trends are playing an important role here. The COVID-19 pandemic dramatically accelerated the shift towards contactless, self-service and automated transactions. Biometric authentication is now commonplace in daily life, most notably as a means of unlocking smartphones. Citizens now expect a fast and frictionless verification experience, even for secure and sensitive processes such as mobile banking. What's more, they are enthusiastic about taking control, and using facial or fingerprint recognition to enable self-service identification and authentication.

But here's the catch. Citizens also expect any data they share to be protected and respected. As biometric data becomes central to border management systems, it places even greater responsibility on border control authorities. In addition to robust cybersecurity, authorities must ensure rigorous compliance with all relevant data and privacy regulations, such as GDPR (General Data Protection Regulation).

4 | The changing nature of border management

Alongside rapidly evolving threats and heightened citizen expectations, another fundamental change is taking place. Border management is no longer about a series of discrete, standalone checkpoints. Instead, authorities are adopting holistic, integrated approaches that bring together any number of different sites and environments.

Across airports, ports, and land crossings, as well as non-regulated and remote border regions, the emphasis is now on unified solutions. Effective systems integration enables real-time data sharing and visibility, to support co-ordinated responses to emerging threats, and better management of peaks and troughs in traveller flow. Remote sensor technology is being utilised to track passengers and cargo, helping to maintain situational awareness and a high state of readiness. Smart, multi-layered approaches also enable border staff to be deployed where they can make the greatest impact on security and the traveller experience.

This new perspective on border management is further driven by governments' growing need for visibility and accountability on people crossing their borders. Another imperative for modern border management systems is therefore providing accurate and up to date information on the flow of people in and out of the country.



5 | The role of new technologies

Border authorities are drawing on a range of technologies to transform the efficiency and effectiveness of their operations. Each of these technologies can deliver compelling benefits.

However, to address the complexities of modern border management, the key to success increasingly lies in seamless integration of them all, and with wider IT infrastructures.



Biometrics



Automated document verification



Cybersecurity



Border surveillance

>> Biometrics

Best-in-class biometric technologies offer very high accuracy, speed, and seamless support for self-service processes. Face, fingerprint and/or iris recognition is being blended with automated passport/document readers within self-service kiosks and eGates. Travellers are welcoming new opportunities to skip the queues, and take control of their border crossing experiences.



The opportunities

Biometric-enabled self-service systems can dramatically enhance the speed and efficiency of processing without compromising security. For border authorities, this approach delivers genuine win-win scenarios: enhancing the passenger experience while strengthening the integrity, accountability and responsiveness of the entire border management operation. Limited staff resources can be targeted at higher risk travellers, or employed in other value-added tasks.



The challenges

Organised crime gangs are utilising advanced techniques to deceive face and fingerprint recognition systems. Moreover, to reduce delays and improve traveller satisfaction, self-service kiosks and eGates must deliver intuitive operation across both the biometric verification and document reading processes.



Key trends

System suppliers are continually improving anti-spoofing and liveness detection systems, aiming to stay one step ahead of even the most sophisticated and determined fraudsters. In addition, multi-modal systems are adding further resilience and reliability. In terms of the user experience, industry-best algorithms combine outstanding accuracy with response times of no more than a couple of seconds. Similarly, the leading document readers can confirm the authenticity of hundreds of different passports and other travel documents in an instant. Features such as illuminated progress bars and green light confirmation of successful verification also ensure stress-free and intuitive operation by travellers, boosting first-time read rates.

Automated document verification

The continuing roll-out of biometric recognition systems within eGates and self-service kiosks is going hand-in-hand with the deployment of automated document readers. In addition to supporting self-service processes that cut delays at the border, automated document verification reduces the risk of human error and enables border staff to be redeployed to other tasks.



Opportunities & trends

Today, the leading document readers can verify instantly the authenticity of hundreds of different ID cards, passports, and other travel documents. In addition, they can automatically extract relevant data. Machine learning models are also being incorporated to support advanced fraud detection, and software is continually updated to keep pace with the latest standards, security features, and fraud techniques and tactics.

As with biometric recognition systems, robust security needs to be combined with intuitive operation, particularly for first time and occasional users. Features such as illuminated progress bars and green light confirmation of successful verification can help ensure stress-free and swift operation by travellers, boosting first-time read rates and overall throughput.

Cybersecurity

Border management systems now comprise a closely connected array of IT infrastructures, software and hardware systems, apps and data. Cybersecurity therefore plays a pivotal role in protecting sensitive data and operational systems.



Opportunities

Effective cybersecurity solutions enable border management authorities to focus on core activities. Robust cybersecurity protocols protect data privacy and ensure system integrity, minimising the potential for cyberattacks to disrupt operations and damage trust.



Challenges

New technologies such as biometrics and automation bring with them new vulnerabilities. Border management systems typically now comprise a closely connected array of IT infrastructures, software and hardware systems, apps and data. In terms of security, they are only as strong as their weakest link. Criminals are using increasingly sophisticated methods to find and exploit any potential gaps in defence.



Key trends

The rise of cloud-based security and cyber-resilient architectures ensures scalable, flexible, and secure border management systems. Increasingly, cybersecurity solutions are mirroring the integrated and holistic approach of modern border management solutions.

Border surveillance

Border surveillance technologies are increasingly seen as essential for maintaining situational awareness and detecting emerging threats.



Opportunities & trends

Drones, smart cameras, and sensor networks enable continuous monitoring of remote and high-risk border areas. AI-driven video analytics enhances threat detection by enabling automated surveillance cameras to analyse feeds in real time, detecting suspicious behaviours such as unauthorised crossings or gatherings. Moreover, by combining multiple surveillance technologies, border authorities can achieve a comprehensive view of border security, enabling faster decision making and effective responses to security incidents.

6 | Thales: delivering a future-ready border ecosystem

As global mobility increases, the need for advanced, integrated border security solutions is paramount. Thales stands out as the only vendor offering a complete, unified framework that addresses both border control and border surveillance. By bringing together biometrics, automation, cybersecurity and surveillance technologies, Thales enables seamless, real-time border management across diverse environments.

Thales empowers governments to safeguard their borders by significantly enhancing the security and efficiency of passenger processing, offering a comprehensive suite of solutions designed to secure, automate, and streamline border crossing and passenger management in air, land, and sea operations.

From front-end to back-end systems, Thales excels in managing the entire border control value chain, with proprietary solutions that lead in all the necessary technologies.

Integrated biometric systems for frictionless operations

Thales offers a range of biometric matchers, passport and fingerprint scanners, as well as facial and iris capture devices. Additionally, Thales provides cutting-edge Automated Border Control (ABC) solutions, including both gates and kiosks, ensuring a robust and efficient border management system.



Automated Border Control (ABC) solutions

- **Self-service border kiosks** incorporating biometric identification to ensure quick and secure traveller verification.
- **ABC eGates** offer a fully automated solution for secure passenger processing, using biometric data for verification at entry and exit points.
- **Biometric capture devices** (facial and iris recognition) ensure efficient and secure processing.
- **Document readers** automatically verify documents such as IDs, passports, and visas. Thales Gemalto Document Verification is a distributed software system that supports an extensive range of Thales document readers, and is also available as an SDK.
- **Mobile devices** such as tablets enhance the efficiency and effectiveness border police addressing immigration issues at land and sea borders.

Robust back-end systems for comprehensive border control



Automated Biometric Identification Systems (ABIS)

The Thales Cogent Multi-Biometric System supports seamless matching of traveller biometrics to secure databases, enhancing border security and operational efficiency. In addition, the system enables frictionless integration of these biometric modalities, ensuring accuracy and inclusivity at border points.



Thales Border Management System

Offers a comprehensive end-to-end solution tailored for secure, efficient, and expedited border clearance across diverse control points, including airports, land crossings, seaports, and railway stations.



Thales Visa Management

Thales Visa Management is a comprehensive suite of applications designed for the secure management of visa applications and the issuance of visas, eVisas, and resident permits. The system streamlines the visa management process, enhancing security, efficiency, and the user experience.

»» Border surveillance

Thales is the only vendor providing a unified framework for both border control and border surveillance, enabling real-time monitoring and situational awareness of both high-traffic checkpoints and non-regulated borders. This dual approach ensures that border security is comprehensive and up to date.

- **HORUS X** is an advanced smart surveillance system integrating all types of sensors to enable operators to supervise the borders and detect objects of interest that can be a threat to border security. HORUS X is effective in both land and maritime environments, including vehicles, people, ships, and even drones.
- **Gecko** is a system combining long-range thermal imaging, a high-definition camera, an optional laser range finder, and highly accurate pan and tilt capability to provide 24/7 surveillance of border areas. The system is designed for both remote monitoring and detection in hard-to-reach areas, including land, sea, and air borders. Operators can detect and identify ships, vehicles, persons, and even drones, at distances measured in kilometres.
- **The SOPHIE multi-functional handheld camera family** includes a thermal camera, positioning system, and laser range finder. SOPHIE enables the detection and identification of ships, vehicles and persons by mobile patrols in all types of environments, thanks to the camera's reduced weight and long-range performance.
- **AI-powered thermal video analytics** enable the automatic and unattended identification of objects of interest, such as persons or vehicles, over the thermal video channel.
- **Vortex Air** is Thales's IMSI catcher solution for detecting and identifying mobile phones in an area of interest. Vortex Air enables devices that have activated positioning functionality to be located, or can estimate their location through advanced analytics.
- **Radars:** integration of both Thales and third-party radars facilitates detection of all types of moving targets, including persons, ships, vehicles and drones, in all types of environments.



Thales's border surveillance solutions are designed to be operated either locally where the sensors are deployed, remotely from a control centre, or in a mix of both local and remote control posts. Thanks to the distributed architecture of HORUS X at the core of the solution, multiple control and supervision sites can be deployed, including local posts, regional command centres, and even a nationwide command centre.

By building on its previous experiences, Thales can propose the optimum mix of sensors to maximise security at all types of non-regulated borders.

Border authorities integrating these surveillance solutions with Thales's biometric and cybersecurity systems benefit from an end-to-end security ecosystem. Real-time analytics from HORUS X and a suite of integrated sensors such as Gecko and Vortex Air enable quick threat detection. Biometric verification systems ensure travellers' identities are verified at every border point.

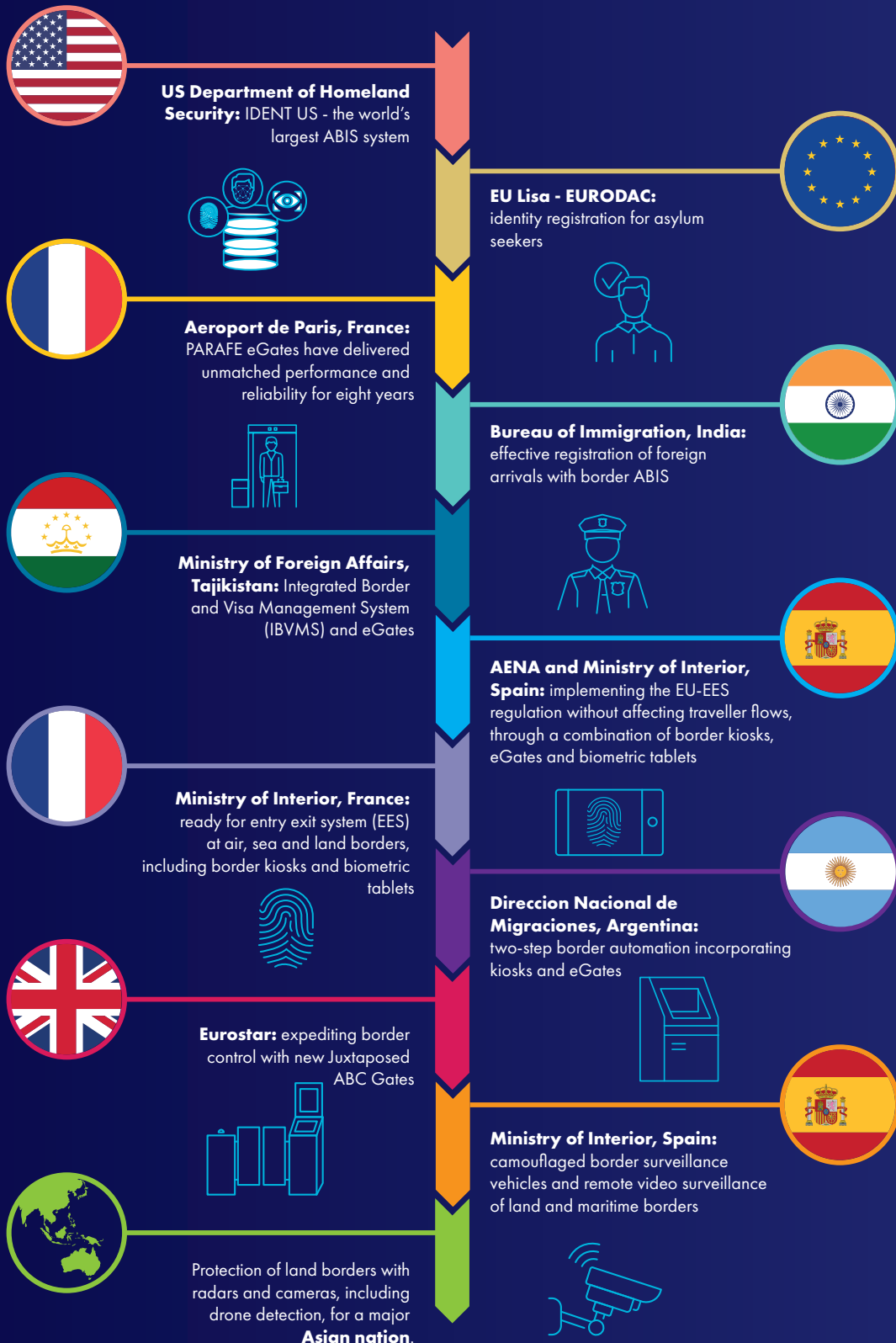
Offering both border control and surveillance within a single unified system, Thales enables real-time situational awareness, reducing response times to potential threats and ensuring seamless integration between identity management and border monitoring.

Thales ABC Gates, Valencia Airport, Spain, 2023



7 | Thales's expertise

With over 30 years of experience, Thales is recognised as an industry leader in border and biometric expertise. Worldwide, we help more than thirty governments safeguard their borders. Our solutions include the largest Automated Biometric Identification Systems (ABIS) programmes and key EU-EES initiatives.



Conclusion:

Shaping the future of secure borders



Global mobility is a powerful force for good. The free movement of travellers across borders is fundamental to economic and social development, and forges closer relationships between nations and peoples.

However, global mobility is also fuelling an increasingly serious and complex set of challenges. As a result, the need for robust, integrated and forward-looking approaches to border management has never been greater.

Thales empowers governments to navigate this landscape confidently, with solutions designed to enhance security, efficiency, and traveller satisfaction.



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