



Overstay detection

**Monitor how long
vehicles stay in your area.**

Improve mobility, safety and security.

Automated. Efficient. Effective.

INTRODUCTION

Vehicles that remain too long in an area can undermine its purpose or indicate a safety or security risk. However, current control methods are often not effective or cost-efficient enough, allowing these situations to go unnoticed or unresolved.

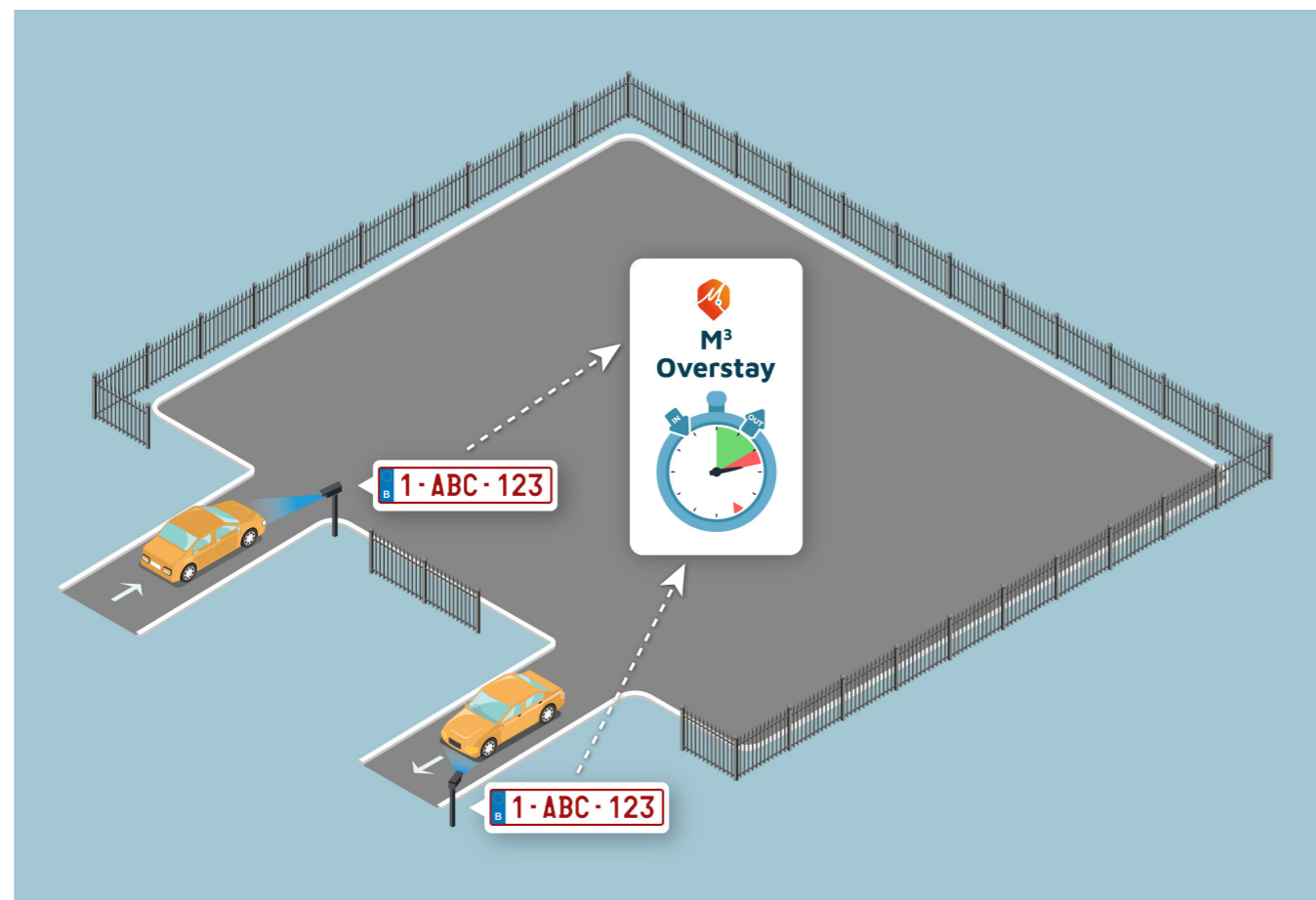
To address this, Macq has developed a solution that automatically detects overstaying vehicles based on their entry and exit movements, captured by smart ANPR cameras installed at every entry and exit point of the monitored site.

This solution builds on Macq's proven ANPR technology, whose effectiveness has already been demonstrated in numerous applications, such as average speed section control with more than 1000 deployments worldwide.

By applying the same logic in reverse – shifting from detecting vehicles that are too fast to those that stay too long – the overstaying application supports a wide range of traffic enforcement, road safety and site security use cases.

Typical use cases include time-restricted parking facilities, EV charging stations, secure neighbourhoods and restricted traffic zones to ensure maximum turnover, safety and liveability.

For the latter use case, this application goes beyond traditional access control at entry points, by verifying that vehicles have effectively left the zone before the end of their permitted time, such as suppliers with a defined time slot or tourists with a day pass.



THE OVERSTAY DETECTION SYSTEM

THE CONCEPT

Installing QCAM3 ANPR cameras

To monitor the dwell time of every vehicle entering the site, each entry and exit point should be covered by a QCAM3, a smart ANPR camera powered by an NVIDIA processor for edge computing.

Connecting to the M³ platform

The QCAM3s send the recognized license plates to the M³ platform, where the overstaying application calculates the dwell time of each vehicle using the timestamps of the registrations.

If the time limit is exceeded, the application automatically creates an event, optionally triggers an alert and retrieves the related images from the cameras as evidence. This push-pull architecture, where images only leave the camera in case of an infraction, guarantees privacy while reducing data traffic and associated costs.

Configuring whitelist and scheduler

Vehicles exempt from the time limit can be added to a whitelist. The scheduler allows users to define when enforcement is applied, which whitelist is active, and when other predefined actions are executed.

While ensuring GDPR compliance and data security.

In addition to edge computing and a push-pull architecture, Macq, as an ISO27001 certified company, ensures GDPR compliance and data security through image blurring, license plate hashing, secure VPN transfer, user authentication, data retention rules, and embedded digital signatures.

Deploying additional applications

By recognizing not only license plates but also other vehicle characteristics, and by storing all this data centrally, the same cameras can be used for numerous applications. These include detecting wanted vehicles, monitoring bus lanes, analysing traffic patterns and statistics and even controlling phone and seatbelt use when using our flagship model, the QCAM5.

THE COMPONENTS:

1. QCAM3
2. M³ platform
3. Overstay Detection
4. Financing
5. Conclusion

1. QCAM3

PROVEN TECHNOLOGY

Our cameras detect vehicles within a fixed and defined region of interest, a technology whose effectiveness has already been demonstrated by Macq in more than 5000 installations.

DESIGNED BY MACQ, MADE IN EUROPE

The QCAM series is the 4th generation of ANPR cameras developed in-house by Macq since entering the market in 2001. The QCAM3 is manufactured in Belgium, while the QCAM5 is produced in Belgium.

The QCAM3 offers a cost-efficient solution for urban areas, roads, parking and industrial environments without compromising on performance.

For more demanding use cases, such as on highways or average speed section control, red light running, seatbelt and phone detection, the QCAM5 provides the necessary high-end processing power.

MULTIFUNCTIONAL TOOL

Besides license plates and country codes, the QCAM3 can automatically recognize vehicle type, brand, model and color, estimate speed and register driving direction, lane, GPS location and NTP-synchronized time stamp. Specific vehicles such as taxis, emergency vehicles, ADR transport and exceptional transport can also be recognized.

Its processor is powerful enough to monitor vehicles across 2 lanes at speeds of up to 180 km/h with over 99% accuracy, even in challenging conditions such as darkness and rain. A built-in infrared illuminator ensures reliable vehicle recognition at night.

EDGE COMPUTING

Our QCAMs do more than just record video. Their embedded NVIDIA processor processes the video images into relevant vehicle data. Video footage or images are only transmitted when necessary, either via push, or retrieved on demand via pull, e.g. in case of an infraction.

Irrelevant image areas, such as other vehicles, the pavement, and windscreens, can be blurred directly on the camera, while the integrity of the official images is ensured by embedded digital signatures.

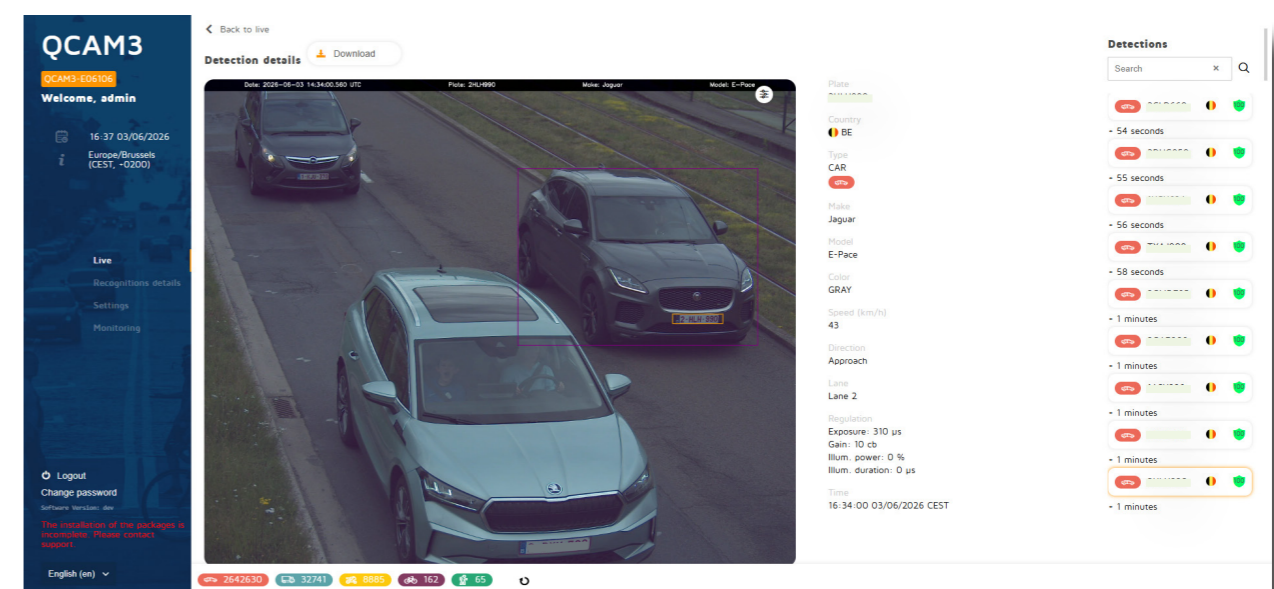
This ensures privacy and reduces data consumption, requiring less bandwidth and less powerful servers, making them less expensive and more scalable. In environments where the internet and its bandwidth is limited, expensive and/or unreliable, edge computing and its internal SSD storage allow systems to keep functioning by storing the processed data internally until the connection has been restored or the retention period has passed.

By processing data at the edge, it also eliminates the single point of failure inherent to centralised, server-side processing architectures, thereby improving overall system resilience and availability.

QUALITY ABOVE ALL

By combining fit-for-purpose components with Macq's trusted recognition technologies, the QCAM3 ensures high, reliable performance. Its connectivity capabilities enable smooth and straightforward communication. With its IK7 and IP67 ratings, the QCAM3 is robust, dust tight and water-resistant.

This results in a proven track record of high uptime, low RMA rates, and long lifespan, with previous generations often exceeding 10 years of operation.



PRACTICAL FLEXIBILITY

The QCAM3 can be powered via 12V or PoE+, removing the need for a separate power cable, and consumes just 12W on average. Both Ethernet and wireless connections (Wi-Fi & 4G) are supported.

The FOV can be easily adjusted remotely to suit the specific situation. Through Macq's online interface, the camera can be panned and tilted using the motorized arm, and the focal length can be adjusted to zoom in or out via the motorized varifocal lens. The autofocus and iris then fine-tune the image sharpness and exposure automatically.

These features eliminate the need for on-site interventions when adjustments are required. No lane closures, no permits, no lifts, no traffic disruption, no safety risks, no costs.

Macq also offers roadside cabinets with integrated routers, batteries, and solar panels, as well as connections to existing power sources such as lighting poles, reducing the need for costly civil works.

CUSTOMER SERVICE

With its dedicated customer service and network of local partners providing first-line support, Macq is able to respond fast to camera-related issues ensuring reliable operations.

Backed by proven product quality and a team of IT support engineers and technicians available 24/7, Macq can offer SLAs with uptime levels of up to 99.9%.

BEST IN TEST

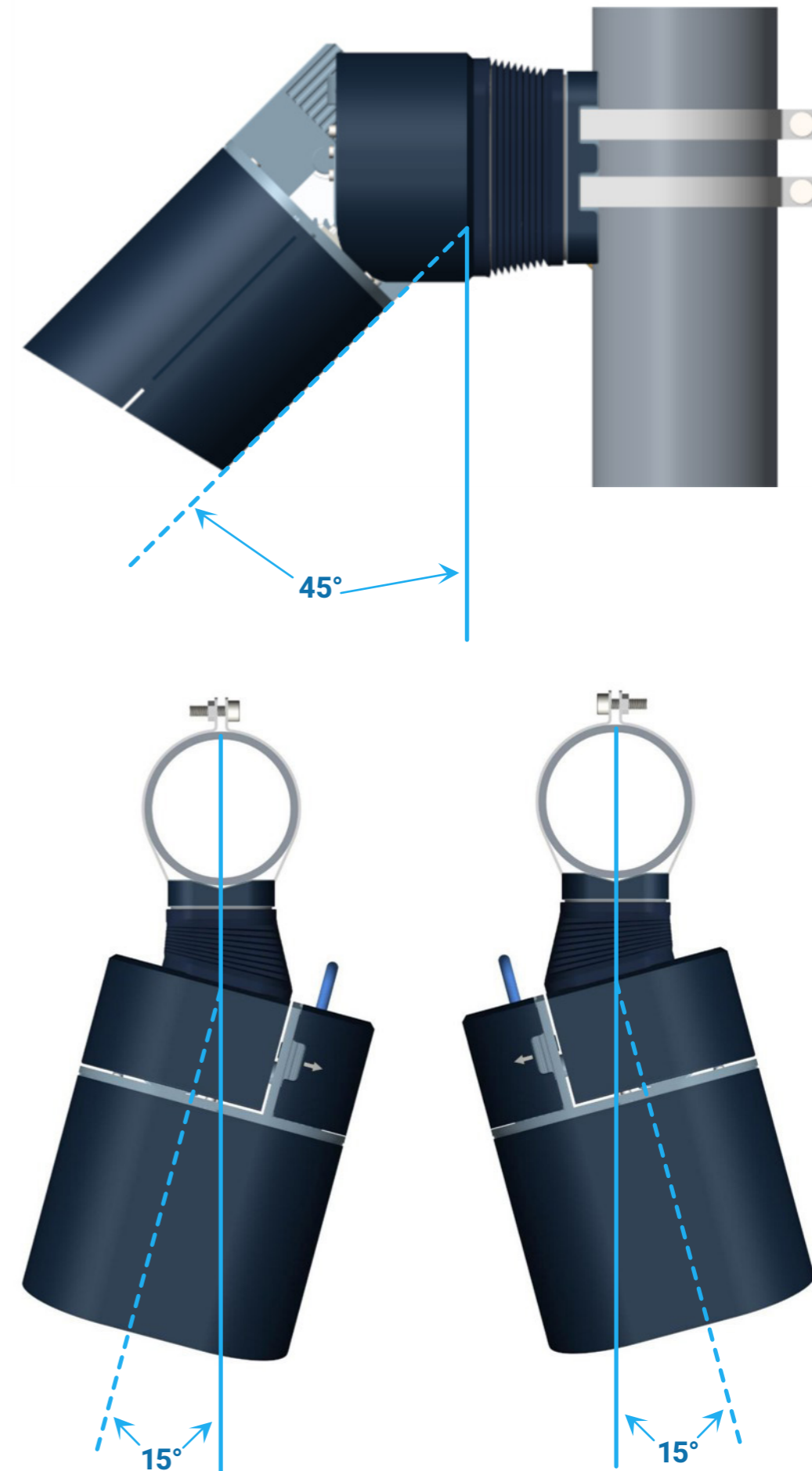
In 2025, 2 independent tests compared our QCAM series with competing cameras, with Macq achieving the highest performance in both.

One of the world's largest industrial companies evaluated the QCAM3 alongside 3 other cameras and ranked it as the best performer, leading to its deployment improving their site security.

The largest police zone in Belgium tested the QCAM3 and QCAM5 in 2 and 3-lane scenarios respectively. In each case, Macq cameras delivered the best results in their category, and offered the optimal balance between performance, cost, and ease of use.

PART OF MACQ'S MOBILITY ECOSYSTEM

The QCAM3 integrates seamlessly with the M³ platform, which based on data from the connected cameras offers various applications to improve traffic safety and mobility, ranging from freeflow parking management, site security to access control.



2. M³ PLATFORM

PROVEN TECHNOLOGY

The M³ platform is used daily by federal police forces, local police zones, regional road authorities, industrial companies, big cities and small municipalities for numerous mobility solutions, demonstrating the reliability and maturity of the technology.

DESIGNED BY MACQ

Beyond quality and flexibility, Macq stands out by developing not only ANPR cameras but also the supporting back-office in-house, enabling a wide range of applications to improve mobility, road safety and site security.

SECURE DATA HUB

M³ is a central platform that collects, stores, and processes ANPR data from all connected cameras. M³ also provides advanced user and role management, including SSO and integration with LDAP or Active Directory, ensuring precise control over data access and rights without compromising ease of use.

SCALABLE

As data is processed in the camera through edge computing, the network scales easier as the number of devices grows. Less powerful servers are required in comparison with classic CCTV cameras, which makes upscaling to connect additional cameras to or deploy extra applications on the platform easier and more cost-effective.

With server-side processing, significantly more CPU power would be required.

OPEN

The M³ platform is designed to be open and interoperable. It can integrate with third-party cameras and external systems, such as mobility rights databases, fine processing platforms and government IT environments.

MODULAR

Based on the collected ANPR data, M³ offers a wide range of applications to improve mobility, road safety and site security, including overstay detection.

CUSTOMER SERVICE

Beyond our cameras, Macq also offers SLAs with uptime levels of up to 99.9% for the M³ platform and its applications, through its customer service and network of local partners.

These services are already successfully deployed for the ANPR applications of the Belgian Federal Police, demonstrating Macq's ability to support critical systems at scale.



3. OVERSTAY DETECTION

THE PRINCIPLE

The ANPR cameras send the recognized license plates to the M³ platform. Based on the timestamps of the recognitions, the overstay detection application calculates the dwell time of each vehicle.

If the time limit is exceeded, the application automatically creates an event, optionally triggers an alert and retrieves the related images from the cameras as evidence.

This push-pull architecture guarantees privacy of drivers that don't overstay and reduces the data traffic and its associated costs.

SITE CONFIGURATION

First, the site to be monitored must be configured, by defining which cameras cover its entry and exit points.

This is done by selecting not only the camera, but also the lanes and direction, as a single camera can monitor multiple lanes and a single road section can serve as both an entry and an exit.

While entry and exit points are usually positioned at the perimeter of an area, they may also be located within the area, for instance at parking facilities.

WHITELISTED VEHICLES

Vehicles that are exempt from the rule and therefore are allowed to remain in the area without any time restriction, must be defined. This can be done based on the license plate or specific vehicle characteristics, such as vehicle type.

These whitelists can be created and managed

SCHEDULER

The scheduler allows users to define when specific actions should be executed, such as (de)activating the overstay detection according to the enforcement period, or a specific whitelist for a certain event.

TIME LIMITS

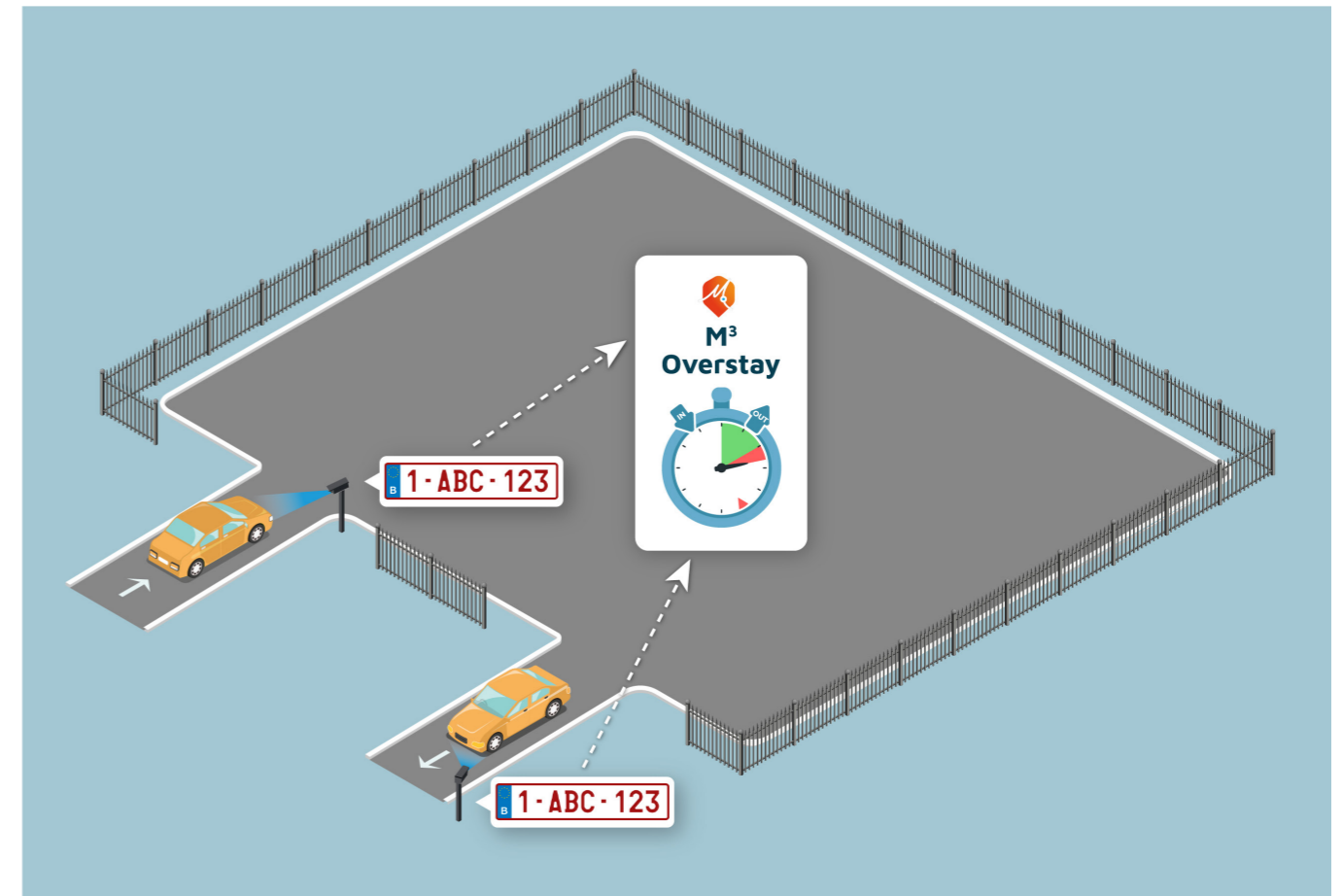
The time limit can be defined either as a maximum duration (dwell time) or as a specific time threshold (deadline).

The limit is also configurable per user type, as in some use cases certain individuals are not exempt from the rule but are subject to less strict conditions. Examples include residents and registered visitors in residential neighborhoods, shop owners and their suppliers in city centres, or civil servants in parking areas at city hall.

EVENT TRIGGERS

Events can be generated immediately upon exceeding the limit, serving as a trigger for real-time action (for safety and security), or upon exit, providing evidence for a fine, charge, or toll (for mobility).

As with all our enforcement applications, all detected events are displayed on the hit page as candidates, where operators can review them and either validate or reject each case. Once reviewed, validated events are stored in the archive together with the relevant metadata and, where applicable, forwarded to the appropriate back-office system for administrative processing of the violation.



The screenshot displays the M3 Overstay detection software interface. On the left, a 'Candidates' list is visible with a 'Live' button. The main area shows two detected events. The top event is for camera QCAMS-E0610B, showing a car with license plate 1-ABC-123. The event details include: Country: BE, Type: Light vehicle, Color: Gray, Direction: Approaching, and Time: 1:40:27 PM 6/16/26. The bottom event is for the same camera, showing the same car with license plate 1-ABC-123, but with Direction: Driving away and Time: 6:17:38 PM 6/17/26. The interface also features a '4h 37m' timer and buttons for 'REJECT' and 'VALIDATE'.

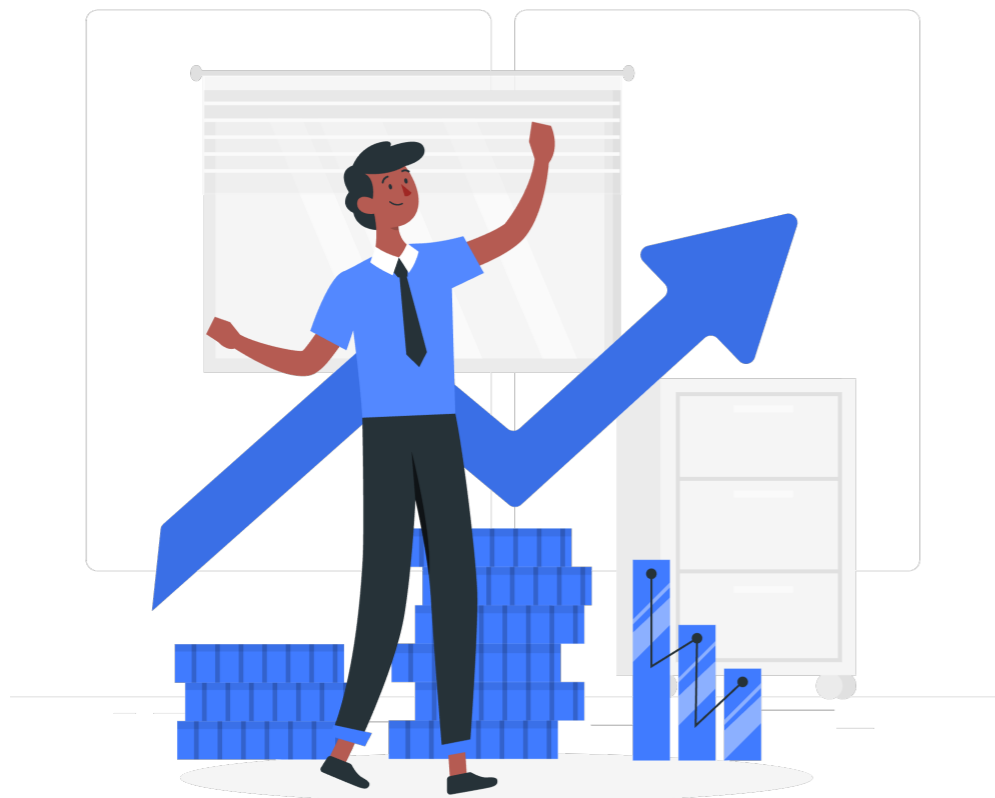
4. FINANCING

In addition to the traditional EPC procurement model, where cameras and M³ licenses are purchased, optionally combined with a maintenance contract based on the required service level, Macq also offers its solutions as a service.

Within this service-based approach, Macq fully relieves the customer of operational burden by covering the entire lifecycle, from design and build to financing and maintenance (DBFM). Leveraging its experience and

expertise, Macq ensures rapid deployment and guarantees quality by linking its remuneration to the system's performance.

Alongside pure CAPEX and OPEX models, Macq also offers hybrid financing solutions, combining reduced upfront investment with a recurring service fee. This allows us to best match the customer's financial and operational requirements, taking into account budget, resources, timeline, and specific needs.



5. CONCLUSION

With our solution, organisations can automatically detect vehicles that remain too long in their area, unlocking value across a wide range of use cases. From improving turnover in parking facilities and reducing traffic in city centres to enhancing safety in neighbourhoods and strengthening security on industrial sites, across any environment where overstaying vehicles create issues.

Built on proven technology, the system combines accuracy, reliability, ease of use, and privacy through

edge computing and high-quality components. Its open design ensures seamless integration with existing systems, while its scalable and modular architecture makes the solution future-proof, enabling organisations to easily add new cameras and applications and reuse the same infrastructure for additional use cases.

Developed by Macq, made in Europe, and backed by dedicated customer service with 24/7 support, the solution guarantees reliable operations at all times.

6. ABOUT MACQ

Macq is a Belgian technology company founded in 1923. With more than 100 years of innovation and a team of 130 experts, Macq develops high-end ANPR cameras and intelligent software to improve mobility, road safety and security.

Our multifunctional solutions support a wide range of applications, including

traffic enforcement, tolling, site security and traffic management. Backed by 24/7 customer support, flexible business models and ISO 27001 certification, Macq delivers reliable, secure and future-proof solutions.

Today, Macq is the Belgian market leader with more than 4,000 cameras in operation and successful deployments worldwide.

LET'S CONNECT

AND EXPLORE HOW OUR APPLICATIONS CAN HELP SOLVE YOUR CHALLENGES.

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