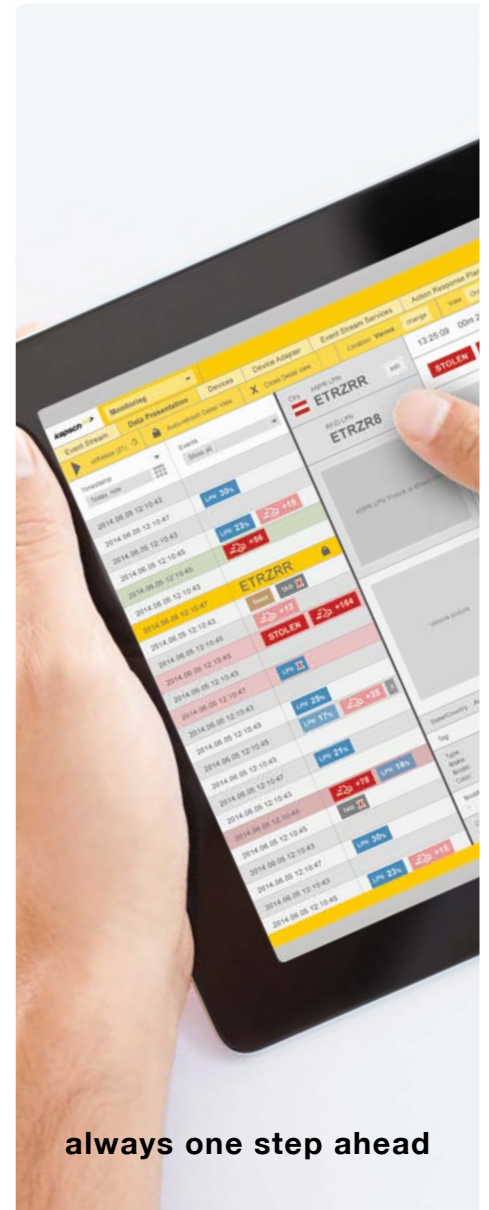
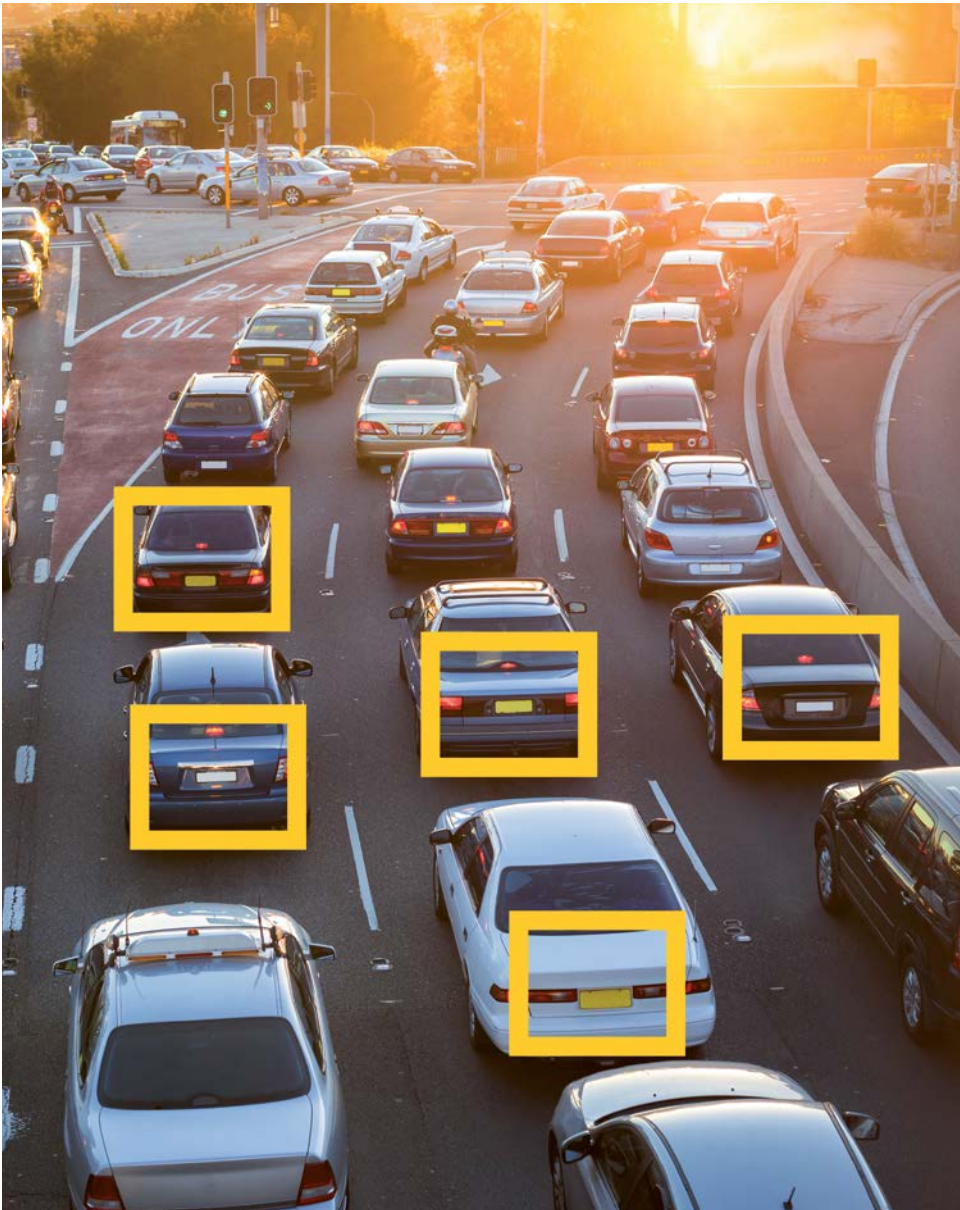


EN

# Kapsch EVR. Electronic Vehicle Registration.



always one step ahead

# Kapsch EVR. Electronic Vehicle Registration.

Vehicle registration is an important prerequisite to the use of motor vehicles on public roads to record the ownership of vehicles, validate the general compliance of vehicles and enable prosecution in case of traffic violations. Proper registration prevents revenue leakage due to unpaid vehicle tax and registration fees. In addition, it is often the prerequisite for road tax payments, for a vehicle insurance providing financial protection to victims of accidents and for regular vehicle inspections ensuring the roadworthiness (technical compliance). Kapsch Electronic Vehicle Registration (EVR) provides a solution gaining all advantages of reliable registration.

## **Automatic vehicle identification by “3<sup>rd</sup> license plate”.**

Electronic Vehicle Registration improves automated vehicle identification by introducing a secure vehicle identifier (electronic tag) and automated compliance monitoring of vehicles. The electronic tag serves as a “3<sup>rd</sup> license plate” and provides a secure and tamper resistant way to identify the vehicle. Complemented by a monitoring network comprising tag readers and license plate recognition cameras the EVR solution collects and verifies vehicle data.

## **Improving vehicle registration compliance.**

The Kapsch EVR solution can identify any registration non-compliances and forward these incidents to law enforcement entities. The presence of the monitoring infrastructure and the prosecution of registration violations will lead to improved registration compliance rates. As vehicle registration is a precondition for registration fees and tax collection these additional registrations will create additional revenues. Similar effects are expected regarding vehicle insurance and other vehicle related fees.

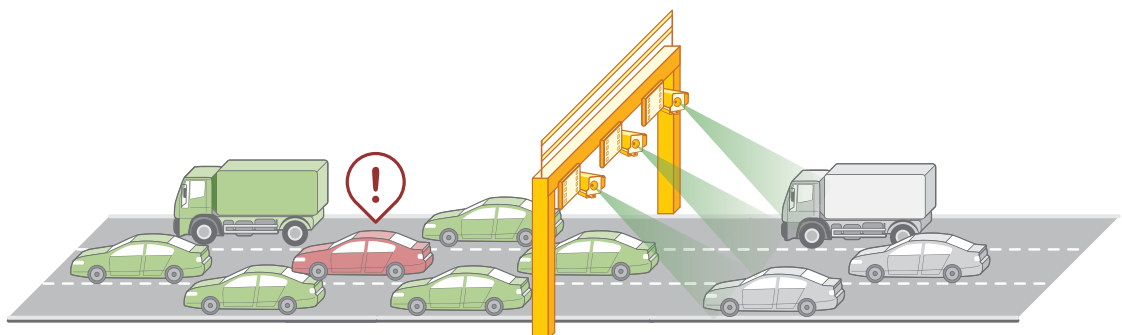
## **The ultimate Electronic Vehicle Registration solution.**

Kapsch provides an end-to-end solution enabling the monitoring of vehicles and validation of its legal status in an

automated and convenient way for both the vehicle owner and authorities. By installing an Electronic Registration Tag (ERT or tag) in the vehicle, a second means of identification, in addition to the license plate, is introduced. The tag enables automated compliance monitoring and prevents the manipulation of the vehicle identity.

Kapsch EVR will improve the quality of the vehicle registration data. Correct vehicle registration data, e.g. vehicle and vehicle owner data, is crucial for efficient traffic law enforcement operations, and consequently Kapsch EVR will improve the efficiency of such operations. The EVR monitoring data also facilitate improved efficiency of existing law enforcement units, as violators can be located automatically.

Kapsch EVR is also suitable to be used for public security issues by performing a systematic monitoring of vehicle movements including hotlist handling (e.g. for identifying stolen cars) and access control to restricted areas. Kapsch EVR offers state-of-the-art encryption technology to ensure secure communication and to prevent the cloning or emulation of vehicle tags.



## Range of EVR applications.

By improving vehicle compliance and traffic law enforcement, Kapsch EVR solution offers a number of advantages for operators and authorities - not only in preventing vehicle related crime.

**Vehicle compliance violations** – identification of vehicles registered as being without evidence on registration or technical compliance (vehicle safety, roadworthiness aspects and exhaust emissions), vehicles with insufficient compulsory insurance and vehicles related to outstanding fines and/or tickets.

**Tax evasion** – by interfacing an existing data base from tax authorities or use the possibility to register tax in the EVR Management System, vehicles for which the tax have not been paid will be detected automatically when passing a monitoring station.

**Vehicle related crime** – identification of vehicles reported stolen, vehicles with license plate or other identifier reported stolen, vehicles with mismatching vehicle identifiers (license plate and tag), vehicles with a suspected cloned or tampered vehicle identifier and vehicles with missing vehicle identification.

**Crime investigation** – allowing police or security forces to identify a specific vehicle, either in real time at a monitoring station, or through data analysis and pattern recognition of monitoring data. This can be applied for search of a suspect, witnesses to a crime or traffic accident, etc.

**Traffic law violations** – detection of traffic law violation or identification of vehicles reported for any traffic law violation, e.g. speed limitations, red light, travelling direction in one-way roads, wrong turn, unauthorised travelling in dedicated lanes and emergency lanes.

**Access violations** – detection and identification of vehicles that unauthorised enter a restricted area, e.g. restrictions in weight, emission or carrying dangerous goods.

**Parking violation** – detection and identification of vehicles making a parking violation.

**Commercial vehicle violation** – detection and identification of transportation vehicles not following regulations for weight, axle weight or weight distribution, as well as any cabotage regulation.

## Maximum flexibility.

Beside the main focus of Kapsch EVR on vehicle registration and security, the solution architecture allows the easy implementation of additional applications related to road tolling, urban traffic solutions, traffic management, and road safety enforcement. In addition commercial applications, such as parking and payment solutions, offer an opportunity to maximize the utilization of the on-board equipment that will make the EVR solution more useful to road users and hence increase the acceptance.

## Satisfying customers' needs.

Kapsch TrafficCom is an end-to-end solution provider offering services including analysis of the current situation, customized solution development in close cooperation with the client, system implementation, training of local staff and commercial and technical operations of the system. Kapsch TrafficCom has a proven record of delivering and operating country-wide end-to-end solutions from its Electronic Toll Collection business.

The Kapsch solution can be built upon a wide variety of Kapsch products (tags, sensor equipment, data management solutions) with a well proven performance record. The solution-based approach of Kapsch takes full benefit of existing structures and resources of the client, identifies weaknesses and optimization needs, offers solutions for these weaknesses and defines new processes and interfaces. This ensures the development of the optimal EVR solution maximizing the benefits to the customer.

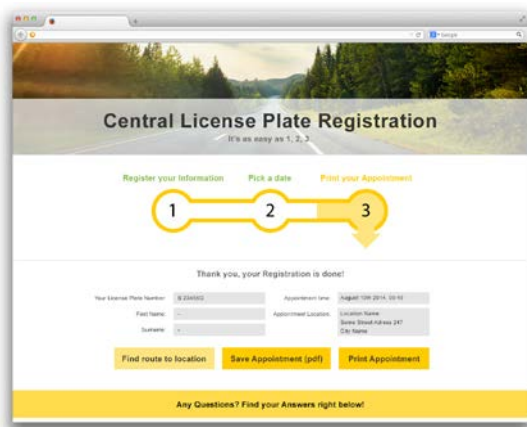
# EVR core processes.

## Tag issuance and registration – easy and reliable.

Through the introduction of an electronic tag, vehicle identity manipulation becomes more difficult. The electronic tag is the key identifier of the vehicle and hence needs to be distributed in a secure way. To ensure that the tag is on the correct vehicle, Kapsch provides an easy- to operate web portal based tag issuance process in only six steps. The process includes physical vehicle inspection and mounting of the tag, typically by an authority representative. An automatic verification as a final step in the process can be added as an additional verification.

The tag issuance process is also a unique opportunity for an additional input to the vehicle registration database, for updating and optimizing the data quality. This is a clear advantage of a tag based EVR solution, compared to less quality systems with ANPR cameras and license plate recognition only.

- 1**  
**Online appointment via citizen portal**
- Collect contact & vehicle information
  - Appointment info
  - Payments (optional)
    - Registration fee
    - Vehicle tax
    - Open fines



Kapsch EVR solution also supports a simplified tag issuance process, where the vehicle owner can install the tag straightforward on his car. The correct installation can be verified afterwards in the official inspection for roadworthiness and/ or by police in traffic controls.



## Compliance Monitoring – quick and comprehensive.

The electronic tag improves monitoring performance by allowing for an identity validation in the field by comparing tag data with the license plate number captured by ANPR (Automatic Number Plate Recognition) cameras. Additional list checks validate the vehicles legal status. The lists are maintained dynamically and are synchronized between the EVR Management System and all roadside stations.

Compliance monitoring consists of the data acquisition, the collection of the data on the road, and data processing. Data processing is gaining importance and new technologies and algorithms allow for new methods on compliance verification

and crime investigation. Examples are the detection of cloned license plates and the historic data analysis for tracking criminals.

## Enforcement – manageable and effective.

The compliance monitoring identifies enforcement cases and provides the corresponding enforcement records. These records can be used as evidence for prosecution with the aim of increasing the pressure on vehicle owners to comply with registration law. It is also an addition revenue stream created by an EVR system that can help to finance the operations cost of the system.

# EVR data acquisition.

## Tags (on-board units).

Kapsch offers a variety of EVR qualified tags supporting different communication standards. The decision for the tag type depends on local requirements and the project scope. When a tag is handed over to a user, vehicle data (e.g. license plate number, vehicle identification number, etc.) can be pre-stored on the tag. For this purpose, Kapsch provides easy-to-use tags personalization equipment which can be operated at every distribution office.

## Permanent Monitoring Stations.

The EVR application focus defines the design of the roadside network of permanent monitoring stations to ensure an optimal data collection and vehicle monitoring. The roadside equipment can be placed at border stations, gas stations, and main roads in a city or at other strategic locations. The equipment can be mounted on existing infrastructure (e.g. bridges, poles, gantries, etc.) or on dedicated poles or gantries. The Kapsch EVR permanent monitoring stations are suitable for Multi-Lane Free Flow (MLFF) operations as used in road tolling installations.

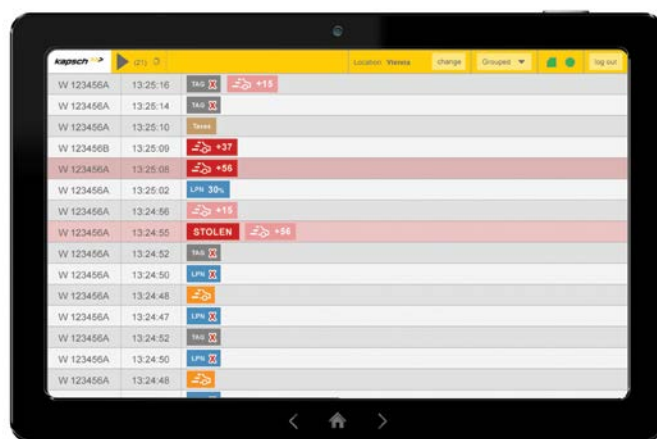


## Portable Monitoring Stations.

To increase the efficiency of compliance monitoring the permanent stations can be complemented by portable stations. A portable monitoring station utilizes a tag reader and an ANPR camera mounted on a portable pole, providing the same functionality as a permanent monitoring station, however with a limited coverage of one driving lane.

## Handheld Data Viewer.

The handheld data viewer is used by on-street enforcement units for receiving incidents data. When a vehicle is identified as being non-compliant or suspect, an incident record is created. An authority representative on the road can subscribe to such incidents, defining the type of incidents to be received and the geographical location. It is also possible to subscribe to a specific monitoring station to receive all incidents from this particular station.



The Handheld Data Viewer can be extended with a handheld tag reader to verify vehicle identity information.

# Data Processing (EVR Management System).

The EVR Management System provides all functionality needed to process data coming from the vehicle monitoring stations in the field. Different sub systems allowing individual customization of the solution design.

Timestamp	ANPR LPN	RFID LPN	Events	Location	Comments
2014.06.05 12:10:43	ABDHDJF	ABDHDJF		Freeway 23B. Direction south.	-
2014.06.05 12:10:47	ABDHDJF	ABXXXX	LPN 30%	Freeway 23B. Direction south.	Pulled out. Visual Problem in detection.
2014.06.05 12:10:43	TREHDJD	TREHDJD		Freeway 23B. Direction south.	-
2014.06.05 12:10:45	ZEEHDJD	ZEEHDJD	LPN 23% +15	Freeway 23B. Direction south.	Pulled out. Fined.
2014.06.05 12:10:45	ETRZRR	ETRZRR	+56	Freeway 23B. Direction south. Height km 120.	Pulled out. Fined. Car impounded.
2014.06.05 12:10:43	ABDHDJF	ABDHDJF		Freeway 23B. Direction south.	-
2014.06.05 12:10:47	ABDHDJF	ABXXXX	LPN 12%	Freeway 23B. Direction south.	LPN mismatch.
2014.06.05 12:10:43	TREHDJD	TREHDJD	Taxi TAG X	Freeway 23B. Direction south.	Not pulled out.
2014.06.05 12:10:45	ZEEHDJD	ZEEHDJD	+12	Freeway 23B. Direction south.	Not pulled out.
2014.06.05 12:10:45	ETRZRR	ETRZRR	STOLEN +164	Freeway 23B. Direction south. Height km 250.	-
2014.06.05 12:10:43	ABDHDJF	ABDHDJF		Freeway 23B. Direction south.	-
2014.06.05 12:10:47	ABDHDJF	NONE!	LPN X	Freeway 23B. Direction south.	-
2014.06.05 12:10:43	TREHDJD	TREHDJD		Freeway 23B. Direction south.	-
2014.06.05 12:10:45	ZEEHDJD	ZEEHDJD	LPN 25%	Freeway 23B. Direction south.	Not pulled out.
2014.06.05 12:10:45	ETRZRR	DJDJKDK	LPN 17% +35 TAG X 2	Freeway 23B. Direction south.	Pulled out. In progress.
2014.06.05 12:10:43	ABDHDJF	ABDHDJF		Freeway 23B. Direction south.	-
2014.06.05 12:10:47	ABDHDJF	ABXXXX	LPN 21%	Freeway 23B. Direction south.	Not pulled out.
2014.06.05 12:10:43	TREHDJD	TREHDJD		Freeway 23B. Direction south.	-
2014.06.05 12:10:45	ZEEHDJD	ZEEHDJD	+78 LPN 18%	Freeway 23B. Direction south.	-
2014.06.05 12:10:45	ETRZRR	DJDJKDK	TAG X	Freeway 23B. Direction south.	Not pulled out.
2014.06.05 12:10:43	ABDHDJF	ABDHDJF		Freeway 23B. Direction south.	-
2014.06.05 12:10:47	ABDHDJF	ABXXXX	LPN 30%	Freeway 23B. Direction south.	Pulled out. Visual Problem in detection.

## Event Handling:

The EVR Management system accepts a continuous stream of vehicle identification events or other types of events. It has the capabilities to correlate, to enrich and to verify data, and to react on any incoming event.

## Incident Management:

Pre-defined action response plans are in place to support a coordinated and well-structured handling of incidents, for example:

- Alert a nearby officer
- Configure a variable traffic sign
- Forward the incident to a state police

Plans can be combined and prepared for automatic procedures.

## Monitoring Data Store:

The highly flexible and scalable data store persists and search also very large amounts and any type of monitored data - textual data, images or even videos. Data can be encrypted and digitally signed for use as binding source of evidence files.

## Vehicle Registration Data Hub:

The Kapsch Vehicle Registration Data Hub provides secure access to up-to-date and reliable vehicle data.

## Data Security:

Strong security measurements including a rigid permission management, integrated justification workflows and auditing make sure that only persons with the appropriate permissions and the required justifications can access the data.

## System Interfaces:

Various interfaces ensuring data connection to all relevant sources:

- National Vehicle Registration Database
- Road Safety Enforcement Solutions
- Other Registration Data Sources
- Government Authority providing various lists to check data matches (i.e. stolen vehicle list, vehicles involved in crimes, and others)
- Debt Collection Agency

## Key features EVR Management System.

- **Highly scalable:** From small local EVR installations to big countrywide systems
- **Distributed software architecture:** Different deployment scenarios according to the project scope
- **Schemaless input:** Accepting data in various formats, allowing for collecting and processing data from different sources (existing and future technologies).
- **Smart data:** Fast extracting of patterns from continuous data flow makes it easy to generate appropriate actions



### Kapsch EVR solution highlights

- Complete and fully integrated solution
- Support of various front end technologies with intelligent data processing capability on the road
- Highly flexible and performant data management with innovative data analysis
- Advanced incident handling options including real time dispatch of information to law enforcement units
- Kapsch as an end-to-end solution supplier for the complete solution, providing a seamless combination of tags and monitoring system for the full benefit to authorities.
- Kapsch end-to-end solution experience from many large-scale projects guarantees best performance

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## About Kapsch Group.

Kapsch is one of Austria's most successful technology corporations to specialize in the future-oriented market segments of intelligent transport systems (ITS) and information and communications technology (ICT). Headquartered in Vienna, Kapsch is organized as a group of companies with the key entities Kapsch TrafficCom, Kapsch CarrierCom, and Kapsch BusinessCom. The companies of the Kapsch Group employ more than 5,000 people around the world. Kapsch. Always one step ahead.

[www.kapsch.net](http://www.kapsch.net)