

Bizkaia

Pay Per Use (PPU) System for Heavy Vehicles

Bizkaia's major roads, the N-636, N-637, and A-8, are vital for regional and international transportation. The N-636 connects industrial centers, the N-637 links urban areas, and the A-8, part of the European E70 route, facilitates international trade along Spain's northern coast. These roads are crucial for the region's economic vitality, supporting significant traffic flow and commerce.

Innovative solutions contribute to a healthy world without congestion.

Kapsch TrafficCom has implemented a Pay Per Use (PPU) system on these roads to optimize traffic management and ensure sustainable infrastructure funding. This system employs an automated charging mechanism utilizing "Free-Flow" technology, enabling vehicles to be charged without stopping. The advanced Free-Flow system ensures seamless vehicle movement, reducing congestion and enhancing overall road efficiency. Kapsch's implementation includes redundant elements to guarantee service continuity and address the high demands of traffic volume and operational reliability, thus contributing to the economic and logistical strength of Bizkaia.



Project Scope:

Implementation Sites: Three main roads in Bizkaia (N-636, N-637, A-8).

Technology: Free-Flow charging system with redundancy to ensure continuous service without single points of failure.

Vehicle Identification: DSRC antennas with overlapping coverage and a license plate recognition system.

Redundant Systems:

- Vehicle Identification DSRC antennas: Overlapping coverage ensures that the failure of one antenna is compensated by adjacent DSRC antennas.
- License Plate Recognition: Similar redundancy to DSRC antennas, ensuring uninterrupted operation.
- Point of Collection Server: Redundant server architecture with independent operation.
- Antenna Controllers: Redundant controllers maintain system operation during failures.
- Communications: Distributed equipment over two switches to avoid single points of failure.
- Power Supplies: Redundant power supplies and cabling for gantry equipment.



The Challenges:

Volume of Traffic: Managing more than 1.4 million daily transits across 20 gantries and 6 cantilevers, covering 146 lanes.

High KPIs: Meeting demanding performance indicators.

Infrastructure: Manufacture and installation of 42-meter bi-directional gantries in aluminum without intermediate supports.

Climate Conditions: Heavy rain and wind impacting operations.

Electricity Activation: Long times for obtaining required electricity near gantries.

Project Timeline: Very short deadlines relative to project scale.

The Solution:

Testing Gantries:

- Controlled Test Environment: Free-Flow gantry for function tests.
- Real Traffic Test Gantry: Located on N-637 in Bizkaia and in Vienna (Tesdoorf) for SW early testing.

Demo Station in Txorierrri: For software testing, license plate training, and proxy installation.

Advanced Technology:

- VDX2i Equipment: Patented technology for processing stereoscopic video images for vehicle detection, tracking, and classification.

Advanced Software:

- Redundancy Management: Software designed to handle device failures by adapting and maintaining service.

The Added Value

- *Redundant System Architecture: Ensures highest market availability and continuity of service.*
- *Future-Ready Design: Prepared for scalability and future enhancements to meet evolving needs.*
- *Efficient Management: Improves traffic operation management and enhances road user experience.*
- *Climate Resilience: Designed to operate effectively under challenging weather conditions.*