Kapsch TrafficCom

Vitoria-Gasteiz

Transit Signal Priority (TSP) – Innovative traffic light priority pilot project for public buses

In 2024, Kapsch TrafficCom Spain was awarded a pilot project by TUVISA, the municipal company responsible for urban transport in Vitoria-Gasteiz, Spain. The project involves the introduction of Connected Vehicle technology for bus priority control.

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For this project, Kapsch TrafficCom integrated its state-of-the-art connected vehicle technology—both hardware and software—with existing traffic management systems. Designed to prioritize a specific bus line (Line 5) at a key intersection, the system operates entirely in the background. This allows drivers to focus solely on the road while the technology automatically manages traffic light prioritization.

Next Generation funds within the Ciudades Conectadas project.

At its core, bus priority is a mechanism that adjusts traffic light phases to allow buses to move more efficiently through the road network—without the need for dedicated bus lanes. By using connected vehicle technology to optimize green light timing for buses, waiting times at red lights can be significantly reduced or even eliminated.

Although currently limited to a single intersection and bus route, the technology is fully scalable paving the way for future deployments in larger urban areas.

The Basque capital of Vitoria-Gasteiz is committed to sustainable and healthy mobility. Kapsch TrafficCom was selected to manage the EcoTrafiX™ platform, integrating control systems and connected vehicle technology into the city's intelligent traffic system—reinforcing both innovation and sustainability.

Project Scope:

The contract includes the supply of both software and hardware for connected vehicle technology:

- Supply and installation of the latest-generation Kapsch 5.9GHz Roadside Unit RIS-9160 to enable data exchange between infrastructure and buses
- Deployment of the Kapsch onboard V2X communication unit CBX-9160
- Configuration and installation of the Kapsch Connected Mobility Control Center (CMCC)
- Integration of connected vehicle technology with Kapsch Traffic Management Systems:
  - EcoTrafiX™ Suite
  - EcoTrafiX™ Controller
  - Mobility Data Platform
- Integration with external products
  - General Transit Feed Specification (GTFS) bus operator database
  - SAE real-time bus schedule data

The Added Value:

- ***Enhanced efficiency of public transportation by reducing delays for public buses, thereby improving the overall commuter experience.***
- ***Simplified implementation and maintenance for municipalities, as the system minimizes the need for construction and reduces long-term operational complexity.***

The Challenges:

Transit Signal Priority (TSP) is an early adoption use case for the connected vehicle industry, built on standardized technology. It enables traffic flow optimization by adjusting the timing of traffic signals for public transport (e.g. buses and trams).

In Spain, the Vitoria pilot serves as a model for other cities, demonstrating technological innovation through the implementation of advanced technologies.

The Solution:

The intersection is equipped with the Kapsch 5.9GHz Roadside Unit RIS-9160, which communicates with the Kapsch onboard V2X communication box CBX-9160 in the bus, as well as with the Kapsch EcoTrafiX™ Traffic Light Controller.

The CBX-9160 continuously transmits the bus's location, speed, and direction of travel. When the bus approaches an intersection, it sends its location to the RIS-9160 installed at that intersection. If the bus enters a predefined detection zone, the CBX-9160 sends a priority request to the RIS-9160.

The RIS-9160 then forwards this request to the EcoTrafiX™ Traffic Light Controller, which grants priority based on real-time traffic flows and predefined rules.

For this pilot, the customer required priority based on the delay of the bus as it approaches the intersection. To achieve this, Kapsch TrafficCom acquired GTFS data from TUVISA, containing details such as the bus's position, direction, and delay.

To process this data, Kapsch developed a GTFS connector that reads and analyzes the delay information. If a delay is detected, the bus is added to a whitelist, which is then transmitted to the RIS-9160. This whitelist is constantly updated based on the latest GTFS data and the results of the connector's analysis.

Finally, the Connected Mobility Control Center (CMCC) acts as a communication gateway, sending the whitelist from the GTFS connector to the Kapsch 5.9GHz RIS-9160.