



AUTOC-ITS

Connecting Europe Facility

AUTOCITS

Regulation Study for Interoperability in the Adoption of Autonomous Driving in European Urban Nodes

AUTOCITS PROJECT

AUTOCITS is an European Project coordinated by INDRA, co-financed by the European commission under the CEF programme, which aim is to contribute to the deployment of C-ITS in Europe by enhancing interoperability for autonomous vehicles as well as to boost the role of C-ITS as catalyst for the implementation of autonomous driving. Three pilots are implemented in three major European cities to do this: Paris, Madrid and Lisbon, located along the Atlantic Corridor. For more information visit and contact in www.autocits.eu

ABSTRACT: Specification and design of the pilots

This document is an executive summary of the report ***Specification and design of the pilots*** of the AUTOCITS project, whose aim is to define the details of the demonstrators of Madrid, Paris and Lisbon. This study focuses in the description of the test sites and test that will be carried out, focusing in the description of the C-ITS services, the scenarios, the equipment and the connected and autonomous vehicles that will participate in the tests.

<http://autocits.eu/>

This document belongs to the AUTOCITS consortium.

1 Introduction

AUTOCITS will carry out a study with pilot in the main urban nodes of the Core Network (Atlantic Corridor) in Spain (Madrid), France (Paris) and Portugal (Lisbon). The aim of the study is to contribute to the deployment of Cooperative ITS in Europe, being aligned with other current initiatives (e.g, C-Roads, C-ITS Platform and Amsterdam Group). The pilots will focus in studying the role of the **C-ITS services as catalyst** for the implementation of autonomous driving, testing the interoperability between the different deployments.

In these urban nodes, it will be deployed the **“Hazardous location notifications” service recommended by the C-ITS platform**. In this application, road works warning, weather conditions, emergency vehicle approaching, slow or stationary vehicle and other hazardous location notifications will be notified to the vehicles.

2 C-ITS services deployed

The C-ITS services that will be deployed in the AUTOCITS Pilots are part of the C-ITS Day 1 services defined by the C-ITS platform in the final report of 2016¹, and will be:

- **Madrid Pilot Site**
 - Slow or stationary vehicle(s) & traffic ahead warning.
 - Road works warning.
 - Weather conditions.
- **Paris Pilot Site**
 - Road works warning
 - Weather conditions
 - Other hazardous notifications
- **Lisbon Pilot Site**
 - Slow or stationary vehicle(s) & traffic ahead warning.
 - Weather conditions.
 - Other hazardous notifications

These C-ITS services have been selected because they are representative use case extensions of the functionalities the current traffic management centers perform that can be deployed under the existing infrastructure and available

¹ <https://ec.europa.eu/transport/sites/transport/files/themes/its/doc/c-its-platform-final-report-january-2016.pdf>

services. Additionally, they are based in V2X communications and allow demonstrating the benefits of the upgrading of the existing technology installed in the European roads:

3 Pilots in the Atlantic Corridor

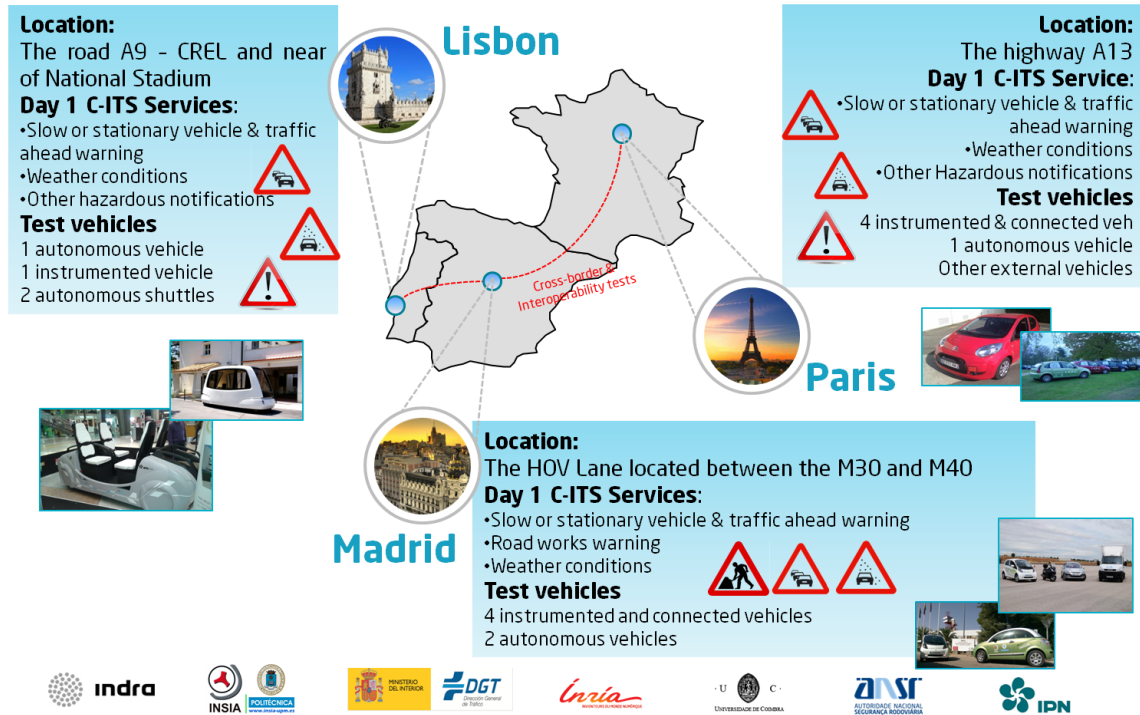


Figure 1 AUTOCITS pilots

3 Location of the pilots

The scenario chosen for the **Spanish pilot** is a reversible HOV-BUS Lane that connects the Madrid urban node with the A6 highway, in particular the section between km 7 and 17, fragment of road in which buses, motorcycles and cars can circulate. Indra, UPM and DGT participate in this pilot.

The **French Pilot** is deployed in the A13, which belongs to the French part of the Atlantic Corridor. The selected highway segment is near Paris and considered one of the main veins toward Paris city. INRIA, with the collaboration of SANEF, are the main participants in the French Pilot activities.

The scenario chosen for deployment of the **Portuguese pilot** is the highway A9 - CREL (Circular Regional Exterior de Lisboa). The section of the highway where the pilot will be deployed is a fragment with 7km between the beginning, near of National Stadium and exit number 2C, intersection with A16. The pilot with autonomous shuttles will use national roads between the National Stadium and Faculty of Human Kinetics.

4 Architecture of the pilots

An adaptation of the following architecture will be defined at each of the Pilot sites:

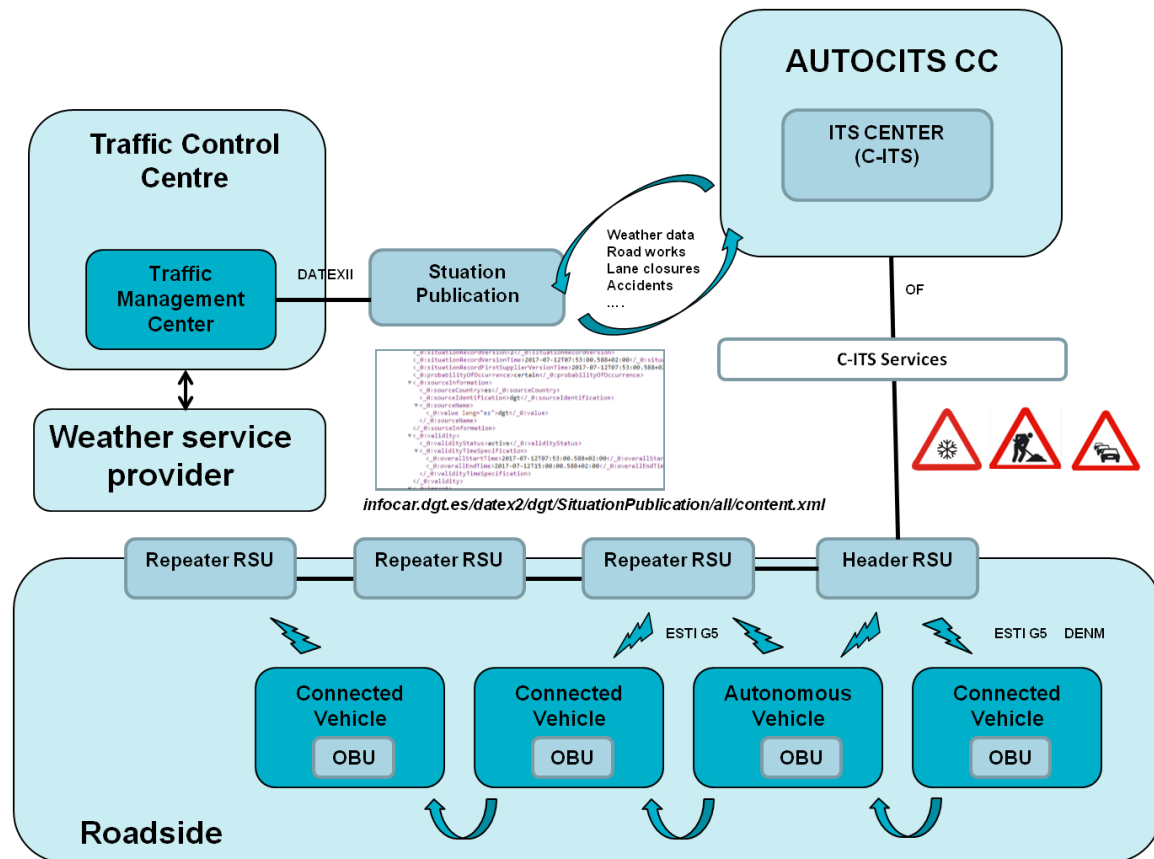


Figure 2 AUTOCITS pilot's architecture

5 Vehicles

5.1.1 Connected Vehicles

Four test-bed vehicles from INSIA will be used in the pilots (Figure 3). All of these vehicles are equipped with INSIA- OBU V2X units in order to connect and receive information from the installed RSUs, needed to enable the planned deployment of the C-ITS.



Figure 3 INSIA's connected vehicles

Four identical testbed vehicles of model Citroen- C3 will be used in the French pilots as connected vehicles. All the four vehicles are equipped with OBU V2X units, IMU, Camera, V2X antennas and some other sensor.



Figure 4 INRIA's connected vehicles

The Group of Automation and Robotics at the Department of Mechanical Engineering of the University of Aveiro will provide an instrumented vehicle from ATLASCAR research group for the Portuguese pilot.

5.1.2 Autonomous Vehicles

Two autonomous vehicles will take part on the AUTOCITS pilots: a Citroën C3 Pluriel and a Mitsubishi iMIEV. Those vehicles are considered of automation level 2 and 3 respectively, and are also equipped with an INSIA-OBU V2X unit.



Figure 5 INSIA's autonomous vehicles

In the French pilot, a Citroën C1 Evie fully electric autonomous vehicle will participate in the tests. This vehicle is fully equipped with communication OBU.



Figure 6 INRIA's electric autonomous vehicle

In Lisbon pilot will be used two different autonomous shuttles. These shuttles are based on a ITS technology called MOVE developed by IPN. The MOVE is a

driverless electric vehicle, designed to be easily used for small trips at low speed, with the aim to be a "**horizontal lift**" able to connect buildings of private or semi-private spaces.



Figure 7 IPN's autonomous shuttles

6 Conclusions

Once the pilots have been defined, including the C-ITS services, infrastructure equipment, connected and autonomous vehicles, on board equipment, communication technologies and profiles, etc, the deployment phase already started. A staged strategy has been defined in order to be able to progressively monitor different aspects of the C-ITS deployment, such as technology compatibility, interoperability of equipment and vehicles, range of communications, etc.

The first tests with connected vehicles are expected to be performed before 2017 ends with partial deployments, while full tests with autonomous vehicles are planned for 2018.

It is important to highlight that AUTOCITS is participating in the **C-ROADS Platform**, an open platform where ongoing C-ITS deployment activities all across Europe are working together towards interoperable C-ITS services. The results summarized in this abstract about service definition and future deployment and test results will be reported to the initiative.

More information related to the deployment and the tests will be included in the project website and in future documents that will be sent to the International Cooperation Group, so from AUTOCITS we encourage you to **keep linked** to the project activities.