

From Intelligent Motorways to Cooperative Intelligent Motorways

The AUTO C-ITS Project's Lisbon Pilot



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ASECAP DAYS



COSTA NAVARINO 2019

Automotive industry is changing

Autonomous driving



80 % of the top ten OEMs announced plans for highly autonomous technology to be ready by 2025

Shared Mobility



It is anticipated to expand 25% more between 2018 to 2025

Connectivity



Consumers' willingness to change car brands for better connectivity has doubled between 2014-2015

Electrification



The global sales of plug-in electric vehicles grew by more than 70% between 2017 and 2018

These four disruptive trends are gaining momentum

”I believe the auto industry will change more in the next 5 to 10 years than it has in the last 50.”

Mary Barra, CEO and Chairman of General Motors

Change is happening quite fast...



7 m in 2035
Europe



21 m in 2035
World

AVs are becoming a reality

The transitional period may become perpetual



AVs will follow an
evolutive approach



Fleet turnover might
take almost 2 decades



Some people enjoy
manual driving



Others have a symbolic-affective
relationship with their cars

Motorway operators will need to be prepared



Lisbon Pilot

goals and achievements

Lisbon Pilot goals and achievements



C-ITS

To contribute to its implementation



C-ITS Interoperability

Ensuring



Autonomous driving

Strengthen the role of C-ITS as its catalysts

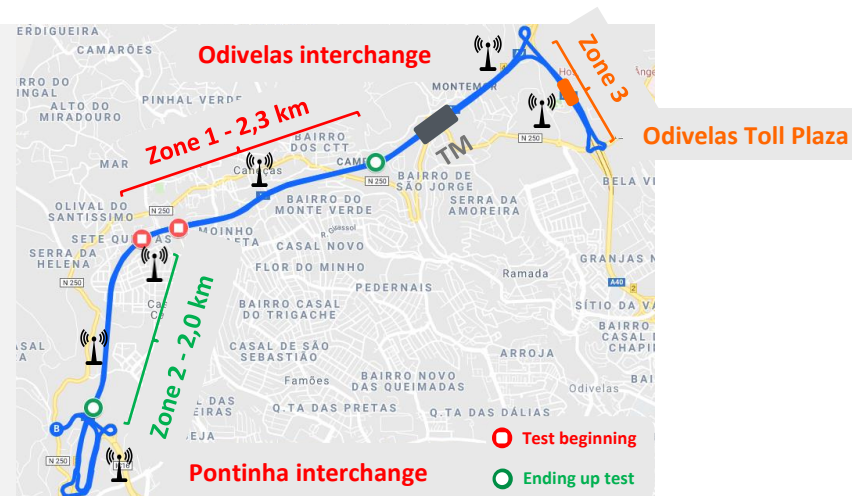
Data collection for the  Consortium and  **Brisa** project

Location

Location

A9-CREL Radial da Pontinha/Radial de Odivelas

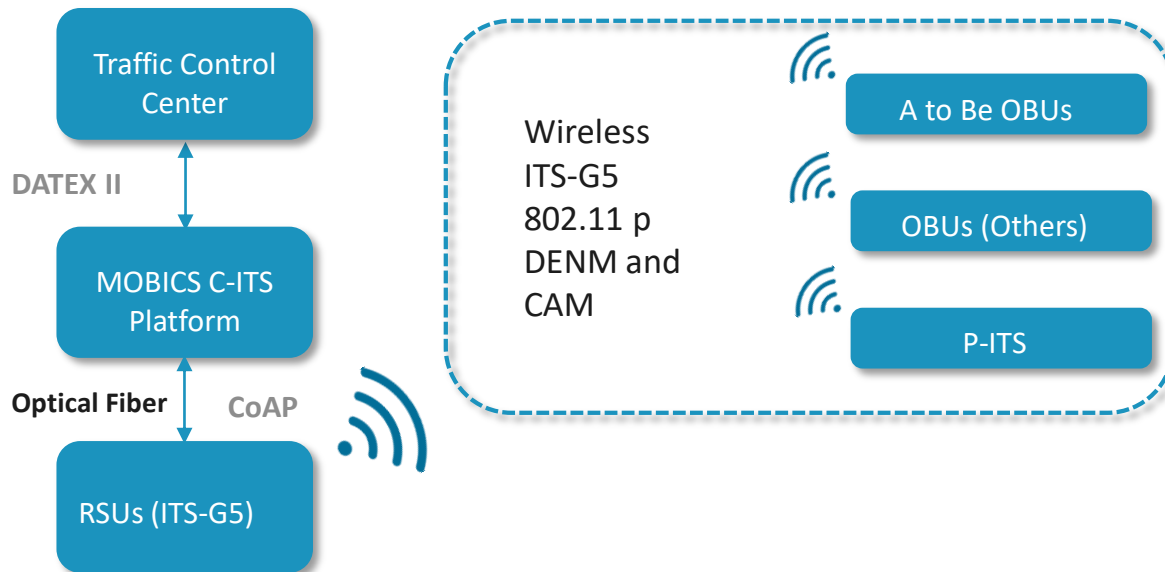
- Zone 1 - Radial Odivelas/Pontinha
- Zone 2 - Pontinha/Radial Odivelas
- Zone 3 - Odivelas Toll Plaza



Infrastructure with **A-to-Be** equipment

What happened?

Pilot architecture



We guarantee the interoperability of C-ITS

Day 1 C-ITS services



Weather conditions



Slow or stationary vehicle and traffic ahead warning



Other hazardous notifications

Only 3 C-ITS services were tested

Test vehicles



2 connected vehicles



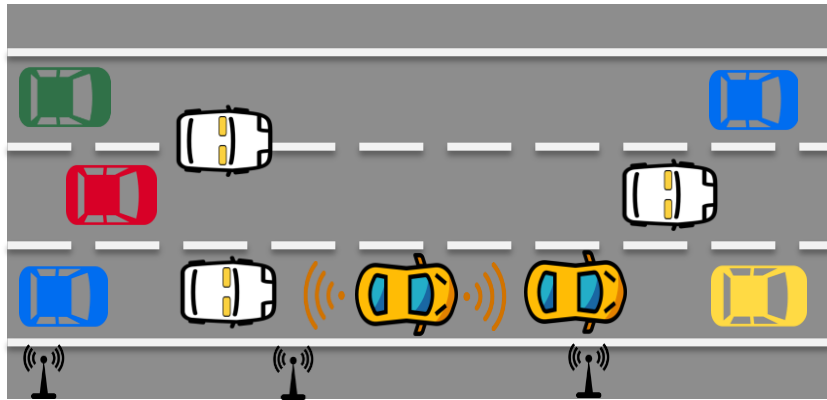
2 connected autonomous vehicles (CAVs)

Level 3 vehicles autonomy

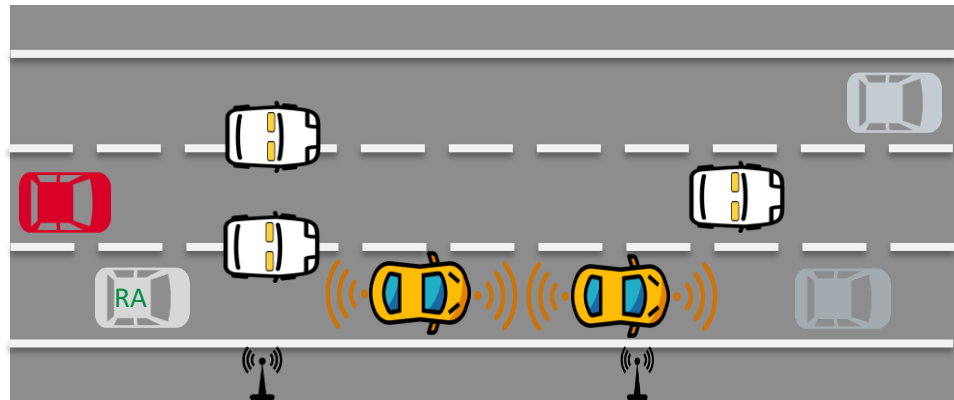
Scenarios

Dedicated lane

01



02



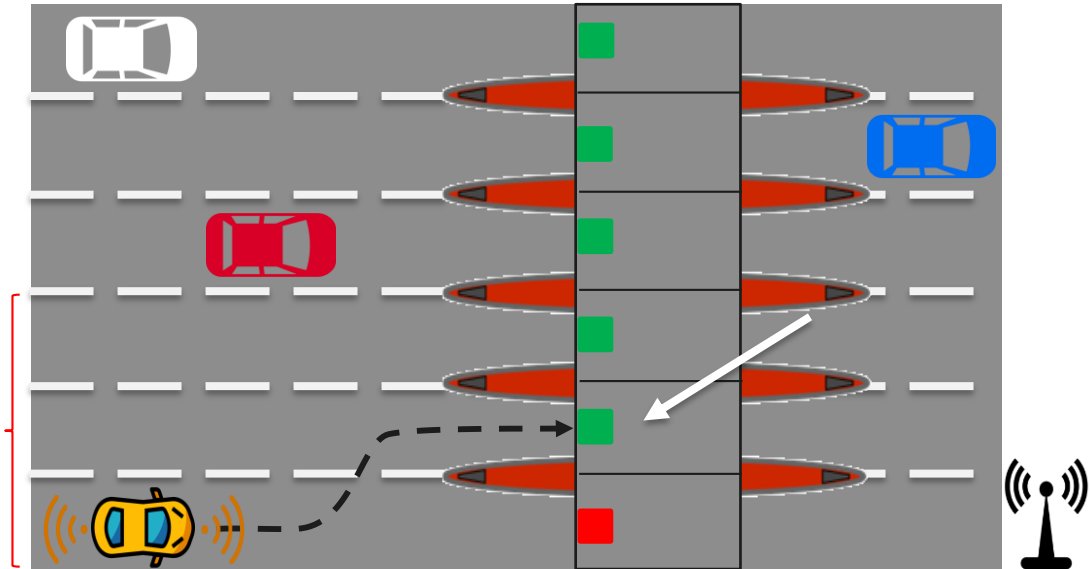
Assured by the Security Services

Scenarios

Odivelas Toll Plaza

03

Tests reserved area



GPS signal loss under the toll plaza cover

Lisbon Pilot assessment

Lisbon Pilot assessment

C-ITS Interoperability assessment



Beginning and end
of DENMs' broadcast



Percentage of DENMs
received



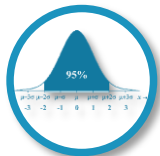
Start of DENMs
reception



Mean time between
received messages



DENMs adequate
reception time



Standard deviation of time
between received messages

Assessing the communication tests between OBUs/RSUs

Lisbon Pilot assessment

CAVs behaviour change assessment



Maximum, minimum and average speed



Answer time to a detected event



Answer start time



Lane change frequency



Total answer time

Adopted behaviour assessment regarding expected behaviour

Conclusions

Conclusions

BRISA's point of view

C-ITS infrastructure and CAVs

- The interoperability between different C-ITS stations, from Portuguese and Spanish manufacturers, was tested and verified
- CAVs behaved as expected for each broadcasted event
- The Lisbon Pilot constituted a further step in ensuring cross border interoperability at European level

Need for more large-scale trials in real-world environment

BRISA's benefits achieved

BRISA's benefits achieved

DATA TO
RESEARCH PROJECT

C-ITS
PLATFORM
IMPROVEMENT

BUGS
CORRECTION

**PIONEERS
IN
PORTUGAL**

IMAGE

EXPERIENCE

CREL
FOR
FUTURE TESTS

*”**Automated driving future** is not just about vehicles technology. It is about a **broad and integrated system** that **allows cars to communicate** with each other and with the driving ecosystem **to keep drivers and other roadway users safe.**”*

Stephen Joseph OBE, CEO of the Campaign for Better Transportation

Thank you!

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