AUTOCITS

AUTOCITS workshop

Lisbon, February,28th

6th Workshop

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R&D Program Manager

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C-ITS

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Context: CEF Project

Connecting Europe Facility (CEF)
key EU **funding instrument** to promote growth and competitiveness through targeted **infrastructure investment** at European level
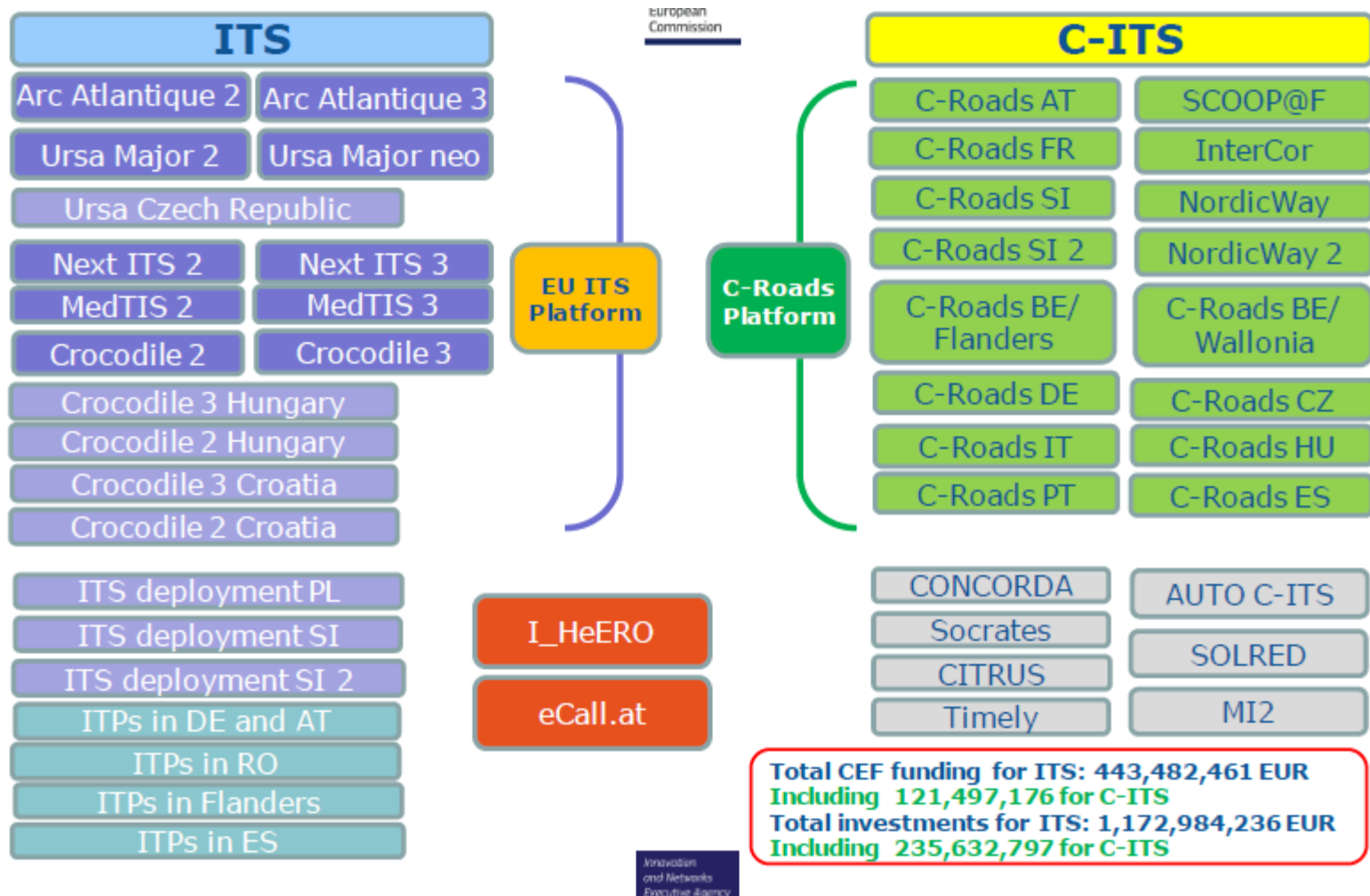
Context: Atlantic Corridor

Atlantic Corridor: The Atlantic Corridor stretches from Portugal to France.

Main urban nodes: Lisbon, Madrid and Paris

Context: ITS & C-ITS Projects

ITS

Arc Atlantique 2	Arc Atlantique 3
Ursa Major 2	Ursa Major neo
Ursa Czech Republic	
Next ITS 2	Next ITS 3
MedTIS 2	MedTIS 3
Crocodile 2	Crocodile 3
Crocodile 3 Hungary	
Crocodile 2 Hungary	
Crocodile 3 Croatia	
Crocodile 2 Croatia	

| ITS deployment PL |
| ITS deployment SI |
| ITS deployment SI 2 |
| ITPs in DE and AT |
| ITPs in RO |
| ITPs in Flanders |
| ITPs in ES |

European Commission

EU ITS Platform

C-Roads Platform

C-ITS

C-Roads AT	SCOOP@F
C-Roads FR	InterCor
C-Roads SI	NordicWay
C-Roads SI 2	NordicWay 2
C-Roads BE/ Flanders	C-Roads BE/ Wallonia
C-Roads DE	C-Roads CZ
C-Roads IT	C-Roads HU
C-Roads PT	C-Roads ES

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eCall.at

CONCORDA	AUTO C-ITS
Socrates	SOLRED
CITRUS	
Timely	MI2

Innovation and Networks Executive Agency

Total CEF funding for ITS: 443,482,461 EUR
Including 121,497,176 for C-ITS
Total investments for ITS: 1,172,984,236 EUR
Including 235,632,797 for C-ITS

Autonomous Vehicles/Driving, New concept?

1950s GM "Firebird II" (Concept)

AUTOCITS: Concept

"*Bring together Cooperative ITS (C-ITS) and Autonomous driving*"

AUTOCITS - In a nutshell

*"AUTOCITS aims to **contribute to the deployment of C-ITS in Europe** and to boost the role of C-ITS as catalyst for the implementation of autonomous driving"*

Regulation

C-ITS: Intelligent Transport Systems (ITS) where ITS stations (vehicles, roadside equipment, traffic control centers and personal devices) communicate and share information

CAD – Connected & Autonomous Driving take advantage of a variety of techniques to detect their surroundings and advanced control systems to interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage

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AUTOCITS: Why C-ITS + Autonomous Driving?

Cooperation (C-ITS) Augments Sensing

- Cooperative vehicles can "talk" and "listen" as well as "seeing"
- Communicate vehicle performance and condition directly rather than sensing indirectly
- Enables closer separations between vehicles
- ….

AUTOCITS: Vehicle-Infrastructure Cooperation

- Speed reduction approaching road works for safety
- Speed harmonization to maximize bottleneck flow
- Automated changing lanes, starting beyond line of sight, to smooth traffic

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AUTOCITS - Objetives

Study on the current National, European and International legal framework for autonomous driving

Pilot C-ITS services for autonomous vehicles (AVs) under the applicable traffic regulation

AUTOCITS

Cooperate with other current initiatives during the study: C-Roads, etc.

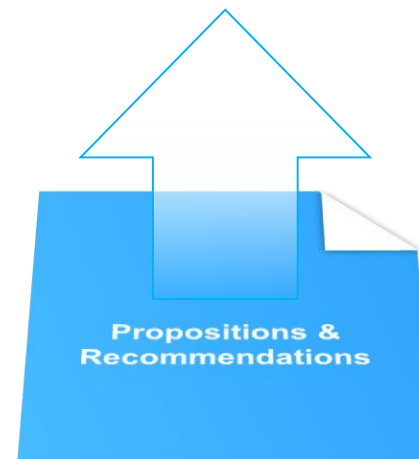**Provide recommendations for regulations and large scale C-ITS deployments**

AUTOCITS: Partners & Figures

Programme: Connected Europe Facility
Starting date: 01-11-2016
Ending Date: 31-03-2019
Duration: 29 months

Call: CEF- 2015
Budget : 2,606,550 €
Coordinator: INDRA
Funding: 50%

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Paris Pilot

Madrid Pilot

Lisbon Pilot

Stakeholders Group
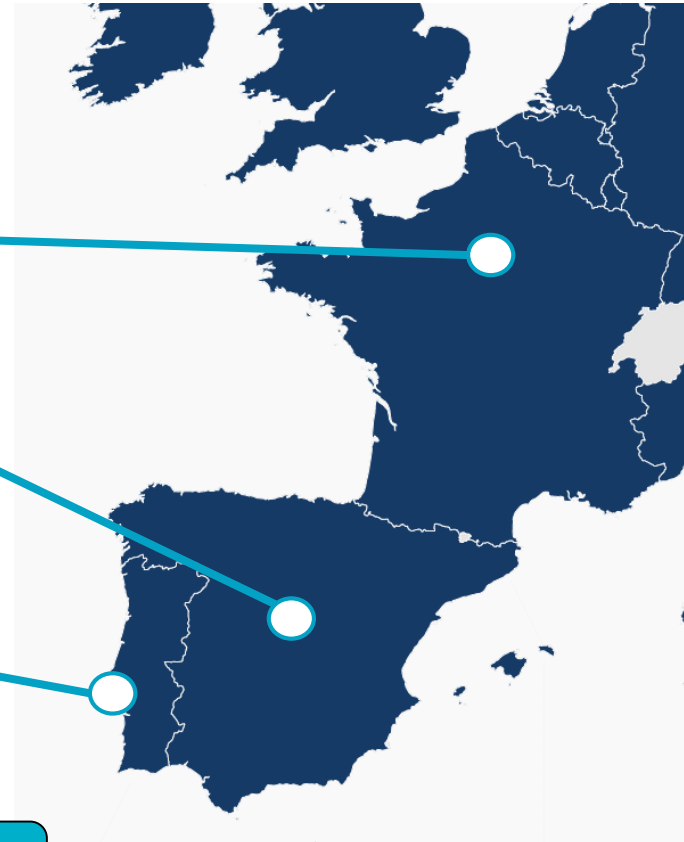
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Regulation study in AUTOCITS (Study)

05

National and European **regulatory frameworks**

Study of the national and European regulatory frameworks for the deployment of the Autonomous Driving

Advanced **International regulations**

United States of America, Japan, Singapore, South Korea , China, Australia, etc.

Propositions & Recommendations

Making propositions and recommendations for regulation and legal framework

Some of the **aspects under study** are:

Alignment with Vienna Convention
Normative on driving
Testing Legislation
Vehicle certification (individual vehicles, mass production)
Laws to be modified
Changes on SAE 3-5 already initiated/foreseen

DOCUMENT AVAILABLE AT WEBSITE WWW.AUTOCITS.EU

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3 Pilots in the Atlantic Corridor

Lisbon

Location:
A9 – CREL Circular Regional Externa de Lisboa / Terminal Cruises

Day 1 C-ITS Services:
•Slow or stationary vehicle & traffic ahead warning
•Weather conditions
•Other hazardous notifications

Test vehicles
2 autonomous vehicle
1 instrumented vehicle
2 autonomous shuttles

Paris

Location:
The A13 highway

Day 1 C-ITS Service:
•Slow or stationary vehicle & traffic ahead warning
•Weather conditions
•Other Hazardous notifications

Test vehicles
4 connected vehicles
1 autonomous vehicle
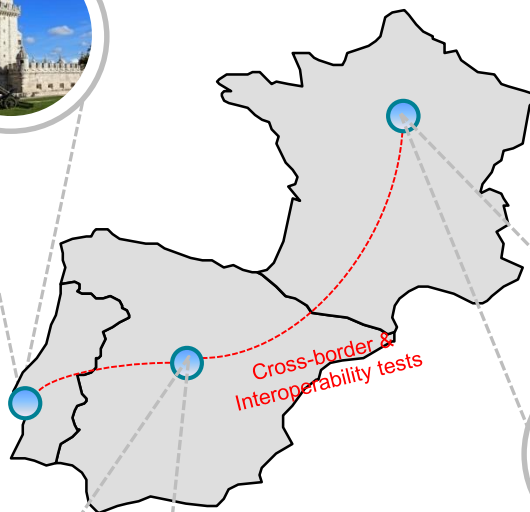
Cross-border & Interoperability tests

Madrid

Location:
The HOV Lane located between the M30 and M40

Day 1 C-ITS Services:
•Slow or stationary vehicle & traffic ahead warning
•Road works warning
•Weather conditions

Test vehicles
4 instrumented and connected vehicles
2 autonomous vehicles

08 Pilot Overview - Spain 🇪🇸

Road: A6 Autovía del Noroeste, stretch between M30 and M40, Reversible high occupancy lane
Length: 10 kms, **15 RSUs** have been installed

Traffic conditions
- More than 20.000 vehicles/day
- Close to traffic: controlled tests
- Open to traffic: private vehicles and public collective transport (bus)
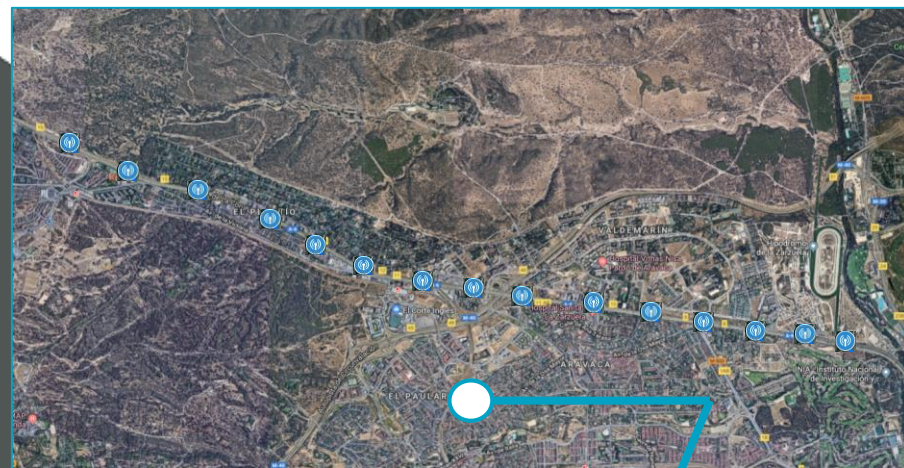
SPAIN

Vehicles involved
- **Autonomous vehicles:** 2 vehicles
- **Connected vehicles:** 4 vehicles

C-ITS Day 1 services
- **Service 1:** Road Works information service
- **Service 2:** Weather information service
- **Service 3:** Traffic ahead service

Communication Channel
- **ITS G5**

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Pilot Overview - Portugal 🇵🇹

Roads
1) A9-CREL Between Radial Pontihna and Radial Odiveras / Cruises Terminal
 Length: 7 kms , **5 RSUs** have been installed / 850m
2) road connecting A9 and Faculty of Human Kinetics
Length: 1kms

Traffic condition
1) Open peri-urban traffic
2) Controlled traffic conditions

PORTUGAL

Vehicles involved
- **Autonomous vehicles**: 2 vehicles
- **Autonomous shuttle:** 2 vehicle
- **Connected vehicles:** 2 vehicles

C-ITS Day 1 services
- **Service 1:** Notification of slow or stationary vehicles
- **Service 2:** Weather information service
- **Service 3:** Other hazardous notifications

Communication Channel
- **ITS G5**

Lisbon Cruise Terminal
Sta. Apolónia Station

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Pilot Overview - France 🇫🇷

Road: Peri-Urban A13 Highway entrance to Paris
Number of RSUs: 2 **RSUs** has been installed

Traffic condition:
Urban and peri-urban traffic

FRANCE
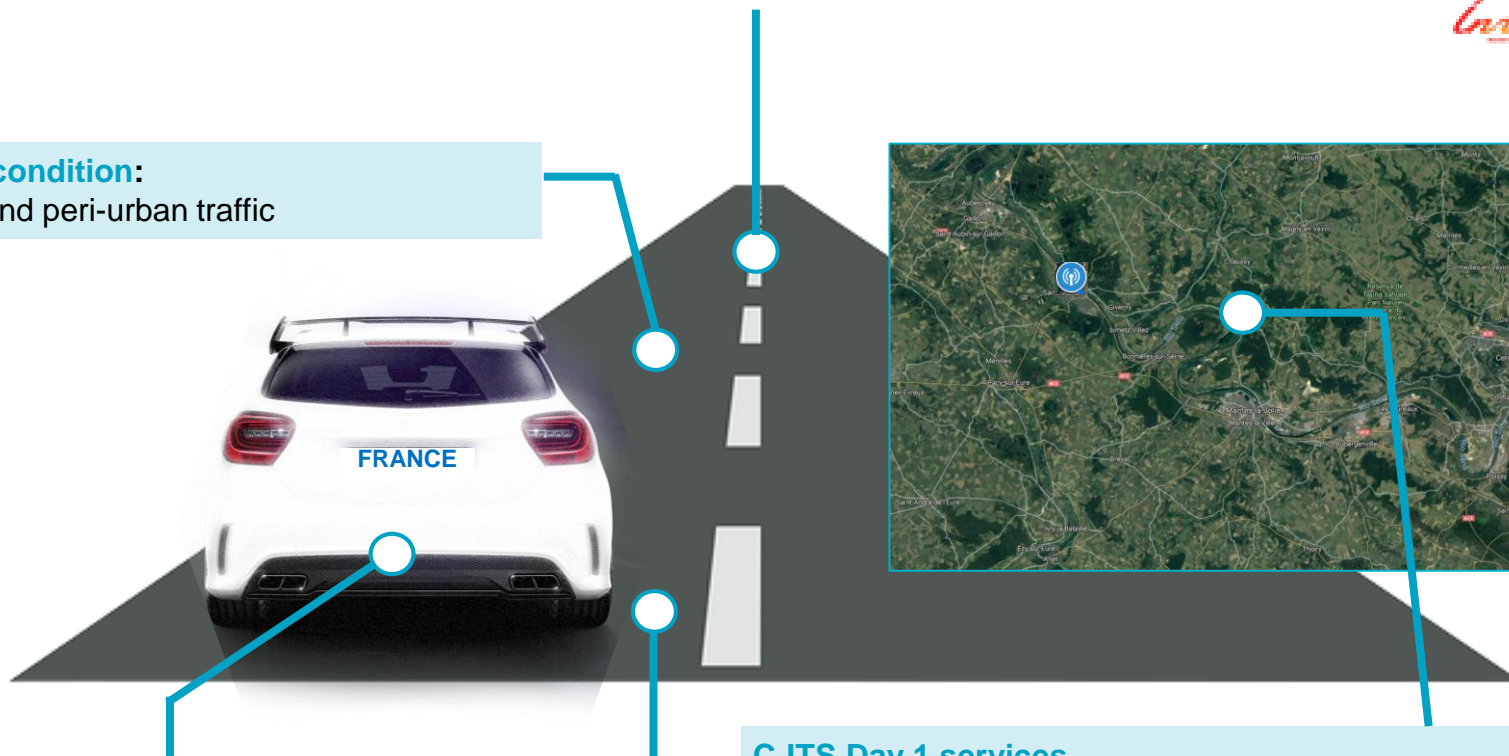
Vehicles involved
- **Autonomous vehicles:** C1 Evie
- **Connected vehicles:** 4 C3 vehicles

C-ITS Day 1 services
- **Service 1:** hazardous location notification
- **Service 2:** contextual speed adapting
- **Service 3:** traffic scheduling assist

Communication Channel
- **ITS G5**

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Provide recommendations for regulations and large scale C-ITS deployments

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Contribution to/from the C-ROADS Platform

C-ROADS

WG2 Technical Aspects/ WG3 Evaluation methodology

TF1 Security aspects
TF2 Service Harmonisation
TF3 Infrastructure Communication
TF4 Hybrid Communication
TF5 Cross border Validation

EXPECTED CONTRIBUTION TO THE PLATFORM

C-ITS SERVICE specifications for
- **Harmonised C-ITS specifications (31/07/2017)**
  Road Weather warning
  Roadworks warning
  Traffic ahead warning
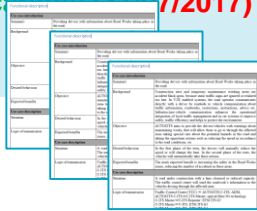
- **Implementation of services:**
- **Provision of Communication model used**
- **Results of cross-border validation tests**
- **Results from pilots assessment and evaluation**

EXPECTED CONTRIBUTION FROM THE PLATFORM

- **C-ITS Services implemetned following ETSI specifications and they have been customised/tailored to C-ROADS based on reference documents**
  - **C-ITS: Infrastructure Function Specification (v1.3) August 2018**
  - **C-ITS Service Description (v1.1) March 2018**

- **Strategy of evaluation including KPIs from WG3**
  - **Evaluation and assessment plan (Final Version) July 2017**

- **Security model**
  - **Security approach for TCC / C-ITS: IMHO, Only address RSUs / OBUs in c-roads**

- **Infrastructure Communication model**
  - **Standarised communication between C-ITS-TCC: DATEX II (ECO-AT)**
  - **Standarised communication between C-ITS-C-ITS: DATEX II (ECO-AT)**
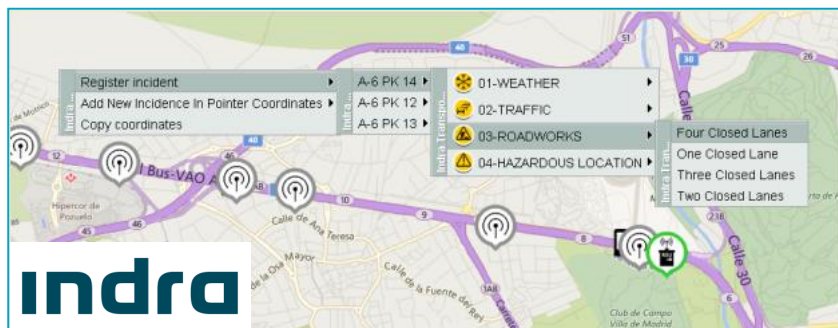 - **Standarised communication between C-ITS-RSUs**

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Contribution to/from the C-ROADS Spain
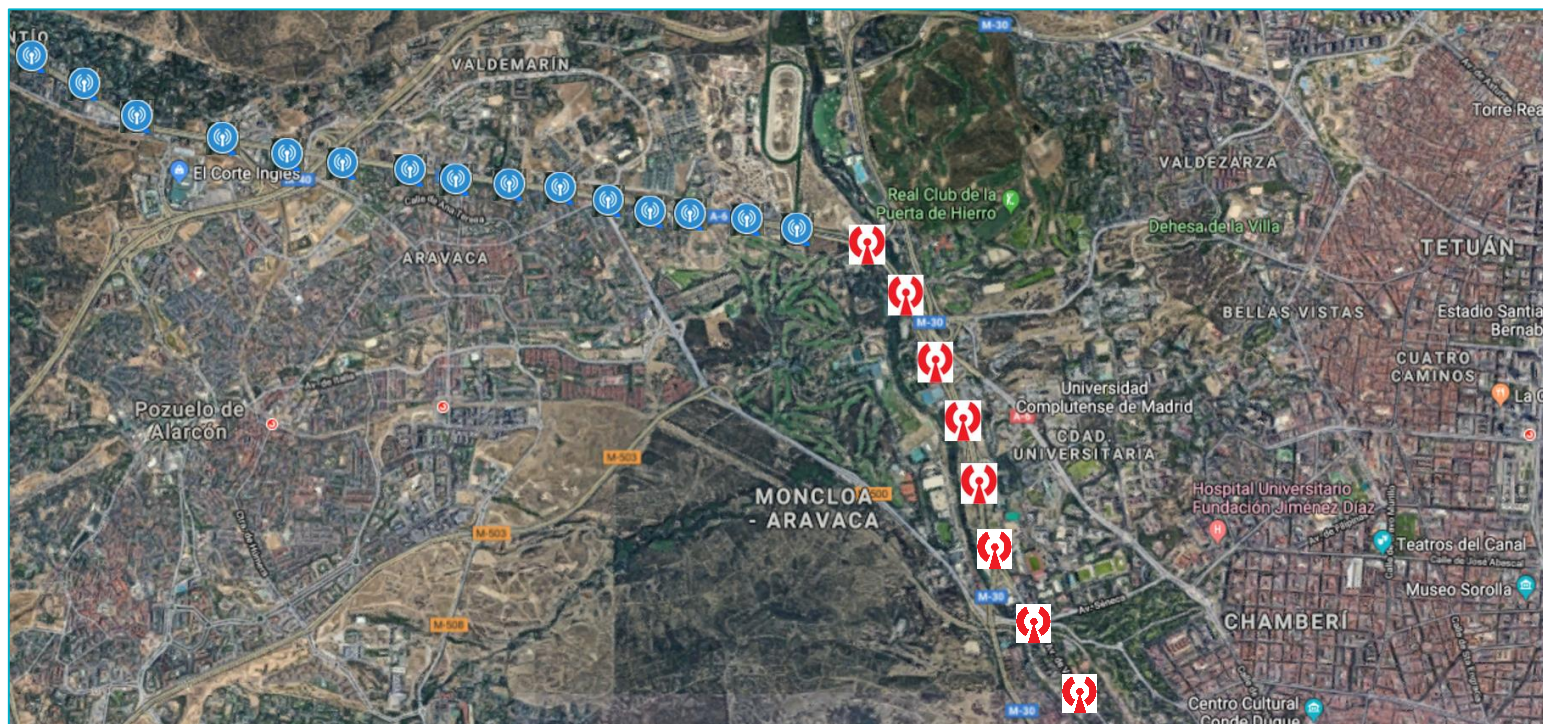
C-ROADS

Spain

🔵 **AUTOCITS deployment**

🔴 **C-ROADS Spain deployment**

AUTOCITS – C-ROADs Architecture
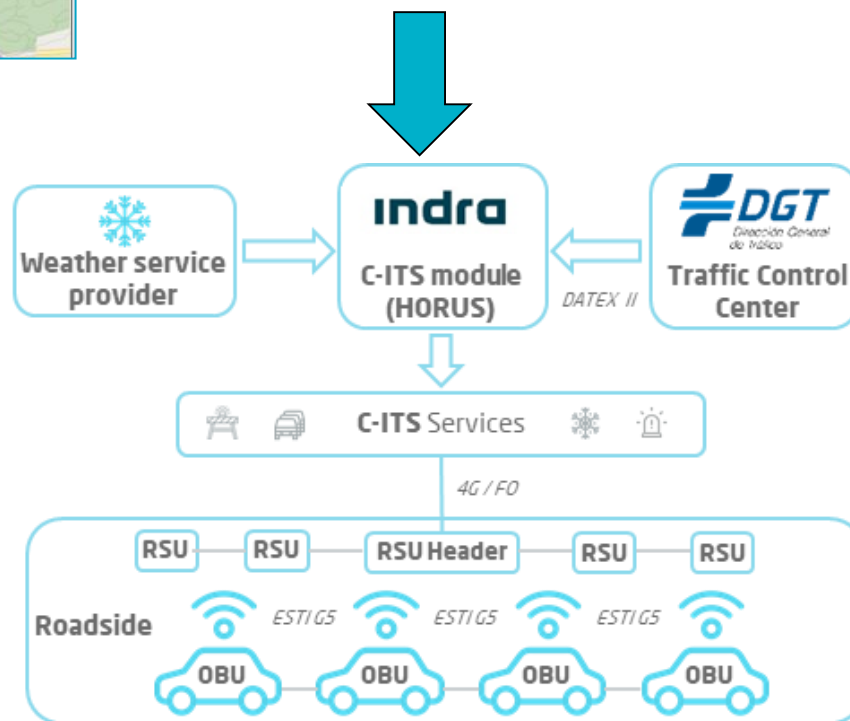
C-ITS

RSU

Autonmous Vehicle

Architecture

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Interoperability and Cross-border tests

Initial interoperability lab tests

Test Infrastructure:
- INSIA Lab Equipment
- V2X Equipment from 5 manufacturers involved in all pilots

Test Objective: Validating compatibility on:
- Frequency channel
- Physical level compatibility
- Sending/Reception of CAM/DEMN messages

Test Results:
- Total compatibility at physical level.
- Frequency channel stablished in 5.900 GHz.
- Stable geo-networking version 0.1.
- Success in interoperability. Sending & reception of CAM/DENM messages.

Initial cross-border tests:

Test infrastructure:
- Two connected vehicles
- V2X equipment from 3 manufacturers

Test Objectives:
- Ensure interoperability of one C-ITS Service (Traffic ahead warning)

Test Results:
- Timestamp origin of times is the same for all teams and are synchronized
- All fields of DEMN messages should be filled to be detected as DEMN
- MAC identification should be unique for each RSU
- Number of hops should be defined in order to forward of messages

Initial Conclusions:
- **Synchronization** of the time zone is needed
- The equipment must all work in the **same frequency**
- Same **versions of geonetworking** protocols must be implemented

Next Cross border tests
- **France– Spain:** March , 2019

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Workshops

1st AUTOCITS WORKSHOP
MADRID, Nov 23rd 2017

2nd AUTOCITS WORKSHOP
PARIS, May 10th 2017

3rd AUTOCITS WORKSHOP
Lisbon, October 10th 2017

1st INTERNATIONAL WORKSHOP
Cologne, 5th July 2017

4th AUTOCITS WORKSHOP
Madrid February 2018

2nd INTERNATIONAL WORKSHOP
Vienna, 17th April 2018

5th AUTOCITS WORKSHOP
PARIS, Dec 14th 2018

6th AUTOCITS WORKSHOP
Lisbon, February 2019

FINAL AUTOCITS WORKSHOP
Madrid, March 2018

Upcoming

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