CONVERGENZA DELLE TECNOLOGIE DEL MONDO FERROVIARIO CON QUELLO STRADALE
IL TRASPORTO ELETTRICO DELLE MERCI SU STRADA: LE «EHIGHWAY»

DEFINIZIONE TECNICA DI SMART ROAD, LA PIATTAFORMA EUROPEA C-ROADS ED I FINANZIAMENTI COMUNITARI

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Summary

• ITS/C-ITS and Smart road
• European Commission co-funding
• C-Roads Platform
• C-Roads Italy
• Conclusion
ITS

The Intelligent Transport Systems, are based on the interaction between information technology, telecommunications and multimedia. They can make transport safer, more efficient and more sustainable by applying various information and communication technologies to all modes of passenger and freight transport.
C-ITS

Cooperative-ITS (C-ITS), are systems that allow effective data exchange through wireless technologies so that vehicles can connect with each other, with the road infrastructure and with other road users. The actual deployment of (C-ITS), is paving the way for automation in the transport sector. This can notably improve road safety and reduce congestion.
Smart Road

To allow such interaction and information exchange, road infrastructure must be equipped with innovative technologies. This involves upgrading the infrastructure and simultaneously integrating V2I C-ITS services and V2V information with vehicle control strategies.

Therefore, the fundamental prerequisite is to make the infrastructure adequate and "intelligent" or "Smart road".
Smart Road

Over the last few years, the use of the term “smart” has become a widespread practice at all levels:

• technology tends to become “smart” in numerous areas
• now we use “smart” phones....etc

Roads must transform themselves in order to play a relevant role in this “revolution”: there cannot be a “smart city” without a “smart road” and together provide citizens with “smart mobility”.

This cooperative element – enabled by digital connectivity between vehicles and between vehicles and transport infrastructure – is expected to significantly improve road safety, traffic efficiency and comfort of driving, by helping the driver to take the right decisions and adapt to the traffic situation.
Smart Road
Co-financed by the Connecting Europe Facility of the European Union
European Commission co-funding

To modernise Europe's transport system, the European Commission is focused to improve the TEN-T network with the necessary technological components to support the deployment of interoperable systems and services and thereby ensure continuity between Member States and operators, with the aim of contributing to a sustainable transport system, in terms of economic, environmental and social impacts and, at the same time, improving road safety, increasing the efficiency of the use of infrastructure and traffic management, improving the interoperability of transport services both for passengers and for goods.

To ensure a coordinated and effective deployment of ITS within the Union as a whole actions must comply with applicable rules and EU legislation.
European Commission co-funding

To ensure a coordinated and effective deployment of ITS within the Union as a whole, actions must comply with applicable rules and EU legislation, in particular the:

European Commission co-funding

At the end of 2016, was finalized the “EU strategy for the coordinated deployment of C-ITS” in order to avoid a fragmented internal market in the field of C-ITS and create synergies between different initiatives.

The EU has already made over 130 Million EUR alone since 2014 through CEF and H2020 on the topic of cooperative, connected and automated vehicles
European Commission co-funding

**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

**C-ITS**
- C-Roads AT
- C-Roads FR
- C-Roads SI
- C-Roads SI 2
- C-Roads BE/Flanders
- C-Roads DE
- C-Roads IT
- C-Roads PT
- C-Roads CZ
- C-Roads HU
- C-Roads ES

**EU ITS Platform**
- I_HeERO
- eCall.at

**C-Roads Platform**

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
European Commission co-funding

Making implementation happen

Project lifecycle: Major tasks of INEA

Preparation and launch of the Calls for Proposals

Key feedback to the European Commission

Technical & financial follow-up of projects

Evaluation & Selection

Preparation of the grant agreements
European Commission co-funding

Last 2018 CEF Transport call

Reference documents

- 2018 MAP Work Programme
- CEF Regulation & TEN-T Guidelines
- Call text
- Application forms (Parts A, B, C and D)
- Guide for Applicants
- Application checklist & CBA checklist
- FAQs published on the call page
- Model grant agreement
- Cohesion Policy CBA methodology & CBA cash flow template
European Commission co-funding

The 2018 CEF Transport call

Content of the call text

- Priority Description
- Budget
- Timetable
- Admissibility and eligibility criteria
- Exclusion, selection and award criteria
- Procedure for submission and evaluation of proposals
- Legal and financial provisions
- Information for Applicants
European Commission co-funding

The 2018 CEF Transport call

- Proposals for **studies, works and mixed proposals are eligible** under the call
- Maximum co-funding rates (% of eligible costs):
  - Studies: 50%
  - Works/Telematic applications: from 20% to 50%
- The minimum size of the Action is not an eligibility requirement (but no less than €500,000 requested funding for studies and €1 million for works is strongly encouraged)
- **Start of eligibility of costs:** as from the date of submission of the application
- **End date of the Action:** no later than 31 December 2023
European Commission co-funding

The **2018 CEF Transport call**

<table>
<thead>
<tr>
<th>Indicative call timeline</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call opening</td>
<td>17 May 2018</td>
</tr>
<tr>
<td>Deadline for submission</td>
<td><strong>CLOSED: 24 October 2018</strong> (17:00:00 Brussels time)</td>
</tr>
<tr>
<td>Evaluation of proposals</td>
<td>November 2018 - March 2019</td>
</tr>
<tr>
<td>Consultation of the CEF Coordination Committee / Information to the European Parliament</td>
<td>March 2019</td>
</tr>
<tr>
<td>Adoption of the Selection Decision</td>
<td>April 2019</td>
</tr>
<tr>
<td>Preparation and signature of individual grant agreements</td>
<td>As of April 2019</td>
</tr>
</tbody>
</table>
### European Commission co-funding

The 2018 CEF Transport call

<table>
<thead>
<tr>
<th>Priority</th>
<th>Number of proposals</th>
<th>Requested funding, €</th>
<th>Available funding, €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail interoperability</td>
<td>14</td>
<td>86.7 million</td>
<td>100 million</td>
</tr>
<tr>
<td>European Rail Traffic Management Systems (ERTMS)</td>
<td>6</td>
<td>93.3 million</td>
<td></td>
</tr>
<tr>
<td>Safe and secure infrastructure</td>
<td>23</td>
<td>158.5 million</td>
<td>200 million</td>
</tr>
<tr>
<td>Innovation and new technologies</td>
<td>44</td>
<td>202.5 million</td>
<td></td>
</tr>
<tr>
<td>Intelligent Transport Services for road (ITS)</td>
<td>23</td>
<td>192.5 million</td>
<td>150 million</td>
</tr>
<tr>
<td>River Information Services (RIS)</td>
<td>2</td>
<td>2.3 million</td>
<td></td>
</tr>
<tr>
<td>Multimodal logistics platforms</td>
<td>36</td>
<td>192.8 million</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>148</strong></td>
<td><strong>928.6 million</strong></td>
<td><strong>450 million</strong></td>
</tr>
</tbody>
</table>
The C-ROADS PLATFORM

Started in 2016, The C-Roads Platform is a joint initiative of European Member States (16MS) and road operators which are in the phase of installing C-ITS for the testing and later operation of “C-ITS Day-1 services”.

Pilot installations will be harmonised, in light of cross-border interoperability based on cooperation within the C-Roads Platform.
The C-ROADS PLATFORM

Key elements are the joint development of technical specifications which are to provide the basis for all pilot deployments, as well as commonly prepared cross-site tests to demonstrate interoperability of the deployed C-ITS services.

All developed specifications will be publicly available and form the basis for pilot installations on the road network.
C-ROADS ITALY
Action N. 2016-IT-TM-0052-S

DURATION EXPECTED
08.02.2017 31.12.2020

BENEFICIARY
Ministero delle Infrastrutture e dei Trasporti
Direzione Generale per lo sviluppo del territorio, la programmazione e i progetti internazionali
Divisione IV- Sviluppo della rete di trasporto transeuropea e dei corridoi multimodali
IMPLEMENTING BODIES

Under the coordination of the Ministero della Infrastrutture e dei Trasporti (MIT) the “Implementing bodies” are the following:

- **ROAD OPERATORS**
  - Autostrada del Brennero SpA
  - Brennerautobahn AG
  - Autovie Venete

- **SERVICE PROVIDERS**
  - TIM
  - Azcom

- **VEHICLE OEMs**
  - IVECO
  - FCA

- **LOGISTIC OPERATOR**
  - CODOGNOTTO

- **TRAFFIC POLICE**
  - Polizia Stradale

- **EVALUATION & ASSESSMENT**
  - Politecnico di Milano

- **Project Management**
  - North Italy Communications S.r.l.
LOCATION OF THE ACTION

Total 347Km

3 Italian motorway operator
- Brenner Motorway (A22 - 313 km)
- Autovie Venete Motorway (A4 - 19km and A28 - 5km)
- CAV motorway (A57 - 10km)
Scope and Objectives

C-ROADS Italy planned to pilot a set of "Day1" C-ITS services as recommended by the European Commission C-ITS Platform.

That implies the infrastructure upgrade and the integration of the C-ITS service in the control logic architecture of the vehicles.

This through the implementation and test, in real traffic conditions, of a complete cooperative system based on V2X technologies, for the following automated driving applications:

• Trucks - Platooning;
• Passenger cars - Highway Chauffeur;
• Combined scenarios of trucks and passenger cars.
• Interaction with road infrastructure

During the pilot phase, the cooperation among vehicles and infrastructure will be tested, collecting all useful data and information about the system management and its results.
Scope and Objectives

The expected impact to be demonstrated are mostly on mobility, considered in terms of:

1. **Safety** – to demonstrate the reduction of risk related to cooperative/automated technology in truck and passenger cars scenarios, and also in combined scenarios

2. **Traffic fluidity** – to show the potential for efficient use of the infrastructure with Platooning technology and Highway Chauffeur technology

3. **Energy efficiency** – to measure in real life conditions the potential for fuel consumption and related emission reduction.

The Italian implementing bodies (Road concessionaires, OEMs, telecom operator, research centre, etc...) will invest in their infrastructure and the industry will use that pilot test infrastructure to test components and services.
Interaction with the C-ROADS PLATFORM

All Italian Implementing Bodies, according to their technical expertise, are involved in the different Working Groups and Task Forces established by the C-ROADS PLATFORM; reporting about the status of national pilots, contributing to the harmonization of the different technical issues that will be discussed within the C-ROADS PLATFORM.

The results and lessons learned from C-ROADS ITALY will be fully shared across Europe through the cooperation in the C-ROADS PLATFORM.

C-ROADS ITALY has assumed the role of:

- **Leader** (Politecnico di Milano) of the **Working Group 3 Evaluation and assessment**.
C-ROADS ITALY - OVERVIEW PROJECT STRUCTURE

The C-ROADS ITALY Activity 1 structure has been organized in order to provide contribution in each of the WGs and TFs of the C-ROADS PLATFORM.
Services and technologies covered by the Pilot

**Day - 1 Services**

<table>
<thead>
<tr>
<th>Service</th>
<th>Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency electronic brake light</td>
<td>X</td>
</tr>
<tr>
<td>Slow or stationary vehicle(s)</td>
<td>X</td>
</tr>
<tr>
<td>Traffic jam ahead warning</td>
<td>X</td>
</tr>
<tr>
<td>Road works warning</td>
<td>X</td>
</tr>
<tr>
<td>Weather conditions</td>
<td>X</td>
</tr>
<tr>
<td>In-vehicle signage</td>
<td>X</td>
</tr>
<tr>
<td>In-vehicle speed limits</td>
<td>X</td>
</tr>
<tr>
<td>Probe vehicle data</td>
<td>X</td>
</tr>
</tbody>
</table>

**Communication technologies**

- ETSI G5: X
- Cellular Communication: X

**HIGHWAY CHAUFFEUR TRUCK PLATOONING**

**RWW:** Road Works Warning

**IVS:** In Vehicle Signage

**OHLN:** Other Hazardous Locations Notification - Slow or stationary vehicle; Emergency brake light; Weather conditions; Traffic Jam Ahead Warning
C-Roads Italy: Hybrid communication scheme
C-ITS messages chain

ITS-G5 chain
- Event detected
- Info sent to the TCC with: RSU, Vehicles OBU, Road sensors
- Event info elaboration and encryption
- Info sent to RSU through fiber link
- Message encapsulation according to ETSI ITS-G5 standard
- DENM broadcasted
- Info sent to RSU through fiber link
- Road Side Unit
- Vehicle
- According to the message type, it is sent to:
  - HMI (warning message visualised)
  - Actuators (vehicle dynamic modified)

4G-Cloud chain
- Event detected
- Info sent to the TCC with: RSU, Vehicles OBU, Road sensors
- Event info elaboration and encryption
- Message encapsulation according to ITS-G5 standards
- Info sent to the Cloud
- DENM stored and available
- Validity check with a vehicle request
- Message downloaded from the cloud
- Message decryption
- Security check
- V2X On Board Unit with 4G connection
- According to the message type, it is sent to:
  - HMI (warning message visualised)
  - Actuators (vehicle dynamic modified)
- Vehicle
- Cloud
- Traffic Control Center
- Event
- C-ITS
- Road Side Unit
- Vehicle
- C-ITS
- Traffic Control Center
- Event
- C-ITS
- Traffic Control Center
- Event
Supervised automated and cooperative driving functionality intended for passenger cars in motorways or motorway-like roads with velocities up to 130 km/h.

The goal is to demonstrate the benefits of V2X hybrid communication (ITS G5 and LTE) to Highway Chauffeur Operational Design Domain.
Truck Platooning

Platooning

- Platooning concept: 2 or more trucks travelling with reduced gap at cruising speed taking advantage of drag reduction and reducing road impact
- 1st vehicle is leading, the remaining are following using Vehicle To Vehicle (V2V) communication information and on-board sensors (ACC radar/camera)
- Basic configuration is 2 vehicle with longitudinal control only (Level 1 automation). The driver is in control of the lateral maneuvering

Goal

Demonstrate the enhancement of Platooning via V2X, ITS, G5 and LTE, enabling data exchange and negotiations among involved vehicles
Work overview: Road Operators

The main objective of the road operators is to provide the required infrastructure for the appropriate testing of the Activity 2 and 3. To do so, the software and hardware of the existing V2X test sites will be upgraded according to the ETSI standards.

In addition, new RSUs will be installed to increase the coverage of C-ITS services along the highways involved.

A dedicated SW development will be carried on to implement the C-ITS messages codification standard.

TCC will be also upgraded in order to permit its communication with Cloud infrastructure.
Another important pilot test is the “Cross border” test with Austria, valid for both Platooning and Highway Chauffeur vehicles.

The aim is to receive the “Day 1” services as in Italy, with no differences for the driver in terms of HMI notifications and vehicle behavior.

The cloud/RSU will recognize the position of the vehicle (or the network operator) and will start to share local event information.

This test could be executed:
- On ITS-G5 connection only
- Through 4G LTE connection, in order to prove also the Cloud interoperability
- Both
Last October 23, a new project proposal named “C-Roads Italy 2”, has been formally submitted to the European Commission answering the 2018 CEF Transport Call.

The main goal of the C-ROADS ITALY 2 action is to study and pilot, principally in real urban traffic conditions (Torino, Verona and Trento Municipality are involved), a set of “Day1” and “Day1,5” C-ITS services as recommended by the EC C-ITS Platform.

The project is now under the evaluation procedure of the European Commission. Results about the evaluation will be available around March 2019.
THANK YOU!

For any additional questions please contact:
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