SAFESPOT European Integrated Project

COOPERATIVE SYSTEMS FOR ROAD SAFETY “SMART VEHICLES ON SMART ROADS”

L. Andreone, R. Brignolo
Centro Ricerche FIAT

CAR 2 CAR FORUM 2008
the European Approach
luisa.andreone@crf.it
Background on cooperative systems for a safe and efficient mobility

... Need to increase robustness and reliability of information to produce a breakthrough in road safety and traffic efficiency.

years 2002 - 2004

● The Car2Car Communication Consortium was created to promote the allocation of a dedicated frequency band for inter-vehicle communication.

● EUCAR, the European Council for Automotive R&D settled the Integrated Safety Program Board to guarantee efficient and complementary research activities aligned with the societal and industrial needs and challenges.

● The European Commission Information Society and Media opened the call for proposal FP6-ICT-Call4 on cooperative systems.

year 2006

● The SAFESPOT Integrated Projects started in parallel to the CVIS and COOPERS Integrated Projects.
The SAFESPOT European Integrated Project

Cooperative Systems for road safety
“Smart vehicles on smart roads”

Based on vehicle to vehicle and vehicle to infrastructure communication to increase road safety. The:

“SAFETY MARGIN ASSISTANT”

detects in advance potentially dangerous situations and extend, in space and time, drivers’ awareness of the surroundings.

Co-funded by the European Commission Information Society and Media in the 6th FP
Supported by EUCAR

Consortium
52 partners from 12 European countries
• OEMs (cars, trucks, motorcycles)
• ROAD OPERATORS
• SUPPLIERS
• RESEARCH INSTITUTES
• UNIVERSITIES


IP coordinator: Roberto Brignolo C.R.F.
The SAFESPOT Integrated Project Organisation

<table>
<thead>
<tr>
<th>TECHNOLOGIES and PLATFORMS</th>
<th>IN VEHICLE SENSING &amp; PLATFORM BOSCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INFRASTRUCTURE SENSING &amp; PLATFORM MIZAR</td>
</tr>
<tr>
<td></td>
<td>INNOVATIVE TECHNOLOGIES DAIMLER</td>
</tr>
<tr>
<td>APPLICATIONS</td>
<td>VEHICLES BASED APPLICATION CRF</td>
</tr>
<tr>
<td></td>
<td>INFRASTRUCTURE BASED APPLICATION COFIROUTE</td>
</tr>
<tr>
<td>TRANSVERSAL ACTIVITIES</td>
<td>DEPLOYMENT, LEGAL ASPECT, BUSINESS MODEL TNO</td>
</tr>
<tr>
<td></td>
<td>CORE ARCHITECTURE RENAULT</td>
</tr>
<tr>
<td></td>
<td>IP MANAGEMENT CRF</td>
</tr>
</tbody>
</table>
The SAFESPOT Integrated Project Concept

...from autonomous intelligent vehicles to cooperative systems
The SAFESPOT Integrated Project Planning

TEST SITES: Italy, France, Germany, Spain, Sweden, the Netherlands,

Design of a common European architecture for vehicle to vehicle and to infrastructure communication for traffic safety and efficiency (led by COMeSafety in cooperation with CVIS, COOPERS, etc.)
The SAFESPOT Integrated Project Enabling technologies: Vehicle ad hoc Dynamic Network

**AD-HOC DYNAMIC COMMUNICATION NETWORK**

The selected communication channel should enable the cooperation among the vehicles and the road infrastructure. Major requirements:

- Reliability, security, low cost
- Need for a dedicated frequency band to avoid interference with existing consumer links
- Routing protocols with multihop forwarding and geo-cast functionalities
- Geographical addressing
- Accessibility with highest priority to exchange time critical safety messages

The selected radio technology is IEEE 802.11p.

SAFESPOT generated a complete set of messages as an extension of existing C2C messages. This set is offered as contribution to C2C and ETSI standardization processes.
The SAFESPOT Integrated Project Enabling Technologies: Relative Positioning

RELATIVE REAL-TIME RELATIVE POSITIONING

- GNSS-based positioning (GPS)
- Communication-based positioning (WLAN)
- Image-based positioning (landmarks recognition)
The SAFESPOT Integrated Project Enabling Technologies: Local Dynamic Maps

Real time representation of vehicle’s surroundings with all static and dynamic safety relevant elements.
The SAFESPOT platforms (vehicle and infrastructure)

The node’s platforms generate, store and exchange information about safety critical events.

The SAFESPOT platforms (vehicle and infrastructure)
The SAFESPOT in Vehicle Architecture

- **PLATFORM DOMAIN**
  - Specific Sensors (radars, laser-scanners, cameras, GPS, ...)
  - HMI Devices (voice, display, acoustic warnings)
  - External applications

- **APPLICATIONS DOMAIN**
  - Safety Margin Assistant
  - Appl. 1
  - Appl. N

- **Data Fusion**
- **Ego Positioning**
- **Local Dynamic map**
- **Message transmission rules defined by the applications**
- **Gateway**
  - to vehicle (CAN buses) or to infrastructure network
- **VANET**
  - (ad hoc network)
The SAFESPOT Integrated Project Applications (examples)

Head on Collision Warning

Frontal Collision Warning

Rear End Collision Warning

Speed alert
The SAFESPOT Integrated Project Test Sites Location

Dorthmund
Goteborg
Helmond
Dortmund
Paris
Turin
Valladolid
The SAFESPOT Integrated Project Perspectives: activities towards future deployment of project outcomes

- Definition of sustainable business and service models for all stakeholders involved in the future deployment of SAFESPOT functions including public authorities
- Identification of major enabling and disabling factors for future deployment
- Cost benefit analysis of SAFESPOT functions
- Estimation of the impact of SAFESPOT functions on traffic safety
CONCLUSIONS

Towards a common architecture for cooperative systems:

SAFESPOT implements a local high speed ad hoc network, as defined by C2C-CC based on the IEEE.802.11p protocol.

SAFESPOT is in the task force led by COMeSafety in cooperation with CVIS, SEVCOM and COOPERS projects to design a “Common “European ITS Communication Architecture”.
REFERENCES

Luisa Andreone
C2C Steering Committee Member
luisa.andreone@crf.it

Roberto Brignolo
SAFESPOt Project Coordinator
roberto.brignolo@crf.it

Centro Ricerche Fiat
Business Line “Infomobility”
(Italy)

www.safespot-eu.org