

The Reality of Intelligent Transport Systems on the APCAP network and Its Challenges

Abstract

Reduction of accidents (Security), reduction of traffic congestion (Mobility) and reduction of CO2 emissions (Sustainability) have been considered important objectives to be achieved by the members of the APCAP network. In this sense, the implementations of services and intelligent transport systems have played a key role. This work describes the reality of ITS on the APCAP network, the participation of the APCAP members on the Easyway Program and Future Challenges.

1. Introduction

The APCAP association (Association of Portuguese Concession Companies of Toll Motorways and Bridges) is composed by the following members: Auto-Estradas do Atlântico (AEA), Auto-Estradas do Douro Litoral (AEDL), Ascendi Grande Lisboa, Ascendi Norte, Brisa, Brisal e Lusoponte. Currently, the APCAP network has an extension of about 1.773 km.

This association has a permanent technical committee dedicated to monitoring and to participation on Road Telematics activities at National and European level.

In this sense, the Intelligent Transport Services (ITS) have a key role to achieve the following objectives:

- Security: Improve road security by reducing accidents.
- Mobility: Improve the efficiency of road by reducing traffic congestion and improve energy efficiency.
- Sustainability: Mitigation of environmental impacts by reducing CO2 emissions.

This document is intended to illustrate the reality of ITS on the APCAP network and to identify future challenges taking into account the European Union legislation and policies for this sector.

2. The Reality of ITS on the APCAP network

The associated companies of APCAP possess a set of technical solutions regarding communications and telematics.

The table below shows the infrastructure currently installed on motorways and bridges of APCAP:

Table 1. APCAP Devices 2012

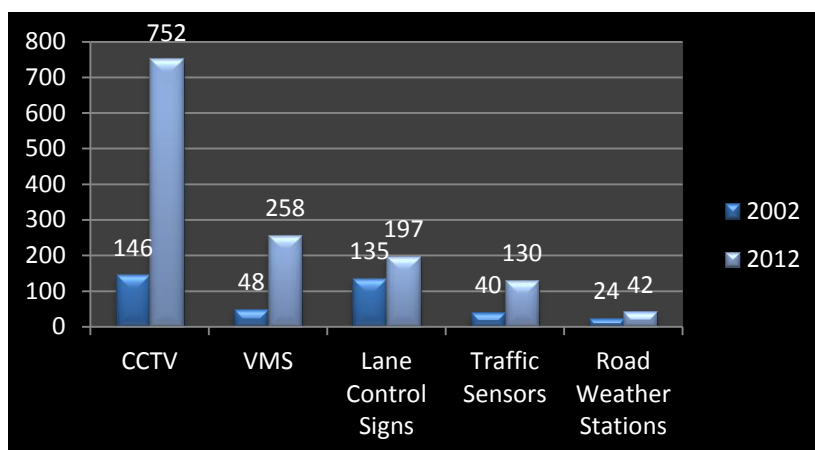
Devices (2012)	AEA	AEDL	Ascendi GL	Ascendi Norte	Brisa	Brisal	Lusoponte	TOTAL
CCTV	25	51	35	22	496	13	110	752
VMS	12	26	10	4	196	8	2	258
Lane Control Signs	24	48	2	0	24	0	99	197
Traffic Sensors	13	38	16	0	46	11	6	130
Road Weather Stations	3	3	1	2	23	6	4	42
Radio Private Network	0	0	1	1	1	1	1	5
Automatic Incident Detection	0	0	9	0	0	0	1	10
SOS	188	116	24	168	1148	90	72	1.806
Traffic Control Center	1	1	1	1	1	1	2	8
Kms	170	129	91	173,5	1092,9	92,7	24	1.773,1

Making a comparison between 2002 and 2012, there is a significant increase of the number of devices installed as shown in the following tables:

Table 2. APCAP Devices 2002

Devices (2002)	AEA	AEDL	Ascendi GL	Ascendi Norte	Brisa	Brisal	Lusoponte	TOTAL
CCTV	9	0	0	0	42	0	95	146
VMS	5	0	0	0	41	0	2	48
Lane Control signs	24	0	0	0	12	0	99	135
Traffic Sensors	13	0	0	0	21	0	6	40
Road Weather Stations	3	0	0	0	17	0	4	24
Radio Private Network	0	0	0	1	1	0	1	3
Automatic Incident Detection	0	0	0	0	0	0	1	1
SOS	182	0	0	168	1040	0	72	1.462
Traffic Control Center	1	0	0	1	1	0	2	5
Kms	170	0	0	173,5	974	0	24	1.341,5

Table 3. Comparison chart 2002/2012



These values are justified by the strong investment made by companies over the last decade. More than 65 million Euros have been invested in this period, demonstrating the concern of APCAP members to achieve the objectives mentioned above.



Fig.1. Traffic Control Center



Fig.2. VMS



Fig.3. CCTV

All these devices have a key role regarding Traveller Information Services contributing for traffic safety improvement, greater efficiency and CO2 emission reduction.

Some Information Services used on APCAP network are presented below:

- Forecast and Real Time event Information
- Traffic Conditions Information (Predictive and Real Time)
- Speed Limit Information
- Travel Time Information
- Weather Information

All companies have at least one Traffic Control Center where the traffic management is performed.

We highlight the following Traffic Management Services applied on the APCAP network:

- **Dynamic Lane Management:** Enables a temporally modifiable allocation of lanes by means of traffic guidance panels, permanent light signals, multiple-faced signs, LED road markers, closing and directing installations, etc.
- **Variable Speed Limits:** Use variable speed signs, mandatory or advisory, as means to help drivers to travel at an appropriate speed considering the prevailing traffic or weather conditions, in some cases supported by Speed Enforcement (SE), in most cases using cameras to identify speeding vehicles and/or drivers.
- **Incident Warning and Management:** Implements a systematic, planned and coordinated set of responsive actions and resources, to prevent accidents in potentially dangerous situations and to handle incidents safely and quickly. It proceeds through a cycle of several phases: from incident detection to restoration of normal traffic conditions, including the use of immediate and advance notice of possible dangers or problems, i.e. warnings, in order to prevent accidents.

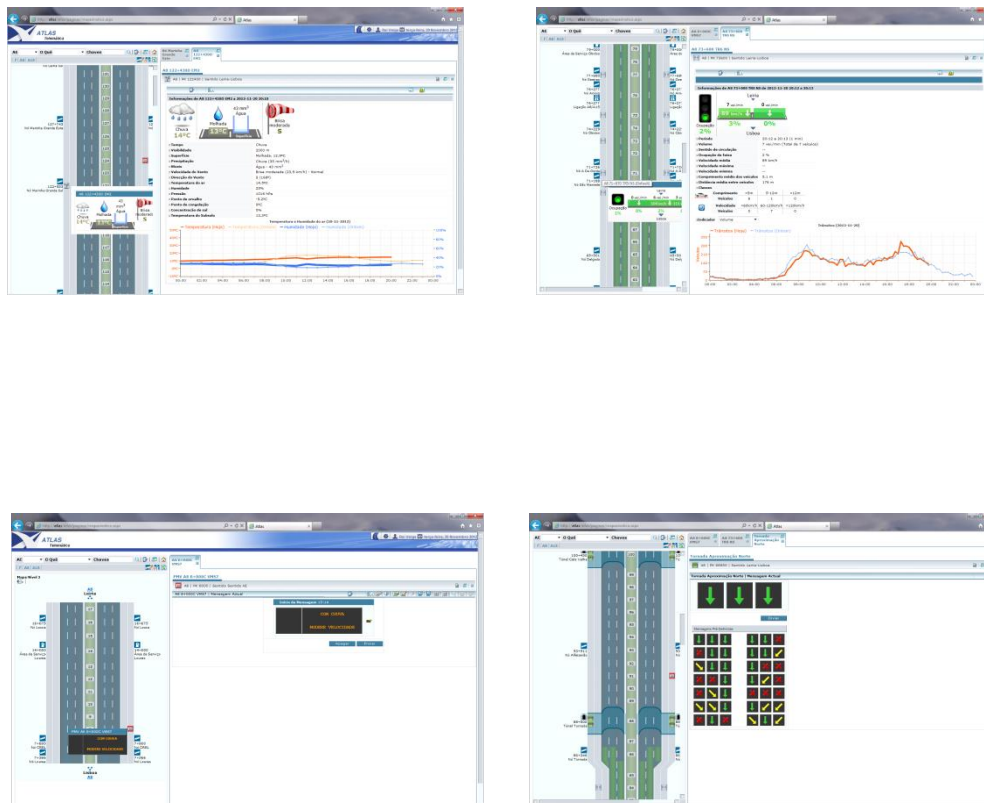


Fig.4. Traffic Management Services examples.

3. The participation of the APCAP members on the Easyway Program

The Easyway is a program to implement harmonized systems and Intelligent Transport Services (ITS) in the Trans-European Road Network. This program is in line with directive ITS recently published by the European Commission (EC).

The main objectives of Easyway program are:

- Traffic safety improvement: Decrease traffic accidents 25% until 2020.
- Traffic reduction of congestions: Decrease traffic congestion 25% until 2020.
- Better environment: Decrease CO2 emission 10% until 2020.

In the last years, APCAP members have undertaken projects to achieve the above objectives, deploying ITS services in the fields of Traffic Management and Travel Information.

We highlight on this program the following activities undertaken by APCAP members:

- Participation on *Marenostrum* project – VMS Harmonisation.
- Deployment of DATEX to interconnect Traffic Control Centers (TCC) for exchange information.

4. Futures Challenges

The following points represent, in our opinion, the most important challenges that will allow us to continue to achieve the proposed objectives:

- **The interoperability between the several entities of the road sector:** It is essential that all entities involved share information in order to contribute to an articulated management of incidents, and to allow the user to make decisions in real time, in order to have safer, more coordinated and efficient journeys. Currently, although some concessionaires already have implemented DATEX protocol as previously mentioned, there is no information exchange on the APCAP network using this protocol. As such, this point is identified as a future challenge.
- **Cooperative Systems** – Communications between infrastructure and vehicles: Over the past 10 years, as already emphasized in this paper, there was a significant increase in the number of devices installed in the infrastructure of APCAP members. Therefore, the implementation of communication systems between infrastructure and vehicles is increasingly justifiable. Cooperative Systems will surely have a key role in obtaining even more satisfactory results on security, mobility and sustainability. In this area, we highlight the creation of the Amsterdam Group.

Amsterdam Group

The Amsterdam Group is a voluntary cooperation Platform composed by the following entities: ASECAP, CEDR, POLIS and CAR-2-CAR Communication Consortium. The main objectives of this group are:

- Support the implementation of intelligent transport cooperative systems, in order to make journeys safer and more efficient in European roads.
- Facilitate and support implementation systems activities in Europe.
- Promote cooperation between authorities, operators, automobile industry and the European Commission. This cooperation will be supported by all brands of vehicles, all vehicle classes and all kind of roads (highways, rural and urban areas).

To this end, the group is working on the definition of priorities to be implemented on most European regions from 2015. The group's view is to perform these implementations by steps.

5. Conclusions

Intelligent Transport Systems are an important tool in the search for customer satisfaction and efficient use of existing infrastructure to make transport more efficient, safer and greener, thus contributing to the development of a sustainable mobility for citizens and the economy.

As such, APCAP members will continue to contribute to the achievement of increasingly satisfactory results, regarding to the reduction of accidents, traffic congestion and CO2 emissions.

6. Thanks

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7. References

- www.amsterdamgroup.eu
- www.easyway-its.eu/