

Directive 2010/40/EU Progress Report 2017 *Spain*

August 2017



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ACRONYMS

AEMET	Agencia Estatal de Meteorología - Spanish Meteorological Agency	DSRC	Dedicated Short Range Communications
ANFAC	National Association of Manufacturers of Automobiles and Trucks	DT	Departamento de Tráfico y Seguridad del País Vasco - Traffic and Security Department of the Basque Country
APP	Application	DVIT	Digital Vision Touch
ATM	Autoridades de Transporte Metropolitano - Metropolitan Transport Authorities	EATA	European Automotive Telecom Alliance
CAM	Content Aggregation Model	EC	European Commission
CCTV	Closed Circuit Television	ESP	Programa Electrónico de Estabilidad - Elektronisches Stabilitäts-Programm
CEDR	Conference of European Directors of Road	ESS	Exploitation Support Systems
C-ITS	Cooperative Intelligent Transport Systems	ETC	Electronic Toll Collection
CONCORDA	Connected Corridors Driving Automation	EU	European Union
CTAG	Centro Tecnológico de Automoción de Galicia - Technological Automotive Centre of Galicia	EU EIP	EU European ITS Platform
DGC	Dirección General de Carreteras - General Directorate of Roads	GPS	Global Positioning System
DGT	Dirección General de Tráfico - General Directorate of Traffic	HGV	Heavy Goods Vehicles
DGTT	Dirección General de Transporte Terrestre - General Directorate of Land Transport	HMI	Human Machine Interface
		IOS	iPhone Operative System
		IoT	Internet of Things
		IP	Information Point
		ITS	Intelligent Transport Systems
		LDM	Local Dynamic Map

LEZ	Low Emission Zone	PSAPs	Public Safety Answering Points
LINCE	Localizador de Incidencias en las Carreteras de España - Events Locator on Spanish Roads	RA	Rest Area
LOPD	Ley Orgánica de Protección de Datos - Spanish Law on Personal Data Protection	RACC	Royal Automobile Club of Catalonia
LOS	Levels Of Service	RDS	Radio Data System
LPR	License Plate Recognition	RIMP	Red de Itinerarios para Mercancías Peligrosas - Itineraries Network for Dangerous Goods
LTE	Long Term Evolution	RNE	Radio Nacional de España
MAC	Código de Autenticación de Mensaje - Message Authentication Code	RSTI	Road Safety Traffic Information
MMTIS	Multi Modal Travel Information Services	RTTIS	Real Time Traffic Information Services
MNO	Mobile Network Operators	SAE	Sistema de Ayuda a la Explotación
NAP	National Access Point	SCT	Servei Català de Trànsit
NFC	Near Field Communication	SIF	Sistema de Información de Frontera - Borderline Information System
NNTT	Nuevas Tecnologías - New Technologies	SIM	Subscriber Identity Module
OPE	Operación Paso del Estrecho - Paso del Estrecho Special Operation	SIRDE	Sistema de Información para Registro de Datos de Expediciones - Management Information System for Recording Data of Dispatches
PITVI	Plan de Infraestructuras, Transporte y Vivienda 2012 - 2024 - Infrastructure, Transport and dwelling national plan 2012 - 2024	SISCOGA	Sistemas Cooperativos Galicia - Cooperative Systems Galicia
PNE	Propuesta de Norma Española	SMS	Short Message Service

TCA Tramos de Concentración de Accidentes - Accident Concentration Sections

TEN-T Trans-European Transport Network

TES Tarjeta Española sin Contacto - Spanish Contactless Card

TESC Comité de la Tarjeta Española sin Contacto - Spanish Contactless Card Comitee

TMC Traffic Management Centre

TRAZA Tramitación de Autorizaciones - Processed Authorizations

UC Use Cases

V2C Voice to Control

V2V Vehicle to Vehicle

VAO Vehículo de Alta Ocupación - High Occupancy Vehicle

VEOS Visualizador Geolocalizado de Sucesos - Events Geolocated Display

VMS Variable Message Signs

WRD Winter Road Dashboard

o

1 Introduction

This document covers the National Progress Report of the Intelligent Transport Systems (ITS) Deployment in Spain according to the European Directive 2010/40/EU¹.

Having regard to the Directive 2010/40/UE, and in particular article 17(3), each Member State has to report every three (3) years and following the initial report structure, the progress made in the deployment of the actions referred to in Article 17(1) (priority actions).

According to Royal Decree 662/2012², and in compliance with ITS Directive, it is established that the General Directorate of Traffic (DGT) will inform the European Commission about the undergone progress in ITS activities and projects related to the Priority Actions.

In August 2011, Spain reported on the state of progress made on implementing technological applications for traffic and transport. In August 2012 also Spain reported to

the Commission on the national ambitions, plans and projects for ITS over the coming five years. Following to these reports in 2014, Spain issued its first every three year report. Now, in August 2017 this second report shows the progress made during the last 3 years.

This document has the aim to gather and organize the existent information regarding the progress in Spain ITS context in a comprehensive and extensive way.



¹ DIRECTIVE 2010/40/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport

² Royal Decree 662/2012 of April 13th, establishing the framework for deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transportation

1.1 Document structure

Following the guidelines with regard to the form of this reporting provided by the European Commission Services, the document is structured in three main sections as shown on the following scheme:

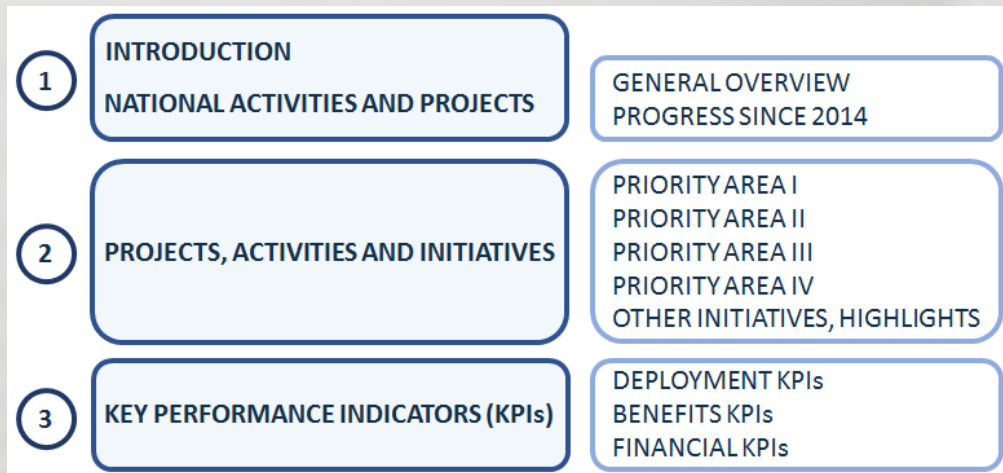


Figure 1 Document structure

The first part consists of a brief introduction of the main national activities and projects in which Spain is involved and their progress since 2014.

Once these projects and activities have been introduced, they are classified in accordance with Annex I: Priority Areas and Actions of Directive 2010/40/EU, and described a bit more deeply on the second block.

The third part of the document focuses on the calculation of KPIs relating to ITS, explaining the methodology and results obtained for each classification of road network in Spain.

1.2 General overview of the national activities and projects

In Spain, it has been remarkable during decades the deployment of systems, applications and services that accompany citizens and professionals in their movements with clear objectives: provide safety, lessen delays increasing the accuracy in travel time predictions; and improve the quality of road transport as well as the comfort for the users.

Important numbers reflect the magnitude of services provided by applications and systems; for example, in 2016, 392 million long distance travels were monitored in

12.196 km of Spanish road network; 1.247.260 messages were displayed in variable message signs; the information web portal received more than 710 million of visits and the traffic information number handled more than 300.000 calls.

In the last 3 years, different trends that impact on daily displacements of citizens and freight transport have been visible. The digitization and irruption of new technologies (IoT, automatization, big data, etc), the increasing number of connected people as a result of the smartphones development and vehicle connectivity, and the improvement of mobile communications (3G, 4G, LTV-E, future 5G), are modulating and participating in activity and focus redesign, among which can be highlighted the deployment of the priority actions set out in the ITS Directive.

This report aims to be the reflection of the initiatives promoted by Public Administrations in a national, regional and local level; private sector players are also working independently or in partnership with public bodies on the development of ITS in Spain.

The information collected in this report strengthens the contributions to the inquiry formulated to participating entities in Working Group 56 of Traffic, Road Safety and Sustainable Mobility Council.

All the initiatives and projects included in this report are developed under the vision, scope and activities of national, regional and local strategies or plans, highlighting:

- Spanish Road Safety Strategy 2011-2020 (Ministry of the Interior - DGT)
- Infrastructure, Transport and Housing Plan 2012 - 2024 (Ministry of Public Works and Transport)
- National Plan for Air Quality and Protection of the Atmosphere 2013–2016 (Ministry of Agriculture, Food and Environment)



A complete list of reference documents is included on section 4 “References”.

The following table shows the main reference projects which have consolidated the National Progress Report activities:

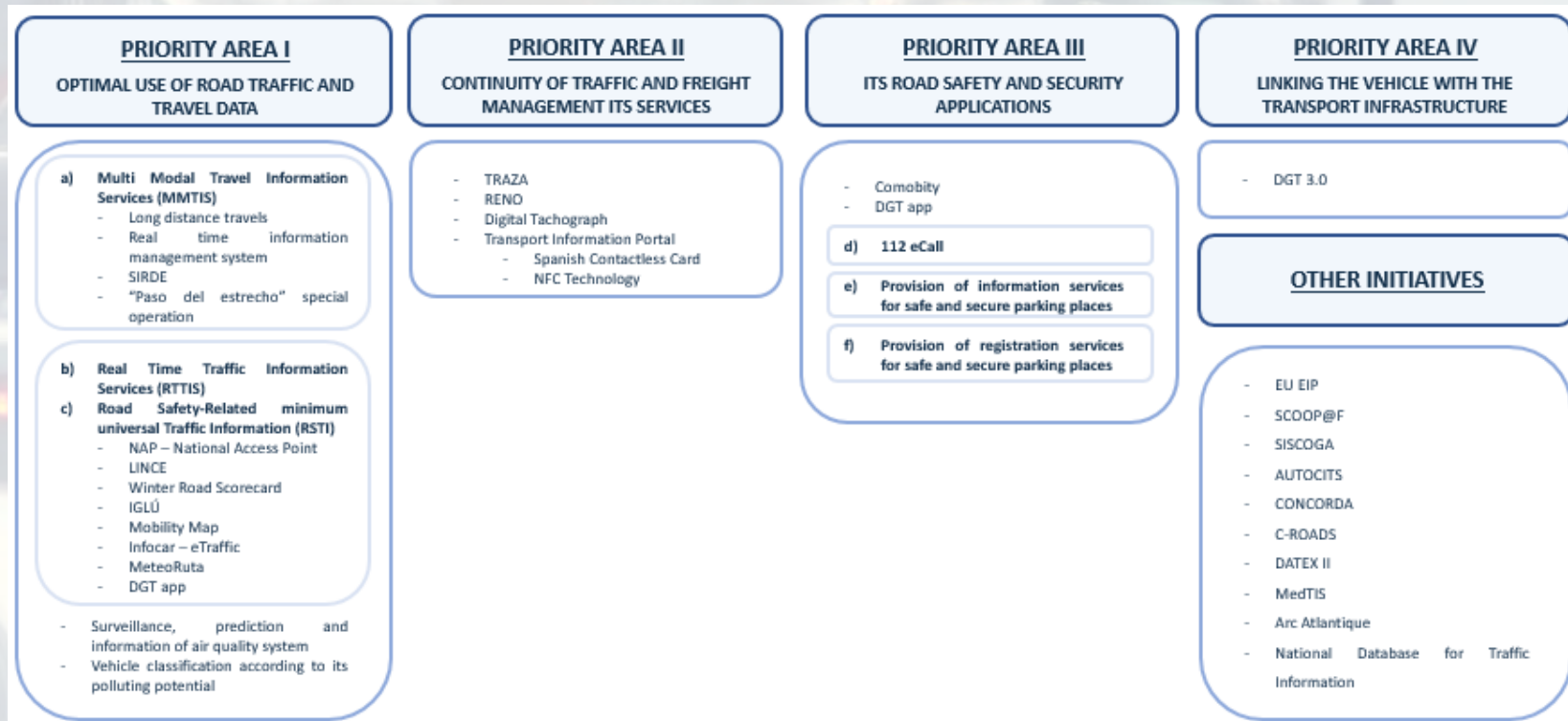


Figure 2 Main projects according to priority areas

1.3 General progress since 2014

According to the 2014 year report structure, (available on the link : https://ec.europa.eu/transport/sites/transport/files/themes/its/road/action_plan/doc/2014_es_its_report_2014_en.pdf) the information on ITS progress within the ITS Directive Priority Actions has been structured following the criteria shown in the table below:

FUNCTIONAL AREA	ITS SERVICE (WHAT)
TRAFFIC INFORMATION	Traffic events and incidences
	Traffic flow (Levels Of Service-LOS)
	Travel times
	Information of speed limits
	Driving restrictions
	Images or video distribution
	Weather-related information
	Itinerary planning
TRAFFIC AND MOBILITY MANAGEMENT	Information exchange
	Dynamic speed management
	Prohibition of truck take-over
	Implementation of reversible lanes
	Hard shoulder use
	Management of high-occupancy lanes
	Ramp metering
	Dynamic management of driving restrictions in mass movements and adverse weather conditions
	Tunnel management
	Traffic management plans
	Dynamic management of urban traffic plans
	Traffic lights priority systems for the public transport
	On request public transport
	Public bicycles services management
Car-pooling and car-sharing	
SAFETY AND EMERGENCY MANAGEMENT	eCall
SURVEILLANCE (ENFORCEMENT)	Speeding control
	Red light control
	Access control due to weather related reasons
	Video surveillance in the public transportation system
TELEMATIC PAYMENT AND ETC (ELECTRONIC TOLL COLLECTION)	ETC offenses
	ETC enforcement
	Mobile phone payment and card verification on public transport
FREIGHT AND FLEET	Information and reservation services on safe and secure parking places for lorries
	Dangerous goods traffic management

FUNCTIONAL AREA	ITS SERVICE (WHAT)
TRANSPORT FACILITIES	Dangerous goods monitoring
	Special transport management
	Urban and interurban logistics
	Lean and green logistics
	Exploitation Support Systems (ESS)
	Trip planning (including door-to door planner)
	Intermodal transport management
	E-ticketing
	Exchange
	Traveller information

Table 1 ITS progress

In the following tables, each ITS service is disaggregated, including current situation of each service in Spain. The following colour-scale has been used to represent 3 levels of deployment and maturity.

Test level, pilot projects or investigation or preliminary studies	Service deployed in some corridors or specific cities	Service deployed in most part of territory or area where it is necessary. There may be space
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Table 2 ITS level of deployment colour scale



1.3.1 Traffic information

1.3.1.1 Events and traffic incidents

WHAT	HOW	WHO	WHERE	2011	2014	2017
EVENTS AND TRAFFIC INCIDENTS	Variable Message Signage (VMS)	DGT, SCT, DT	Accesses and ring roads of big cities. Some sections of the interurban network of Spain			
		Municipalities	Big cities			
		Toll operator	Sections of highways			
	Web servers	DGT, SCT y DT	All interurban network			
		Municipalities	Big cities			
		ITS Service providers using data provided by Administration or other agents	All interurban network			
	RDS-TMC	DGT via RNE	All interurban network			
	Information telephones (011), SMS, 01 ...	DGT, SCT, DT, Some municipalities of big cities	All the urban and interurban road network			
	Teletext and interactive digital televisions	DGT, SCT, DT	All interurban network			
	Smartphone Apps	ITS Public and private providers with information provided by the administration or other servers and Comobity	All interurban network and part of the urban one			
NAP	DGT, SCT, DT and Madrid City Council, Toll operators, Service Providers	Interurban and partial urban network				

Table 3 Events and traffic incidents

1.3.1.2 Traffic flow (LOS)

This information is available through private operators (Google, INRIX, etc.) as well as toll motorway operators using web services and smartphone applications.

1.3.1.3 Travel times

WHAT	HOW	WHO	WHERE	2011	2014	2017
TRAVEL TIMES	VMS	DGT, SCT, DT, Big cities and some toll operators	Accesses and ring roads of big cities, big urban axes and some stretches of toll motorways.	Yellow	Green	Green
	Web servers	DGT	Accesses and ring roads of big cities.	Yellow	Green	Green
		Municipalities	Big cities	Yellow	Yellow	Yellow
		ITS Service providers using data provided by Administration or other agents	All interurban network	Orange	Yellow	Green
	Smartphone Apps	ITS Public and private providers with information provided by the administration or other servers	All interurban network and part of the urban one	Orange	Yellow	Yellow
	NAP	DGT, SCT, DT and Madrid City Council	Interurban and partial urban network	Orange	Orange	Yellow

Table 4 Travel times

1.3.1.4 Information of speed limits

WHAT	HOW	WHO	WHERE	2011	2014	2017
SPEED LIMIT INFORMATION	VMS	DGT, SCT, DT, big cities and some toll operators	Accesses and ring roads of big cities, big urban axes and some road stretches of toll motorways			
	Web Servers	ITS Service providers using data provided by Administration or other agents	All interurban and urban network			
	Smartphone Apps	ITS Public and private providers with information provided by the administration or other servers	All interurban network and part of the urban one			
	NAP	DGT, SCT, DT and Madrid City Council	Interurban and partial urban network			

Table 5 Information of speed limits

1.3.1.5 Driving restrictions

WHAT	HOW	WHO	WHERE	2011	2014	2017
DRIVING RESTRICTIONS	VMS Web servers Channels of news	DGT, SCT, DT	Accesses and ring roads of big cities, big interurban axes Social networks and web-based info dissemination.	Yellow	Green	Green
	Web Servers	ITS Service providers using data provided by Administration or other agents	All interurban and urban network	Yellow	Green	Green
	Smartphone Apps	ITS Public and private providers with information provided by the administration or other servers	All interurban network and part of the urban one	Orange	Yellow	Green
	NAP	DGT, SCT, DT and Madrid City Council	Interurban and partial urban network	Orange	Yellow	Green

Table 6 Driving restrictions

1.3.1.6 Image or video distribution

WHAT	HOW	WHO	WHERE	2011	2014	2017
IMAGE OR VIDEO DISTRIBUTION	Web servers Smartphone Apps	DGT, SCT, DT, big cities, some toll operators and ITS service providers	Accesses and ring roads of big cities, big interurban axes What	Yellow	Green	Green

Table 7 Image or video distribution

1.3.1.7 Weather related information

WHAT	HOW	WHO	WHERE	2011	2014	2017
WEATHER – RELATED INFORMATION	VMS Web servers Smartphone Apps	DGT, SCT, DT and ITS service providers	Specific points of the interurban network			

Table 8 Weather related information

1.3.1.8 Itinerary planning

WHAT	HOW	WHO	WHERE	2011	2014	2017
ITINERARY PLANNING	Web servers and Smartphone Apps	DGT, SCT, DT and ITS service providers	All road network			

Table 9 Itinerary planning

1.3.1.9 Information exchange

WHAT	HOW	WHO	WHERE	2011	2014	2017
INFORMATION EXCHANGE	DATEX	DGT, SCT, DT, concession of highways and Service providers	Interurban road network, including an exchange with France and Portugal			
	.xml files for private operators	DGT, Basque Government	Interurban road network			
	Text files for private operators	SCT				

Table 10 Information exchange

1.3.2 Traffic and Mobility Management

1.3.2.1 Dynamic speed management

WHAT	HOW	WHO	WHERE	2011	2014	2017
DYNAMIC SPEED MANAGEMENT	VMS Speed cameras	SCT	Specific sections of interurban and peri urban network			
	Web servers	DGT	Specific sections of interurban and peri urban network			
	VMS Web Servers	Toll operators	Specific sections of peri urban network			

Table 11 Dynamic speed management

1.3.2.2 Prohibition of truck take over

WHAT	HOW	WHO	WHERE	2011	2014	2017
PROHIBITION OF TRUCK TAKE-OVER	VMS Web servers News channels	DGT, SCT, DT and toll operators	Specific sections of interurban network			

Table 12 Prohibition of truck take over

1.3.2.3 Implementation of reversible lanes

WHAT	HOW	WHO	WHERE	2011	2014	2017
IMPLEMENTATION OF REVERSIBLE LANES	VMS Web servers News channels	DGT, SCT, DT	Specific sections of interurban network			

Table 13 Implementation of reversible lanes

1.3.2.4 Hard shoulder use

WHAT	HOW	WHO	WHERE	2011	2014	2017
HARD SHOULDER USE	VMS	DGT, SCT, DT	Specific sections of interurban network			

Table 14 Hard shoulder use

1.3.2.5 Management of high occupancy lanes

WHAT	HOW	WHO	WHERE	2011	2014	2017
MANAGEMENT OF HIGH OCCUPANCY LANES	VMS Web servers News channels	DGT	20-km stretch on the high capacity A-6 Madrid peri urban motorway access.			
	VMS Web servers News channels	SCT	Finished HOL project on C-58 (oct.2012: HOV+3; march 2013 HOV+2; sept. 2014 HOV +2 (1+1 layout).			
	High occupancy pilot with rear seat detection	INDRA	Some urban network			

Table 15 Management of high occupancy lanes

1.3.2.6 Ramp metering

WHAT	HOW	WHO	WHERE	2011	2014	2017
RAMP METERING	VMS Web servers News channels	Barcelona City Council				
	VMS Web servers News channels	DGT	A-5 and A-1 peri urban Madrid motorways M-40 assessment			

Table 16 Ramp metering

1.3.2.7 Dynamic management of driving restrictions in mass movements and adverse weather conditions

WHAT	HOW	WHO	WHERE	2011	2014	2017
DYNAMIC MANAGEMENT OF DRIVING RESTRICTIONS IN MASS MOVEMENTS	VMS Web servers News channels NAP	DGT, SCT, DT, Madrid and Barcelona Councils	Interurban Networks and ring roads metropolitan areas of big cities: Madrid y Barcelona			
DYNAMIC MANAGEMENT OF DRIVING RESTRICTIONS IN ADVERSE WEATHER CONDITIONS	VMS Web servers News channels NAP	DGT, SCT, DT, Madrid and Barcelona Councils	Interurban Networks and ring roads metropolitan areas of big cities: Madrid y Barcelona			

Table 17 Dynamic management of driving restrictions in mass movements and adverse weather conditions

1.3.2.8 Tunnel management

WHAT	HOW	WHO	WHERE	2011	2014	2017
TUNNEL DYNAMIC MANAGEMENT	Variable Message Signs Web servers News channels	DGT, SCT, DT, toll operators, Madrid and Barcelona Municipalities	Tunnels of the interurban and urban network			
	Incident detection	Toll operators	Tunnels of some interurban network			

Table 18 Tunnel management

1.3.2.9 Traffic management plans

WHAT	HOW	WHO	WHERE	2011	2014	2017
TRAFFIC MANAGEMENT PLANS	In traffic Management centres by means of service levels algorithms, traffic conditions, automatic incident detection and travel times. Variable Message Signs Web servers News channels Smartphone apps	DGT, SCT, DT and toll operators	In all traffic management centres, the interurban road network of Spain			

Table 19 Traffic management plans

1.3.2.10 Dynamic management of urban traffic plans

WHAT	HOW	WHO	WHERE	2011	2014	2017
DYNAMIC MANAGEMENT OF URBAN TRAFFIC PLANS	Traffic lights priority system and urban Traffic Management Centres with adaptative algorithms.	Municipalities and Authorities that regulate traffic lights. Provinces	Centralised Control Systems based on traffic lights in Spanish cities			
	Big Data technology applied to traffic management	Málaga City Council & Indra (Transforming Transport)	High capacity network in Malaga			

Table 20 Dynamic management of urban traffic plans

1.3.2.11 Traffic light priority system for the public transport

WHAT	HOW	WHO	WHERE	2011	2014	2017
TRAFFIC LIGHTS PRIORITY SYSTEM FOR PUBLIC TRANSPORT	Traffic lights priority system, exploitation support systems and urban traffic Management Centres	Municipalities and municipal transport companies	Cities: Donostia-San Sebastián, Albacete, Vigo, Valencia, Zaragoza, Bilbao, Malaga, Murcia.			

Table 21 Traffic light priority system for the public transport

1.3.2.12 On request public transport

WHAT	HOW	WHO	WHERE	2011	2014	2017
ON-REQUEST PUBLIC TRANSPORT	On-board equipment exploitation aids, info screens, reservation centre, tool for making reservations (web, SMS, telephone).	Municipalities, authorities of public transport and operators of public transportation	Rural environments or low density environment in cities and/or metropolitan areas: Madrid, Asturias, Zaragoza, Camp de Tarragona, Castilla y León...			

Table 22 On request public transport

1.3.2.13 Public bicycles services management

WHAT	HOW	WHO	WHERE	2011	2014	2017
PUBLIC BICYCLES SERVICES MANAGEMENT	Equipment stations – bike racks– Conventional and electrical bicycle; Contactless card; Intermodality with other public transport modes. Web servers News channels- web portals Apps	Municipalities and Municipal Transport Companies	Spanish cities: Madrid, Barcelona, Valencia, Sevilla, Bilbao, San Sebastián, Murcia, Ciudad Real, Zaragoza, A Coruña...			

Table 23 Public bicycles services management

1.3.2.14 Car pooling and car sharing

WHAT	HOW	WHO	WHERE	2011	2014	2017
CAR – POOLING	Variable Message Signs Web servers Apps	DGT, SCT, DT	Specific stretches of the interurban road network			
	Smartphone Apps	Private providers with information provided by the administration or other servers	Spanish cities: Madrid, Barcelona, Valencia, Sevilla, Bilbao, San Sebastián, Murcia, Ciudad Real, Zaragoza, A Coruña...			
CAR SHARING	Web servers Apps	Private companies in major cities	Light vehicles, mopeds and motorcycles			
	Smartphone Apps	Private providers with information provided by the administration or other servers	Spanish cities: Madrid, Barcelona, Valencia, Sevilla, Bilbao, San Sebastián, Murcia, Ciudad Real, Zaragoza, A Coruña...			

Table 24 Car pooling and car sharing

1.3.3 Safety management, road safety and emergencies

WHAT	HOW	WHO	WHERE	2011	2014	2017
eCALL	Communication mobile network, PSAPs (Public Safety Answering Points) upgrade and protocols of exchange of information	112 PSAPs, DGT, MNO (Mobile Network Operators)	In 19 autonomous regions Operative in some regions like Valencia			

Table 25 Safety management, road safety and emergencies

1.3.4 Surveillance (Enforcement)

1.3.4.1 Speeding control

WHAT	HOW	WHO	WHERE	2011	2014	2017
SPEEDING CONTROL	Speed control devices	DGT, SCT, DT and Municipalities	Specific areas due to safety reasons			
	Mean speed controls	DGT, SCT, DT and big cities municipalities	Specific risky stretches such as tunnels			

Table 26 Speeding control

1.3.4.2 Red Light control

WHAT	HOW	WHO	WHERE	2011	2014	2017
RED LIGHT CONTROL	Camera, traffic sensor and traffic light unit	DGT, SCT, DT and Municipalities	Traffic light regulated intersections with road safety problems In interurban roads with adverse weather conditions			

Table 27 Red Light control

1.3.4.3 Access control due to weather related reasons

WHAT	HOW	WHO	WHERE	2011	2014	2017
ACCESS CONTROL	Licence Plate Recognition (LPR) and VMS supported with automatic fee devices	Municipalities	Downtown historical cities / Air quality protection on sensitive areas			
	Licence Plate Recognition (LPR) and VMS supported with automatic fee devices	Toll operators	Some network highway			

Table 28 Access control due to weather related reasons

1.3.4.4 Video surveillance in the public transportation system

WHAT	HOW	WHO	WHERE	2011	2014	2017
VIDEO-SURVEILLANCE IN THE PUBLIC TRANSPORTATION SYSTEM	Onboard cameras, driver alarm, control centre, operation support systems.	Municipalities, authorities of public transport, operators of public transport, taxi drivers.	Vehicles of the different modes, in cities and/or metropolitan areas: Madrid, Barcelona, Valencia, Murcia, Zaragoza, Guipúzcoa...			

Table 29 Video surveillance in the public transportation system

1.3.5 Telematic payment and ETC

1.3.5.1 ETC offenses

WHAT	HOW	WHO	WHERE	2011	2014	2017
ELECTRONIC TOLL COLLECTION OFFENSES	Camera, offense sensor, ETC, DVIT and automatic offense device	Toll operators; DGT	Toll roadways (integration with national fine management centre –ESTRADA centre)			

Table 30 ETC offense

1.3.5.2 ETC enforcement

WHAT	HOW	WHO	WHERE	2011	2014	2017
ETC	DSRC antennas in tolls, on-board devices	Toll operators	All Spanish toll motorways throughout the country.			
	SIGO, prepaid telematic payment	Toll operators	AP46 Málaga – Las Pedrizas			
	Interoperability different ETC	Toll operators	Some highways network			

Table 31 ETC enforcement

1.3.5.3 Mobile phone payment and card verification on public transport

WHAT	HOW	WHO	WHERE	2011	2014	2017
PAYMENT AND CARD VERIFICATION OF PUBLIC TRANSPORTATION BY USING THE MOBILE PHONE	SIM cards, application of payment in the mobile phone, onboard verification equipment that use NFC technology.	Municipalities, public transport authorities and operators.	Preliminary and pilot studies in some metropolitan areas such as: Madrid, Valencia, Murcia, Málaga, Gipuzkoa, Lleida, Pamplona...			

Table 32 Mobile phone payment and card verification on public transport

1.3.6 Freight and fleet

1.3.6.1 Information and reservation services on safe and secure parking places for lorries

WHAT	HOW	WHO	WHERE	2011	2014	2017
INFORMATION ABOUT INTERURBAN PARKING SPACES	Variable Message Signs Web servers	Parking operators; DGT	Intelligent Truck Parking			
INFORMATION ABOUT URBAN PARKING SPACES	Variable Message Signs Web servers	Madrid, Barcelona and Terrassa Municipalities				

Table 33 Information and reservation services on safe and secure parking places for lorries

1.3.6.2 Dangerous goods traffic management

WHAT	HOW	WHO	WHERE	2011	2014	2017
DANGEROUS GOODS MANAGEMENT	Variable Message Signs Web servers LPR	Madrid, Barcelona and Terrassa Municipalities				
	Web server Variable Message signs LPR	SCT	Web-based application to decide best route for dangerous goods			

Table 34 Dangerous goods traffic management

1.3.6.3 Dangerous goods monitoring

WHAT	HOW	WHO	WHERE	2011	2014	2017
DANGEROUS GOODS MONITORING	Variable Message Signs Web servers	Ministry of Public Works and Transport (DGTT)	All state-dependent road network nationwide tunnels			
	Web application	SCT	"TRESA" application for special transports authorizations"			

Table 35 Dangerous goods monitoring

1.3.6.4 Special transport management

WHAT	HOW	WHO	WHERE	2011	2014	2017
SPECIAL TRANSPORT MANAGEMENT AND MONITORING	Web applications	DGT	TRAZA application for abnormal size/weight transport authorizations.			
		SCT	TRESA application for abnormal size/weight transport authorizations.			

Table 36 Special transport management

1.3.6.5 Urban and interurban logistics

WHAT	HOW	WHO	WHERE	2011	2014	2017
URBAN AND INTERURBAN LOGISTICS	Technical department	Ministry of Public Works and Transport (DGTT)	Nation-wide road network			

Table 37 Urban and interurban logistics

1.3.6.6 Lean and green logistics

WHAT	HOW	WHO	WHERE	2011	2014	2017
LEAN AND GREEN LOGISTICS	Logistics platform creation.	Ministry of Public Works and Transport (DGTT) Transport operating companies	Nation-wide road network			

Table 38 Lean and green logistics

1.3.7 Transport facilities

1.3.7.1 Exploitation Support Systems (ESS)

WHAT	HOW	WHO	WHERE	2011	2014	2017
EXPLOITATION SUPPORT SYSTEMS	Follow-up and fleet control through geolocalization (GPS) and wireless voice/data communication with mobile units. Boarding Systems control. Driver help interface. Centre of operation control: Communication servers and database, client positions, geographical and synoptic information.	Municipal Transport Companies Interurban transport companies	In most Spanish cities and in areas served by interurban service connecting main urban nodes			

Table 39 Exploitation Support Systems (ESS)

1.3.7.2 Trip Planning (including door to door planner)

WHAT	HOW	WHO	WHERE	2011	2014	2017
TRIP PLANNING	Computer tool that supports the planning job of helping operators. The information generated is used by the ESS (European Social Survey)	Municipal Transport Companies; Interurban transport companies	In most Spanish cities and in areas served by interurban service connecting main urban nodes: Madrid, Barcelona, Valencia, Sevilla, Gran Canaria, Pamplona, Murcia, Asturias, etc.			
TRIP PLANNING	http://www.fomento.es/portalsitrabus/	Ministry of Public Works and Transport (DGTT)	All interurban Spain's concessions.			
	Smartphone App	DGT + Other service providers (based on DGT sources)	Nation-wide road trip planning (including weather, incidences, restrictions and traffic L.O.S)			

Table 40 Trip Planning (including door to door planner)

1.3.7.3 Intermodal transport management

WHAT	HOW	WHO	WHERE	2011	2014	2017
INTERMODAL TRANSPORT MANAGEMENT	Introduction of a unique transport card. e-ticketing harmonizing systems of different operators. Control and compensation centres to make a distribution between the operators and other system agents.	Transport regulation bodies in regions and provinces	Limited to separated region areas			
	Road-Sea seasonal intermodality	DGT	Information dissemination for long-range nationwide road trips to Access sea ports (traffic levels, ports occupation, estimated departures times, en-route rest areas, etc).			

Table 41 Intermodal transport management

1.3.7.4 E-ticketing

WHAT	HOW	WHO	WHERE	2011	2014	2017
E-TICKETING	Magnetic, contactless, or bar-code technology. Sale systems for card usage, centre of e-ticketing control and management.	Municipal transport companies. Interurban transport companies (urban and interurban)	Areas served by interurban service connecting main cities. cities and/or metropolitan areas: Madrid, Comunitat Valenciana, Murcia, Andalucía, Asturias, Mallorca, Gran Canaria, Zaragoza, Gipuzkoa, Camp de Tarragona, Lleida, Pamplona, Vigo, A Coruña...			

Table 42 E-ticketing

1.3.7.5 Exchange

WHAT	HOW	WHO	WHERE	2011	2014	2017
EXCHANGE	Apps and required servers for multimodal information	Public Transport Authorities in regions and provinces Service providers	Big cities and peri urban areas			

Table 43 Exchange

1.3.7.6 Traveller information

WHAT	HOW	WHO	WHERE	2011	2014	2017
INFORMATION TO TRAVELLERS	Systems for visually impaired people. Wireless or fixed communication between the control centre (SAE) and info screens in real time, Apps for info dissemination through different channels and formats for users	Transport Municipal Companies Interurban transport companies	Areas served by interurban service connecting main cities. Cities and/or metropolitan areas: Comunitat Valenciana, Murcia, Andalucía, Asturias, Mallorca, Gran Canaria, Zaragoza, Gipuzkoa, Camp de Tarragona, Lleida, Pamplona, Vigo, A Coruña...			

Table 44 Traveller information



2 Projects, activities and initiatives

On the following sections, the most significant initiatives and progresses are described and included into the priority areas, as shown below:



Figure 3 Projects, activities and initiatives

Depending on the subject, the activities will be classified regarding the priority actions according to the priority areas and in accomplishment with Directive 2010/40/EU.

2.1 Priority area I. Optimal use of road, traffic and travel data

The objective of the projects of this priority area is mainly focus on the enhancement of the provision of traffic and travel information services, in order to provide more accurate and reliable journeys with pre-trip and in-trip traffic and travel information which can reach their smartphone apps, navigation devices or on board units in cars and trucks.

This information includes planned roadworks, sport events, expected time of arrival and warnings about hazardous weather or road conditions ahead in the route.



2.1.1 Description of the national activities and projects

The optimal use of road, traffic and travel data involves many ITS projects which can be structured in three (3) different priority actions:

- Priority action (a): Multimodal Travel Information Services
- Priority action (b): Real-Time Traffic Information Services
- Priority action (c): Safety related Universal Traffic Information

However, there are other activities and initiatives associated with these topics which do not match exactly with any of these priority actions. These activities are mainly related to the “National Plan for Air Quality and Protection of the Atmosphere 2013-2016” which includes actions to control the emissions related with road transport and apply restrictions in order to reduce the severe effects on human health and ecosystems that air pollution can cause.

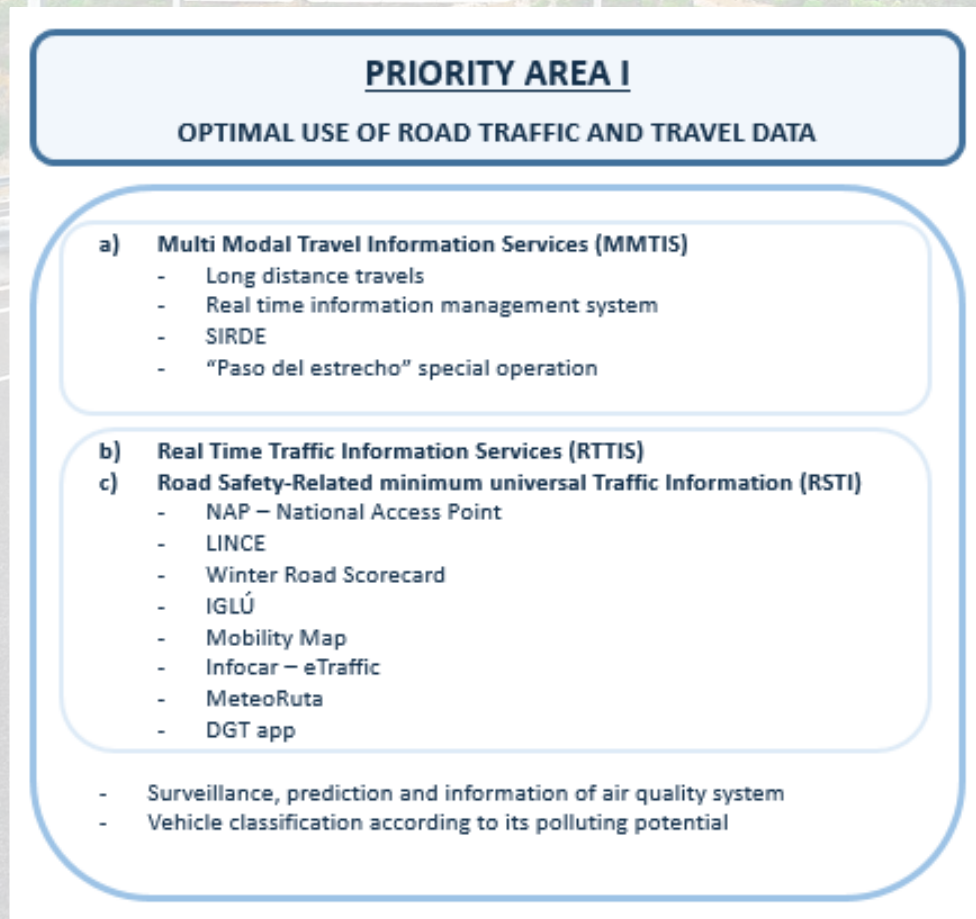


Figure 4 Priority Area I

2.1.2 Reporting under the Draft Delegated Regulation with regard to the provision of EU-wide multimodal travel information services (priority action a)

2.1.2.1 Long distance travels

According to road administration data, the percentage of cross-border demand related to long-range travels within the European Union, continues being considerably high (around 14%), which highlights the relevance of a proper connectivity of the network and the seamless provision of services and traffic/road safety information.



Figure 5. Vilar de Formoso - Portugal Border Crossing



Figure 6 Le Perthus. Spain - France Border Crossing

2.1.2.2 Land transport management

2.1.2.2.1 Provision of information services on multimodal movements

Within the context of Ministry of Public Works and Transport ITS Program³, an “Intermodal Transport Catalogue” is being developed with the purpose of collecting all the information of routes and schedules of passengers’ regular transport for medium and long distance for all modes of transport, including rail and regular road transport.

A “Transport Information Portal” (accessible through the website: <http://www.fomento.es/portalsitransitranbus/>) is also being implemented, (from the aforementioned Catalogue), which enable citizens to easily access this information on intermodal transport alternatives for medium and long distance journeys in a complete and reliable way, through a multimodal system that will allow to analyse and search the different transport alternatives to make specific route, detailing the possible options and schedules in each mode of transport available. In addition, the portal will contain updated information on incidents that may occur. The aim is to contribute to the promotion of intermodal transport, facilitating access to information and

³ Report on ITS Action Plan 2012-2024. Ministry of Public Works and Transport.

reducing costs, and ultimately helping to improve territorial cohesion.

2.1.2.2.2 SIRDE

Ministry of Public Works and Transport developed in November 2016 an application called “SIRDE” (Sistema de Información para Registro de Datos de Expediciones – Management Information System for Recording Data of Dispatches) for the improvement of the management road passenger transport concessions, which is the responsibility of the General State Administration.

This Application can be downloaded for free in a device located on the buses. SIRDE collects the exploitation data of the concessions by reading a QR code printed on the tickets. At the same time, the positioning of buses is collected.

All these passengers’ data and routes are sent in real time to a data warehouse of Ministry of Public Works and Transport where they are managed and analysed for the development of O/D (origin and destination) matrices.

For the approval of this system, the Ministry has carried out numerous tests in some routes, with the collaboration of diverse concessionary companies. Some

resolutions that oblige public service contractors of regular general road

transport to implement and use SIRDE have already been signed. On 1st November of 2017, 20 companies with a transport service contract will have incorporated SIRDE into their fleet.

The remaining concessions will incorporate the obligation to implement the application in the contract as they are being renewed.

2.1.2.2.3 “Paso del Estrecho” Special Traffic Operation

General Directorate for Traffic (DGT) has implemented a dispositive to offer assistance and information to

users on their trips through the main routes in Spain to the departure harbours to North Africa.⁴

This operation involves that more than 1.200.000 vehicles pass across the border between France and Spain (Irun and La Jonquera) and use these corridors to arrive final destination.

This special operation integrates rest areas, information points, emergency areas and variable message panels located in the two main national corridors: Central Corridor and Mediterranean Corridor.



⁴ Operación Paso del Estrecho (OPE) 2016 - General Directorate of Traffic - Ministry of the Interior

The messages displayed on VMS are intended for users in transit through Spain with main destination North Africa. This signalling reports about multimodal information regarding the occupancy (high or very high) of the harbours of Algeciras, Tarifa, Motril and Almería, the average waiting time from the departure harbour of Algeciras to Ceuta or Tánger, and some recommendations regarding the purchase of boarding tickets.



Figure 8 Multimodal information on VMS

In emergency situations, the panels are also used to give warnings and recommendations to the citizen.

In relation to the transit of vehicles that take place during the period of “Operación Paso del Estrecho, OPE”

in the Spanish territory, it is very important to have continuous knowledge of traffic intensity on the borderlines of Irún, La Jonquera and Algeciras harbour.

For this reason, a Borderline Information System (“Sistema de Información de Frontera, SIF”) has been implemented for the integration of all the data necessary for calculations and estimations of mass movements, regarding the reading and identification of vehicles’ nationalities on the border post, having in an automated way the traffic of vehicles from the borderline until their arrival, mainly to Algeciras harbour.

For the OPE, the reading and identification of vehicles’ nationalities on the border post and a selection of vehicle measurement points of the main corridors, were implemented from the SIF, having automated data from the borderline until their arrival to the different embarkation harbours.

The data supplied by the SIF corresponding to the time evolution of the intensity movements of the boardline points of Irún (AP-8) and La Jonquera (AP-7) shows the diversity of nationalities accessing and crossing our country (vehicles registered in Italy, Great Britain, Belgium, Netherlands, Germany and France.)

In the figure below, the location of the automatic License Plate Recognition (LPR) and Closed Circuit Television (CCTV) cameras used during the development of the OPE is detailed.

During the “OPE Campaign”, a leaflet with advice, recommendations and indication of the location of rest areas and information points is included on the DGT website.



Figure 9 Location of LPR and CCTV used during the OPE



Figure 10. Example of DGT website “OPE” advice

This leaflet is published in French and Arabic with information of the main corridors to cross Spain, authorized service areas, emergency telephone numbers, etc.



Figure 11 Example of front page of the triptych

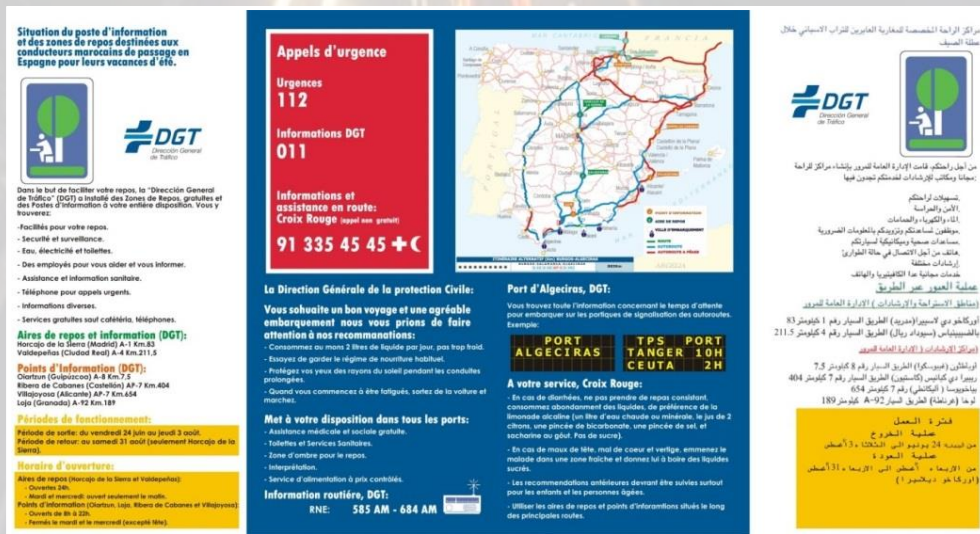


Figure 12 Example of the backside of the triptych

In addition, up-to-date data of interest to Arabic speaker drivers have been published regularly on the DGT website.

2.1.3 Reporting obligation under Delegated Regulation (EU) 2015/962 on the provision of EU-wide real-time traffic information services (priority action b)

2.1.3.1 National Access Point (NAP)

Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport Text with EEA relevance, includes among its priority areas the optimum use of road network, traffic and travel data. In this sense, there is a high growing demand in the use and implementation of information and communication technologies in

the automotive world, which will support new services and technological advances in road safety.

Within the framework that configures the abovementioned Directive and its delegated regulations, it should set a common access point that allows the information coming from different sources be available for everybody and with a standard format.

In compliance with above, the General Directorate for Traffic has put into operation a neutral Common Point for traffic information (from now on, NAP): Spain National traffic Access Point- <http://nap.dgt.es> provides high quality EU-wide real-time traffic information.



INICIO Español English

GOBIERNO DE ESPAÑA MINISTERIO DEL INTERIOR DGT

Punto de Acceso Nacional de Tráfico y Movilidad (Directiva 2010/40/EU)

Publicaciones

- Mapa de Movilidad
 - Acceso al mapa
- DGT
 - Incidencias
 - Radares
 - Radares fijos
 - Tramos INVVE
 - Paneles
 - Tiempo Real
 - Localizaciones
 - Cámaras
 - Tiempo Real
 - Localizaciones
- DT-GV
 - Incidencias
- SCT
 - Incidencias
- Ayuntamiento de Madrid
 - Incidencias
 - Incidencias en vía pública
 - Incidencias en vía pública (Mapa)
 - Incidencias Calle 30
 - Trabajos planificados en Calle 30
 - Paneles
 - Tiempo Real
 - Localizaciones
 - Cámaras
 - Tiempo real
 - Tiempo real Calle 30

Publicaciones

Actualmente en el PAN se recogen publicaciones de información de tráfico de las entidades listadas a continuación.

DGT	<p>Dirección General de Tráfico, información de tráfico de toda la red estatal de carreteras, excepto Cataluña y País Vasco.</p> <p>http://www.dgt.es/</p>
DT-GV	<p>Departamento de Tráfico del Gobierno Vasco, información de tráfico del País Vasco.</p> <p>http://www.trafficoa.eus/</p>
SCT	<p>Servei Català de Trànsit, información de tráfico de Cataluña.</p> <p>http://transit.gencat.cat</p>
Ayuntamiento de Madrid	<p>Información del portal de Datos Abiertos del Ayuntamiento de Madrid.</p> <p>http://datos.madrid.es/portal/valle/sgob</p>

Información Adicional

Figure 13 NAP - Homepage

2.1.3.2 LINCE

LINCE is the acronym for “Localizador de Incidencias en las Carreteras de España - Events locator on Spanish Roads”, is one of the applications which is contributing to the NAP. Used by DGT, is a centralized web system designed to allow joint management of traffic events and

traffic conditions on all roads controlled by the TMCs distributed nationwide.

LINCE use VEOS (Visualizador Geolocalizado de Sucesos - Events Geolocated Display) to visualize, represent and search traffic events information on the web map in real time.

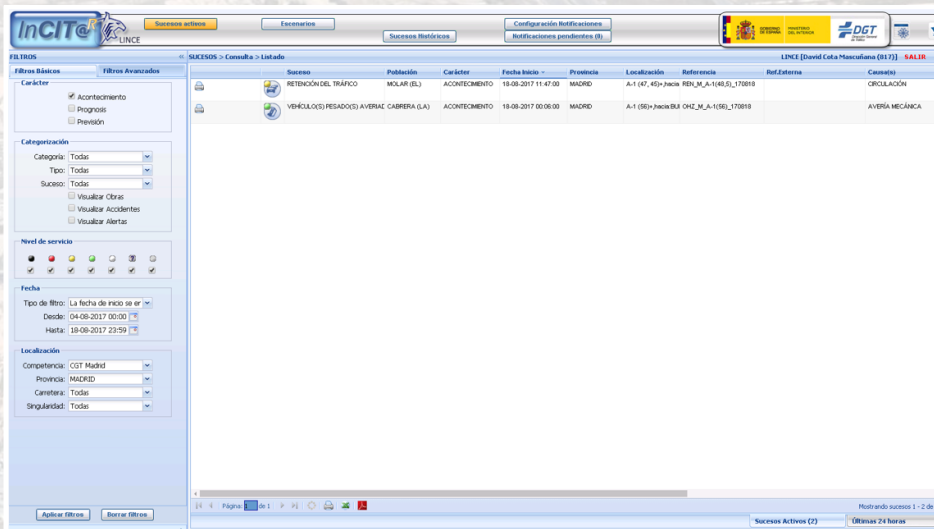


Figure 14. LINCE Homepage

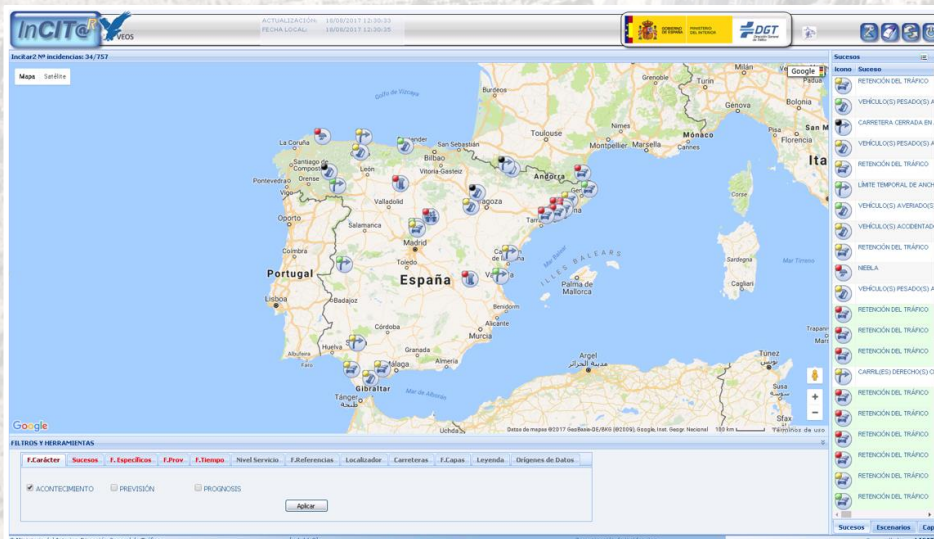


Figure 15 VEOS – Homepage

2.1.3.3 Winter Road Dashboard (WRD)

With the purpose of providing real time information related to winter road conditions, a new application was developed in Spain under the name of “Winter Road Dashboard (WRD)”. This tool is conceived as a living instrument, a composition of key aspects related to each other, which must be updated regularly, and through their consultation, will facilitate the decision making on mobility and road safety during the winter.

The WRD was programmed as an interface in LINCE, to complete the information provided by this platform. This web service has a limited access to certain users with competence in the matter. This information may be sent, likewise, to everyone concerned, for the correct dissemination of the information and the measures or actions to be carried out.



Figure 16. WRD - Access icon

The combination of quantitative and qualitative characteristics of the roads is the best way to describe a specific scenario in a concise and detailed way. A graphical alternative that allows to provide this information in a compact way, is based on the creation of a mosaic of tables that initially include concepts such as:

- Levels of restriction by colour coding.
- Number of kilometres of road network associated with each Level of Restriction.
- Number of events related to Winter Road.
- Information aggregated by road type, province, TMC, etc.



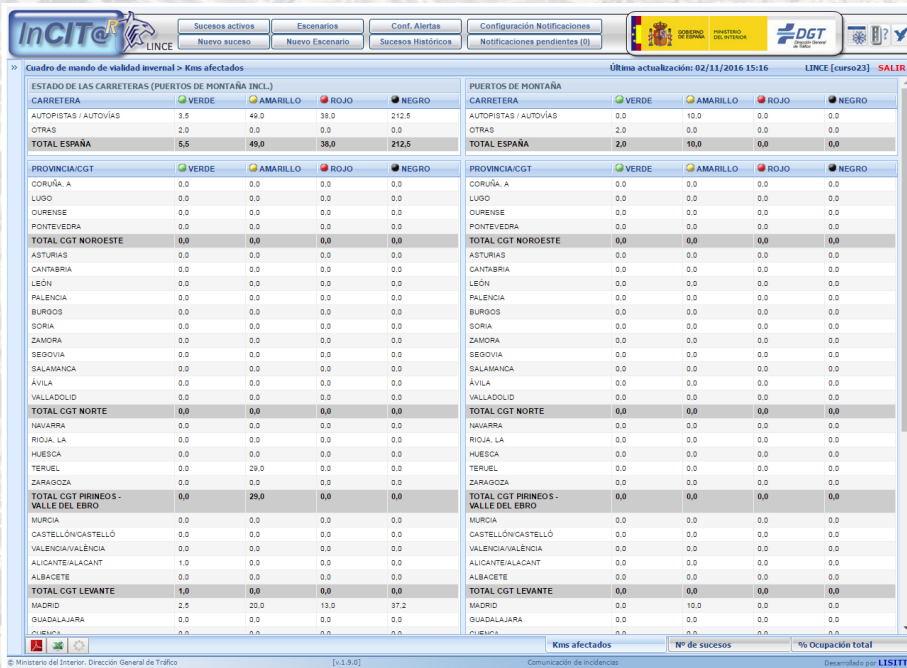


Figure 17 Kilometres of affected roads

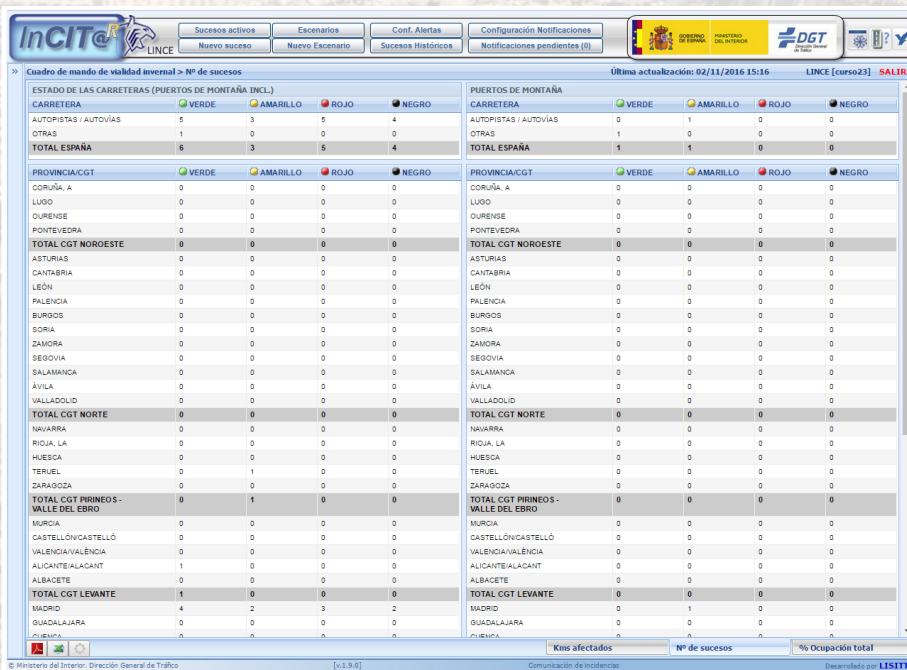


Figure 18 Number of events

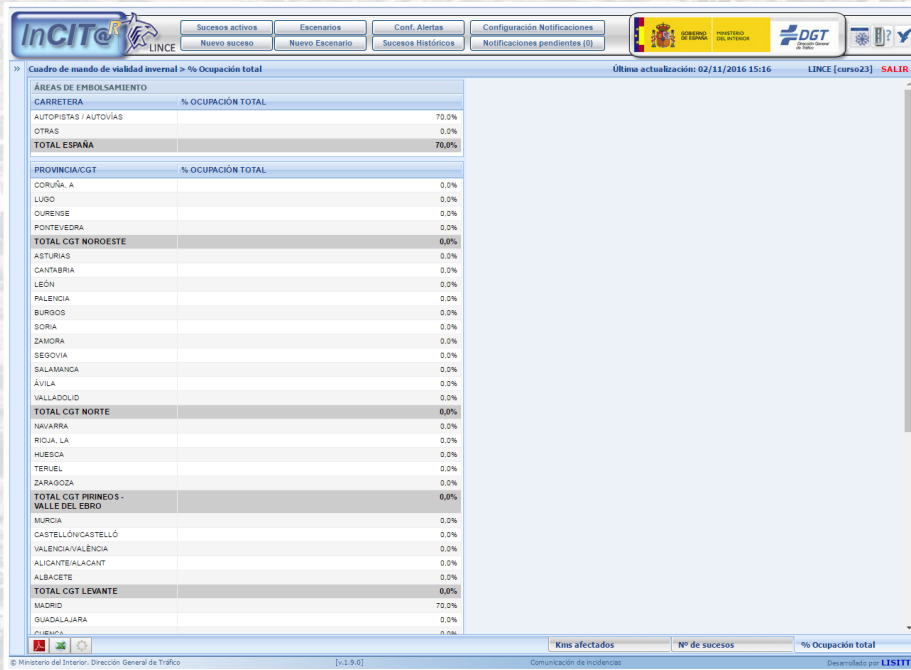


Figure 19 Occupancy rate of emergency parking areas

In conclusion, WRD is a very simple scheme but with great added value, as it provides enough information to make decisions and make judgments about road conditions in adverse weather episodes.

2.1.3.4 IGLÚ

The purpose of IGLU is to facilitate road operators the direct feeding of the NAP with real time information of the road conditions during winter, to provide better information and facilitate traffic management.

Incidentes activos (7)						
INCIDENCIA	LOCALIZACION	PROVINCIA	FECHA	SINGULARIDAD		
HIELO	A-2 (30, 35) +	MADRID	11-08-2016 13:11	NINGUNA		
HIELO	A-2 (37, 39) +	MADRID	11-08-2016 13:20	NINGUNA		
HIELO	A-4 (25, 30) +	MADRID	11-08-2016 13:57	ENTRADA		
NEVADA	A-43 (1, 5) +	CIUDAD REAL	11-08-2016 13:57	NINGUNA		
NEVADA	A-43 (10, 8) -	CIUDAD REAL	11-08-2016 13:58	NINGUNA		
HIELO	A-4 (25, 27) *	MADRID	11-08-2016 13:58	VÍA DE SERVICIO		
QUITANIEVES / SAL	A-2 (15, 25) +	MADRID	09-08-2016 16:30	NINGUNA		

Datos básicos

Suceso*: Nivel de servicio*: Fecha de inicio*:

Localización

Nombre: Singularidad:

Tramo afectado

Provincia inicial*: Provincia final*:

Carretera*: PK inicial*: PK final*:

Sentido*: Hacia:

Información adicional

Observaciones:

Figure 20 IGLU - Main menu

The list displays for each incident the following features:

- LOS: icon that indicates the incident type and road impact
- Incident: describe the event type, among the followings:

- Snow: snow on the road
- Ice: landslide risk caused by ice on the road
- Snow plough / salt: shows the snow ploughs that are being used to clean the roads. This kind of incident does not have any associated LOS.
- Location: road, PKs range and direction where the incident is located.
- Province: province where the incident is located.
- Date: last modification date.
- Singularity: special features of incident location.

IGLU allows road operators to continuously update the situation of an incident.



2.1.3.5 Mobility map

Mobility map is a web application link to the NAP which offers static and dynamic traffic information of all Spanish roads (state, regional and local).



Figure 21 Mobility map – National Roads

The Mobility Map provides an interactive map where users can visualize the following information:

- Kilometre Points
- Accident Concentration Sections (TCAs)
- Restrictions
- Special surveillances areas
- Roads
 - Information related to adverse weather conditions:
 - Elevation
 - Emergency parking areas
 - Other layers of interest:
 - Level - crossings
 - RIMP (Red de Itinerarios para Mercancías Peligrosas – Itineraries Network for Dangerous Goods)
 - Safe cycle routes
- Warnings caused by adverse weather conditions

Mobility Map makes easier to search for precise information regarding the parameters mentioned before.

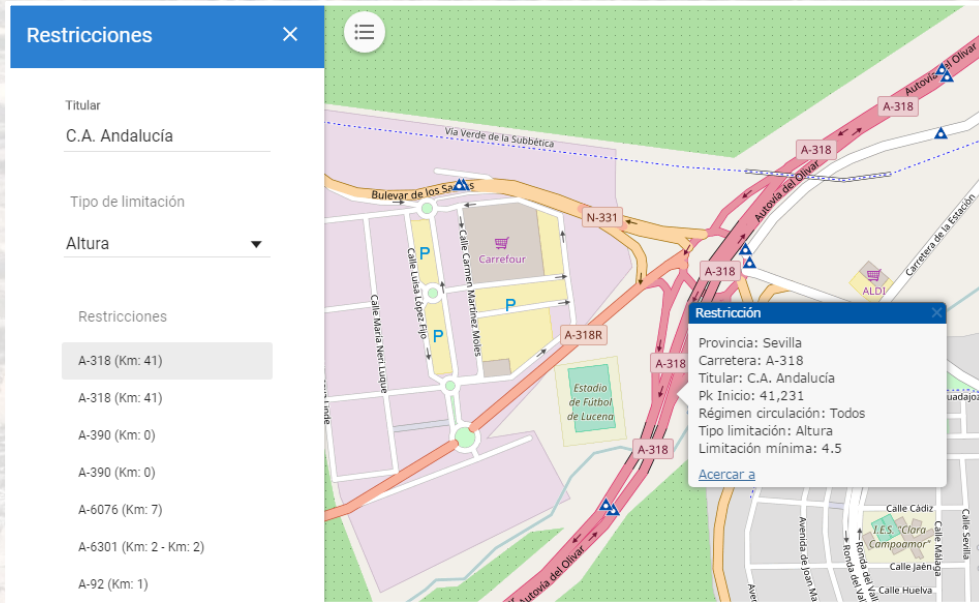


Figure 22 Restriction search on Mobility Map

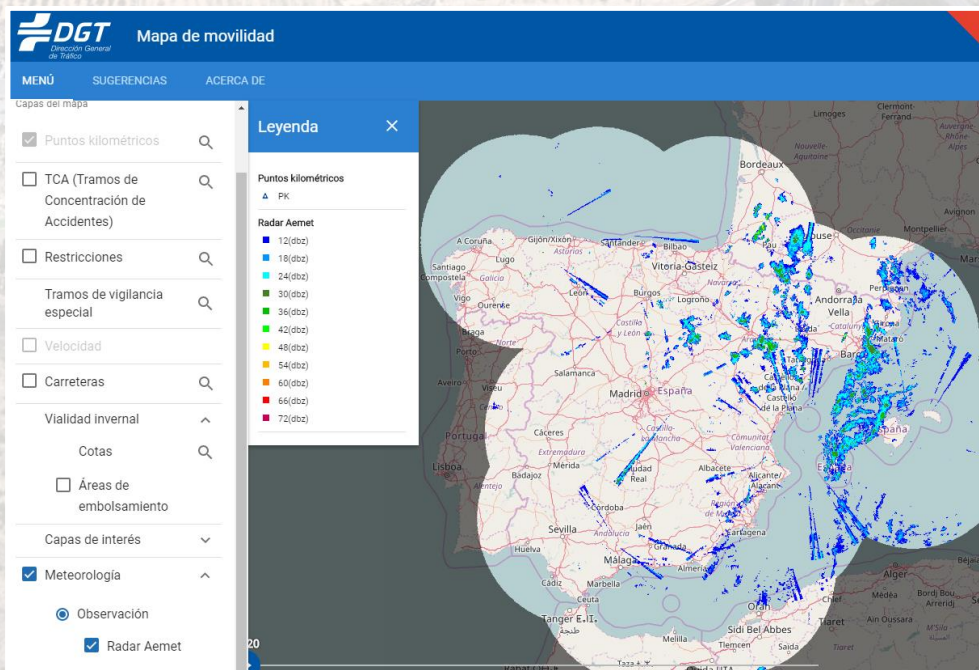


Figure 23 Weather conditions on Mobility Map

2.1.3.6 Infocar – eTraffic

This service, developed by DGT is an example of the integration of the information provided by the NAP in a traffic map in which is possible to visualize:

- Updated real-time incidents on national roads from the information registered in the NAP.
- Scheduled road works and restrictions (height and mass).
- Traffic data
- Personalised services:
 - Storage of more frequent routes.
 - Personalization of the most relevant services for the user (cameras, panels, etc).

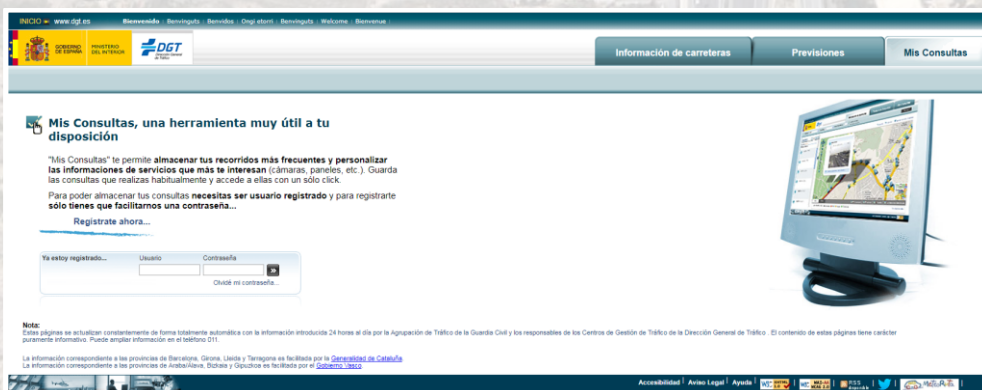
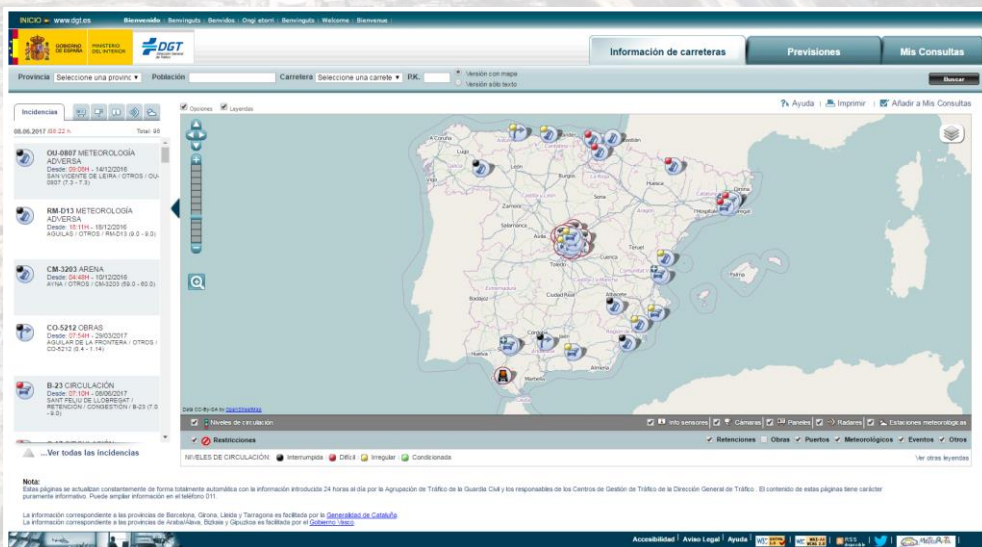


Figure 24. Infocar - Homepage and My queries page

2.1.3.7 *MeteoRuta*

MeteoRuta is a specific tool of AEMET for road traffic, through which it is possible to find information of meteorological variables that affect the driving (rain, snow, wind, low temperature), and its temporal evolution for the next 24 hours.

It consists of an interactive map viewer that displays the meteorological conditions of the roads with the current warning layer of AEMET.

This information is generated automatically by the statistical treatment of the results of the numerical prediction models.

It is possible to visualize all the information related to the different meteorological phenomena which define the status of the road.



Figure 25 MeteoRuta - Homepage



Figure 26 MeteoRuta - Map Viewer

2.1.3.8 DGT APP

This APP developed by DGT is in line with the accomplishment of Directive 2010/40/UE requirements, regarding to RTTI and RSTI.

The information currently provided to users by this tool can be classified in the following way:

- Traffic incidents:
 - Congestion
 - Road works
 - Mountain passes
 - Meteorology
 - Events (sport events, festivals, etc)
 - Other
- Traffic cameras
- Radars

For each of the previous events, the application provides the following contents:

- Location of the event: Based on “road kilometre point”, initial and final point indicated by the name of the town, flow direction, etc.
- Category of the event (see previous list).
- Driving behaviour advice: Enforcement and advice is undertaken by Traffic Management Centres in compliance with “Resolución de 1 de Junio de 2009, Manual de Señalización Variable”

norm, which establishes criteria and structure for variable message sign info provision covering all the previous categories (see an example in next figure).

- Date and hour of the incident.

2.1.3.9 Sport events and traffic restrictions

According to the Spanish regulation every sport event should be communicate to DGT in case interurban roads are affected. The duration of the event and the routes where it is valuable traffic information. It is included at the NAP and is available to all users.

In addition, at the beginning of the year it is published at the DGT website a calendar of scheduled sport events which interurban roads are affected.

Since 2014, at the beginning of the year is been publishing a regulation about traffic restrictions. This regulation takes into account road safety, mobility and efficiency during the dates when the forecast of traffic is higher and considering the danger of some specific vehicles, as heavy vehicles. This information is also available at the NAP.

2.1.3.10 Coverage of EU-wide real-time traffic information services in Spain

Spain will apply the specifications of the provision of EU-wide real-time traffic information services beyond the trans-European road network and the motorway network.

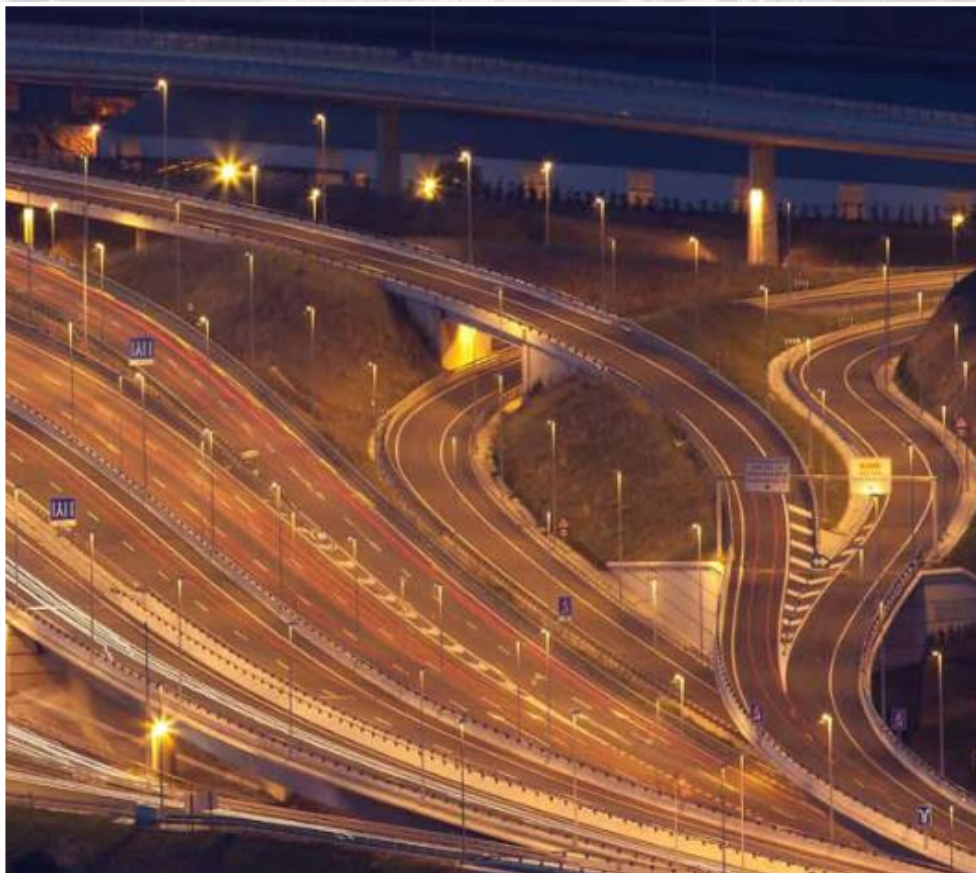
Regarding the inventory of Trans-European roads reflected on the “TENtec Interactive Map Viewer” of the European Commission:

https://ec.europa.eu/transport/themes/infrastructure/ten-t-guidelines/maps_en

It is possible to identify some relevant motorways that are not included in the Comprehensive network which should be covered with ITS services.

After this analysis, some of the roads that constitute the main road network in Spain, and which are not included in the Comprehensive classification are listed below.

Anyway these specifications will cover the whole network of Spanish roads, independently of their category.



2.1.3.11 Important Roads not included in Trans – European Networks

In the next table are showed the roads not included in Trans – European Networks:

TIPOLOGY	ROAD	ITINERARY
Motorway	A-11	Valladolid - Tudela del Duero
Motorway	A-11	Aranda del Duero
Motorway	A-11	El burgo de Osma
Motorway	A-12	Rioja
Motorway	A-13	Rioja
Motorway	A-14	Lleida
Motorway	A-2	Madrid - Barcelona
Motorway	A-2	Sils (enlace N-II con C-63) - Fornells de la Selva (enlace E-15)
Motorway	A-26	Besalú (Enlace N260 con C-66) - Olot
Motorway	A-27	Tarragona
Motorway	A-32	Bailén (enlace A-44) - Úbeda (enlace N-322)
Motorway	A-33	Estación de Blanca (A-30) - (enlace N-344)
Motorway	A-38	Valencia
Motorway	A-4	jerez de la frontera - Polígono tres caminos
Motorway	A-42	Madrid - Toledo
Motorway	A-45	Antequera (A-92/N-331) - Malaga (A-7)
Multi Lane	A-45	Málaga
Motorway	A-48	Cádiz (CA-33) - Vejer de la frontera (N-340)
Motorway	A-51	Ávila
Motorway	A-58	Trujillo (E-90) -Cáceres (N521)
Motorway	A-6	Betanzos - A Coruña
Motorway	A-60	Valladolid - León
Motorway	A-66	Onzonilla - Benavente
Motorway	A-67	Aguilar de Campo - Palencia
Multi Lane	A-68	
Motorway	A-7	Marbella - Fuengirola
Motorway	A-7	Estepona - Marbella
Motorway	A-70	San Juan de Alicante - Bonavista
Motorway	A-77	Alicante
Motorway	A-79	Alicante
Motorway	A-91	Murcia
Motorway	A-40	Cuenca – Tarancón - Ocaña
Motorway	A-44A	Granada

TIPOLOGY	ROAD	ITINERARY
Motorway	A-5R	Madrid
Motorway	A-66R	Gijón
Motorway	A-68	Tudela
Motorway	A-7N	Murcia
Motorway	A-7/N-340	Tarragona
Motorway	A-7S	Málaga
Motorway	A-7S	Cádiz – Málaga, Granada, Almería, Murcia
Motorway	AC-14	A Coruña
Motorway	AI-81	Avilés
Motorway	AI-82	Avilés
Motorway	AP-2	Lleida - Villafranca de Ebro
Motorway	AP-36	Ocaña-La Roda
Motorway	AP-36	Ocaña-La Roda
Motorway	AP-4	Jerez de la Frontera - Sevilla
Motorway	AP-41	Madrid - Toledo
Motorway	AP-46	Puerto de las Pedrizas - Málaga
Motorway	AP-4R	Sevilla
Motorway	AP-53	Santiago - Dozón
Motorway	AP-61	Segovia - El Espinar
Motorway	AP-66	Campomanes - Rioseco de Tapia
Motorway	AP-71	Astorga - León
Motorway	B-22	Barcelona
Motorway	B-23	Barcelona
Motorway	B-23	Barcelona
Motorway	B-24	Barcelona
Motorway	B-30	Barcelona
Motorway	B-40	Barcelona
Motorway	BU-11	Burgos
Motorway	CA-32	Cádiz
Motorway	Ca-33	Cádiz
Motorway	CA-35	Cádiz
Motorway	CA-36	Cádiz
Motorway	CO-32	Enlace A-45 - Enlace N437 (Cordoba)
Motorway	CS-22	Castello de la Plana (Castellón)
Motorway	CT-31	Enlace RM-332 - Enlace AP-7 (Cartagena, Murcia)
Motorway	CT-32	Cartagena (Murcia)

TIPOLOGY	ROAD	ITINERARY
Motorway	CV-80	Finaliza en el enlace con A-7. Alicante
Motorway	EL-20	Desde la AP-7. Elx. (Alicante)
Motorway	GJ-81	Hasta enlace con A-8 (Gijón, Asturias)
Motorway	GR-14	Enlace A-7 - Enlace N-340 (Motril, Granada)
Motorway	H-30	Enlace HU-3101 - Enlace N-442 (Huelva)
Motorway	H-31	Enlace A-49 - Enlace H-30 (Huelva)
Motorway	LE-11	Enlace N-630 - Enlace A-231 (León)
Motorway	LE-30	Enlace LE-20 - Enlace AP-71 (León)
Motorway	LL-12	Enlace AP-2- Enlace LL-11 (Lleida)
Motorway	LO-20	Desde Enlace N-232 (Logroño, Rioja)
Motorway	LU-12	Lugo
Motorway	M-11	Enlace M-30 - Enlace M-111 (Madrid)
Motorway	M-12	Enlace E-5 - Enlace A-1 (Madrid)
Motorway	M-13	Enlace M-12 - Enlace M-110 (Madrid)
Motorway	M-14	Enlace E-5 - Aeropuerto de Barajas (Madrid)
Motorway	M-21	Enlace M-40 - Enlace A-2
Motorway	M-23	Madrid
Motorway	M-31	Enlace M-40 - Enlace M-50 (Madrid)
Motorway	M-40	Enlace A-1. Entero (Madrid)
Motorway	M-50	Enlace R-2 (Madrid)
Motorway	M-50	Enlace A-1 - Enlace A-6 (Madrid)
Motorway	MA-20	Malaga
Motorway	MA-23	Malaga
Motorway	MA-24	Enlace A-7S (Málaga)
Motorway	MU-30	Enlace A-7S - Enlace N-301 (Murcia)
Motorway	MU-31	Enlace MU-30 - Enlace A-30 (Murcia)
Motorway	N-122A	Zamora
Motorway	N-2	Enlace Z-40 (Zaragoza) - Enlace N-2R
Motorway	R-2	Madrid
Motorway	R-3	Madrid
Motorway	R-4	Madrid
Motorway	R-5	Madrid
Motorway	Z-40	Zaragoza
Motorway	A-1	De Miranda de Ebro (L.P. Burgos) a Treviño oeste (L.P. Burgos)
Motorway	A-1	De Treviño este (L.P. Burgos) a Ziordia (L.P. Navarra)
Motorway	A-1	De Pto. Etxegárate (L.P. Navarra) a San Sebastián (AP-8)
Motorway	A-1	De Ziordia (L.P. Alava) a Pto. Etxegárate (L.P. Guipúzcoa)

TIPOLOGY	ROAD	ITINERARY
Motorway	A-10	De Irurtzun (AP-15 y A-15) a Alsasua (A-1) (Autovía de la Barranca)
Motorway	A-12	De Pamplona (A-15) a Viana (L.P. La Rioja)
Motorway	A-15	De Areso (L.P. Navarra) a Villabona (N-I)
Motorway	A-15	De Noáin (AP-15 y PA-30) a Berriozar (AP-15 y PA-34) (Ronda de Pamplona Oeste)
Motorway	A-15	De Irurtzun (AP-15 y A-10) a Areso (L.P. Guipúzcoa) (Autovía de Leitzarán)
Motorway	A-21	De Noáin (AP-15) a Yesa (N-240 L.P. Zaragoza) (Autovía del Pirineo)
Motorway	A-231	De Osorno (L.P. Palencia) a Villalbilla de Burgos (BU-30)
Motorway	A-231	De Onzonilla (N-630 y A-66r) a Sahagún (L.P. Palencia)
Motorway	A-231	De Sahagún (L.P. León) a Osorno (L.P. Burgos)
Motorway	A-316	De Úbeda oeste (A-401) a Martos oeste (Autovía del Olivar)
Motorway	A-318	De Lucena (A-45) a Cabra (A-339) (Autovía del Olivar)
Motorway	A-334	De Fines a Albox
Motorway	A-357	De Casapalma a Málaga (Autovía del Guadalhorce)
Motorway	A-376	De Montequinto a Utrera norte
Motorway	A-381	De Jerez de la Frontera (AP-4) a Los Barrios (A-7) por Medina Sidonia
Motorway	A-382	De Jerez de la Frontera (AP-4) a Arcos de la Frontera (A-384, A-372 y A-393)
Motorway	A-383	De A-7 a La Línea de la Concepción (norte)
Motorway	A-395	De Granada sur (A-44) a túneles del Serrallo (Ronda sur de Granada)
Motorway	A-480	De Sanlúcar de Barrameda (Camino de la Reyerta) a Jerez de la Frontera (N-IV)
Motorway	A-483	De Bollullos del Condado (A-49) a Almonte sur (A-474)
Motorway	A-491	De Base de Rota (P.K 15) a El Puerto de Santa María (A-4)
Motorway	A-497	De Huelva a Punta Umbría (A-5050)
Motorway	A-601	De Vitoria (L.P. Valladolid) a Segovia (SG-20 y CL-601)
Motorway	A-601	De Valladolid (VA-30) a Vitoria (L.P. Segovia)
Motorway	A-610	De Palencia a Magaz de Pisuerga (N-620)
Motorway	A-68	De Castejón (AP-15 y N-232) a Cortes de Navarra (N-232)
Motorway	A-7056	De A-357 a Parque Tecnológico de Andalucía (A-7054)
Motorway	A-8	De Basauri (AP-8) a Ontón (L.P. Cantabria)
Motorway	A-8009	De Sevilla (SE-20) a La Rinconada (A-8004)
Motorway	A-8028	De SE-30 a Torreblanca de los Caños (A-92) (vía borde de "El Pino")
Motorway	A-8062	De Bormujos (A-474) a Gines (A-8076)
Motorway	A-92	De Huéneja (L.P. Granada) a Tabernas (N-340a)
Motorway	A-92	De L.P. Málaga a Huéneja (L. P. Almería) por Loja y Granada
Motorway	A-92	De La Roda de Andalucía (L.P. Sevilla) a L.P. Granada por Archidona
Motorway	A-92	De Sevilla (SE-30) a La Roda de Andalucía (L.P. Málaga)

TIPOLOGY	ROAD	ITINERARY
Motorway	A-92G	De Santa Fe (A-92) a Granada (A-44)
Motorway	A-92M	De Estación de Salinas (A-92) a Villanueva de Cauche (A-45)
Motorway	A-92N	De Puerto de El Contador (L.P.Granada) a L.P. Murcia (A-91) por Vélez Rubio
Motorway	A-92N	De Guadix (A-92) a Puerto de El Contador (L.P. Almería) por Baza y Cúllar
Motorway	AG-11	De Padrón (N-550) a Ribeira (AC-550) (Autovía del Barbanza)
Motorway	AG-13	De O Castelo (VG-1.3) a Coiro (N-VI Km 583,200)
Motorway	AG-31	De San Cibrao das Viñas (A-52) a Celanova sur
Motorway	AG-41	De Curro (AP-9) a Sanxenxo (VG-4.1 y PO-504)
Motorway	AG-51	De Lira (A-52 salida 291 y EP-4102) a Currás (PO-402)
Motorway	AG-53	De Piñor (L.P. Pontevedra) a Barbantes (A-52)
Motorway	AG-53	De Dozón (AP-53) a Piñor (L.P. Ourense)
Motorway	AG-54	De Maside (AG-53) a O Carballiño (N-541)
Motorway	AG-55	De A Coruña (AC-552) a Carballo oeste (AC-552)
Motorway	AG-55	De Carballo oeste (AC-552) a Baio (AC-430 y VG-1.5)
Motorway	AG-55	De Baio norte a Santa Irene (AC-552)
Motorway	AG-56	De Santiago de Compostela sur (SC-20 y AP-9) a Brión (AC-543)
Motorway	AG-57	De Baiona (PO-552) a Vigo sur (VG-20) (Autopista do Val Miñor)
Motorway	AG-57N	De AG-57 a Nigrán
Motorway	AG-58	De Penelas (AG-59 Km 1) a Cacheiras (AC-841)
Motorway	AG-59	De Ostilos (AC-537) a A Ramallosa (AC-841)
Motorway	AG-64	De Ferrol a L.P. Lugo por As Pontes de García Rodríguez (Autovía)
Motorway	AG-64	De L.P. A Coruña a Vilalba (A-8 y LU-861) por Cabreiros (Autovía)
Motorway	AP-1	De Etxabarri-Ibiña (N-622 y N-624) a Léniz (L.P. Gipuzkoa)
Motorway	AP-1	De Léniz (L.P. Alava) a Eibar (AP-8)
Motorway	AP-15	De Tudela (AP-68) a Noáin (A-15 y PA-30)
Motorway	AP-15	De Berriozar (A-15 y PA-34) a Irurtzun (A-15 y A-10)
Motorway	AP-8	De Eibar (L.P. Gipuzkoa) a Basauri (A-8)
Motorway	AP-8	De Bilbao sur (A-8 y BI-631) a Valle de Trápaga (A-8)
Motorway	AP-8	De Behovia (Frontera Francia) a Eibar (L.P. Bizkaia)
Motorway	ARA-A1	De Villafranca de Ebro (N-II) a El Burgo de Ebro (N-232) (Autopista)
Motorway	AS-117	De Riaño (AS-I y AS-116) a Sama de Langreo
Motorway	AS-17	De Posada sur (Pol. Ind. Asipo) a Lugones (AS-266)
Motorway	AS-17	De Meres (A-64) a Riaño (acceso 37)
Motorway	AS-I	De Mieres (A-66) a Gijón por Pola de Siero (Autovía Minera)
Motorway	AS-II	De Oviedo a Gijón (Autovía Industrial)
Motorway	BI-626	De Puente La Salve a (N-637)
Motorway	BI-627	De Ugazko a BI-626

TIPOLOGY	ROAD	ITINERARY
Motorway	BI-644	De Kareaga (N634) a Sestao (BI-3739)(por Vega Vieja)
Motorway	C-13	De Lleida sur (LL-12) a Els Magraners (C-13B)
Motorway	C-13	De Vilanova de la Barca sur (C-13Z) a Termens sur
Motorway	C-13B	De C-13 y N-240 a LL-11
Motorway	C-16	De Barcelona a Terrassa sur (C-58)
Motorway	C-16	De Terrassa sur (C-58) a Viladecavals
Motorway	C-16	De Viladecavals a Sant Fruitos de Bagès (C-25)
Motorway	C-16	De Sant Fruitos de Bages (C-25) a Berga sur
Motorway	C-17	De Centelles sur a Montesquiu (L.P. Girona)
Motorway	C-17	De Montesquiu (L.P. Barcelona) a Ripoll (C-26)
Motorway	C-25	De Ferran (L.P. Lleida) a Manresa (BV-4501)
Motorway	C-31	De Castelldefels (C-32) a L'Hospitalet de Llobregat
Motorway	C-31	De Barcelona (plaza Les Gloriès) a El Masnou (C-32 y B-20)
Motorway	C-31C	Sant Boi de Llobregat (A-16) - El Prat de Llobregat (B-17)
Motorway	C-32	De Cubelles (L.P. Tarragona) a Castelldefels
Motorway	C-32	De Montgat (B-20 y C-31) a Palafròls (N-II)
Motorway	C-32	De Castelldefels a Barcelona (Av. Diagonal)
Motorway	C-32	De El Vendrell (AP-7) a Cubelles (L.P. Barcelona)
Motorway	C-33	De Barcelona (Avda. Río de Janeiro) a Montmeló (A-7)
Motorway	C-35	De Maçanet de la Selva (AP-7) a Llagostera (C-65)
Motorway	C-58	De Barcelona (C-33) a Terrassa (C-16)
Motorway	C-60	De Mataró (C-32 y B-40) a La Roca del Vallés (AP-7) (Autovía de La Roca)
Motorway	C-65	De Santa Cristina d'Aro a Llagostera (C-35)
Motorway	CL-631	De Cubillos del Sil a Toreno
Motorway	CM-10	Ronda norte de Guadalajara (de A-2 km 59 a N-320 por Río Henares)
Motorway	CM-40	Ronda suroeste de Toledo (de Bargas (A-40) a Nambroca (CM-42 y N-401))
Motorway	CM-41	De Valmojado (A-5) a Illescas (A-42 y CM-43) (Autovía de la Sagra)
Motorway	CM-42	De Villafranca de los Caballeros (L.P. Toledo) a Villafranca de los Caballeros (L.P. Toledo)
Motorway	CM-42	De Alcázar de San Juan (L.P. Toledo) a Tomelloso (A-43)
Motorway	CM-42	De Toledo (N-401 y A-42) a Herencia (L.P. Ciudad Real)
Motorway	CM-42	De Alcázar de San Juan (L.P. Ciudad Real) a Alcázar de San Juan (L.P. Ciudad Real)
Motorway	CM-43	De Illescas (A-42 y CM-41) a Añover de Tajo (CM-4004)
Motorway	CM-45	De Ciudad Real (A-41 y CM-4111) a Almagro (CM-412)
Motorway	CM-9420	De A-41 a Aeropuerto de Ciudad Real

TIPOLOGY	ROAD	ITINERARY
Motorway	CV-13	De Benlloch (CV-10) a Aeropuerto de Castellón
Motorway	CV-30	De V-30 a CV-31 por Ronda Norte de Valencia
Motorway	CV-336	De San Antonio de Benagéber (CV-35) a Bétera
Motorway	CV-35	De Valencia (CV-30) a Casinos por Llíria
Motorway	CV-36	De Valencia (V-30) a Torrent (A-7) por Picanya
Motorway	CV-50	De Alzira (CV-42 y CV-43) a L'Alcúdia (A-7)
Motorway	CV-50	De Benaguasil (CV-364) a Llíria (CV-35)
Motorway	CV-500	De puerto de Valencia (V-30) a El Saler
Motorway	CV-80	De Sax (A-31) a Castalla norte (CV-806 y CV-815)
Motorway	EX-A1	De Navalmoral de la Mata oeste (A-5) a Moraleja (EX-108)
Motorway	EX-A2	De Miajadas (A-5) a Vivares (L.P. Badajoz)
Motorway	GC-1	De Las Palmas de Gran Canaria (GC-1 AM) a Arguineguín (GC-200) (Autovía Marítima)
Motorway	GC-1 AM	Avda. Marítima Las Palmas de Gran Canaria (Hoya de la Plata (GC-1) a Pza. Belén María)
Motorway	GC-10	De La Garita (rotonda de las Tazas) a Telde (GC-41) (Autovía de Telde)
Motorway	GC-2	De Las Palmas de Gran Canaria (GC-1) a Bañaderos (GC-330)
Motorway	GC-2	De Gáldar (GC-75) a Las Cruces (GC-220 y GC-293)
Motorway	GI-11	De Lasarte (N-I) a San Sebastián (GI-20)
Motorway	GI-20	Variante de San Sebastián (de Errentería (AP-8 a Aritzeta (AP-8))
Motorway	GI-41	De Astigarraga (AP-8) a San Sebastián (Autovía del Urumea)
Motorway	GI-632	De Beasain (N-I) a Urretxu - Legazpi
Motorway	GIV-6546	Palafrugell a Calella y Llafranc
Motorway	M-100	De Alcalá de Henares (M-203 y M-300) a Alcalá de Henares (M-118)
Motorway	M-100	De M-111 y M-106 a A-1 (km 23)
Motorway	M-407	De Leganés (M-406) a Griñon (M-404 y M-415)
Motorway	M-45	De M-40 (Km 29) a San Fernando de Henares (M-50 y acceso A-2) por Leganés
Motorway	M-500	De A-6 (km 9) a Pte. de los Franceses (Calle 30)
Motorway	M-501	De M-40 (km 36,500) a Navas del Rey (M-855) por Brunete
Motorway	M-503	De Majadahonda (M-50) a Villanueva de la Cañada (M-600)
Motorway	M-607	De Madrid (M-40) a Colmenar Viejo norte (M-609)
Motorway	M-609	De M-607 a Soto del Real (Centro penitenciario)
Motorway	Ma-1	De Cala Major a Peguera
Motorway	Ma-13	De Palma de Mallorca (Ma-20) a Sa Pobla (Ma-2200 y Ma-3420)
Motorway	Ma-19	De Palma de Mallorca (C/ Manuel Azaña) a Lluçmajor
Motorway	Ma-20	Circunvalación de Palma de Mallorca (de Ma-19 a Ma-1)

TIPOLOGY	ROAD	ITINERARY
Motorway	MA-3101	De A-45 a Casabermeja por Los Gámez
Motorway	N-240	De Vitoria (A-1) a Legutio
Motorway	N-634	De Amorebieta este a Amorebieta oeste
Motorway	N-634	De Galdakao este a Bilbao (Atxuri)
Motorway	N-644	De A-8 a puerto de Santurtzi (Autovía del Puerto)
Motorway	N-I	De Pto. Etxegárate (L.P. Navarra) a Lasarte (AP-8)
Motorway	PO-010	De Balsa (VG-20) a Polígono industrial de Balaídos
Motorway	RM-1	De San Javier (AP-7) a Zeneta (RM-F16)
Motorway	RM-11	De Lorca (N-340 enlace 541) a Aguilas (RM-333 y RM-D14)
Motorway	RM-15	De Alcantarilla (A-7 y MU-30) a Caravaca de la Cruz (RM-730) (Autovía Río Mula)
Motorway	RM-16	De A-30 (P.K.-161) a Aeropuerto de Corvera
Motorway	RM-17	De los Martínez del Puerto (A-30) a RM-16 y RM-E7
Motorway	RM-19	De Puerto de la Cadena (A-30) a San Javier (AP-7) (Autovía)
Motorway	RM-2	De Alhama de Murcia (A-7) a A-30 (enlace 171 a Torre Pacheco) y RM-F14
Motorway	RM-23	De Alhama de Murcia (RM-2 y RM-603) a Canal del Taibilla (RM-3) (Autovía)
Motorway	RM-3	De Totana (A-7 salida 611) a Mazarrón (RM-332)
Motorway	T-315	De Reus (C-14) a Vila-seca (N-340a) (Autovía de Bellisens)
Motorway	TF-1	De Santa Cruz de Tenerife (TF-5) a Santiago del Teide (TF-375)
Motorway	TF-11	De Santa Cruz de Tenerife (Dique del Este) a San Andrés
Motorway	TF-1VE	De Añaza (TF-1) a Santa María del Mar (TF-28)
Motorway	TF-5	De Santa Cruz de Tenerife a Los Realejos
Motorway	V-14	De AG-55 a As Rañas (AC-14)

Table 46 Important Roads not included in Trans – European Networks

2.1.4 Reporting obligation under Delegated Regulation (EU) No 886/2013 on data and procedures for the provision, where possible, of road safety-related minimum universal traffic information free of charge to users (priority action c)

2.1.4.1 National Access Point (NAP)

National Access Point aggregates from different data sources, real-time traffic information. It seeks that the information in real time would help the user to improve the driving on a particular route or to advance situations of adversity that could put their safety at risk.

This information is provided by the NAP through the VMSs or the periodic reports in different media. Information may include changes in speed limits, road closures or suggest alternative routes.

2.1.4.2 Road safety-related minimum universal traffic information free of charge to users

Considering the list of road safety-related events or conditions which are describe at the COMMISSION DELEGATED REGULATION (EU) No 886/2013 the Spanish provision of information was done using different tools as is said, although most of the information is available at the NAP. Anyway, other applications and websites try to make easier the access to final users and also feed the

NAP to get relevant information. Following it is explain how it is provided and how it would be provided this information in the near future.

Besides with the app COMOBITY final users can inform if a car is stopped on the road giving its coordinates. DGT is launching a platform where the information about safety events can be included by other platforms, Service Providers and final users.



2.1.4.3 Slippery road

The information related to these events is taken from specific sensors in determined locations, users direct reporting and from AEMET. In short time, TMC would be possible to get this information through different ways; for instance, cooperative communication among vehicles, floating car data, etc...

2.1.4.4 Accident area

Nowadays most information about accidents is got through cameras, police reporting and 112 emergency services. Currently also some Service Providers feed the NAP with events related to accident or breakdowns.

2.1.4.5 Short-term road works

Knowing accurate and reliable data about road works is key for road safety and taking into account that with this information drivers will be aware of the road situation and then they will comply with the limitations and safety measures was developed the app RENO.

Every maintenance or construction company informs DGT about the scheduled road works, the area affected (kilometres, lanes, shoulders, ...). Once they access RENO, they can inform the exact moment when the work begins, pauses or finishes every day. This

data is transmitted in real time to the NAP and everybody can get updated information continuously.

2.1.4.6 Reduced visibility

The reduced visibility phenomenon is critical for safety road. In specific locations, where reduced visibility is identified as recurrent situation, has been deployed ITS that identify the reduced visibility, close the affected lanes, divert the traffic flow and forecast the duration of the episode.

Also with AEMET, DGT is working to integrate, at the Mobility Map, information related to reduced visibility forecast due to fog, heavy precipitations, winds...



2.1.4.7 Wrong-way driver

This situation is extremely dangerous and DGT is really concern about this kind of event. Therefore different pilots using video cameras, loops or access control to identify a wrong-way driver had tried but unfortunately none of them worked without failure, so they are used as conditional warnings. Anyway, DGT keep working on it, bearing in mind solutions with geo positioning by GPS. One of them is the collaboration with a Service Provider to receive notifications if a user identifies a wrong way driver.

2.1.4.8 Unmanaged blockage of a road

This event can be controlled by cameras and police reporting. As abovementioned with the NAP, LINCE informs of all those incidents that occurred in the different ways of the Spanish frame of traffic, and it is when there is an unmanaged blockage road. Also, other users and Service Providers can inform of it through LINCE via NAP.

2.1.4.9 Exceptional weather conditions

As in case of reduced visibility, information related to forecast of exceptional weather conditions is being including at the Mobility Map and available to the final users.

In addition, the WRD was programmed as an interface in LINCE, to complete the information provided by this platform. This web service has a limited access to certain users with competence in the matter. This information may be sent, likewise, to everyone concerned, for the correct dissemination of the information and the measures or actions to be carried out.

All these aspects are intended to provide a snapshot of the road condition in real time, so that it is easy to make a gross assessment of the need to establish lines of action aimed at improving traffic or preventing it for safety reasons.



2.1.5 Other: Environmental initiatives and projects

2.1.5.1 Environmental data and air quality monitoring

The improvement of air quality is regarded as a priority action line for the Ministry of Environment.

In line with the “National Plan for Air Quality and Protection of the Atmosphere 2013-2016”, ITS technology becomes essential for proper dynamic traffic management which allows to develop all kind of measures or actions based on traffic enforcement, restrictions, information, or surveillance.

In this document road traffic was considered because its high level of pollution into the environmental. In order of that, government is changing traffic laws, even these related with traffic and safety. There are twelve specific objectives, where TRA 6 and TRA 9 are the most important:

- TRA 1: Reduction of emissions from unpaved roads.
- TRA 2: Establishment of the concept of pollution episode and the regulatory framework for the adoption of specific measures.
- TRA 3: Support for the use of bicycles as an alternative way of transport.
- TRA 4: Carrying out control campaigns of the compliance of the

regulation of technical inspection of vehicles.

- TRA 5: Creation of the national state regulatory framework for the implementation of Low Emission Zones (LEZ).
- TRA 6: Implementation of a vehicle classification system according to its potential level of pollution.
- TRA 7: Establishment of special road lines (BUS-VAO)
- TRA 8: Improving driver information about air quality and mobility.
- TRA 9: Regulation of speed and traffic flows in urban and metropolitan areas.
- TRA 10: Improvements in the car park.
- TRA 11: Improvements in the public transport systems.
- TRA 12: Identification of high levels polluting vehicles.



2.1.5.1.2 Surveillance, prediction and information of air quality system

In the period between 2014-2017, many cities had different initiatives in order to improve the air quality. One significant example has been the implementation by the City of Madrid of an Information of Air Quality System, which allows knowing, in every moment and real time, the concentrations of pollutants, with the aim of protecting the health of the population and reducing risky situations.

The high concentrations are mainly caused by traffic emissions, and they take place usually with high pressures or stable atmosphere, which require the implementation of measures in order to reduce contamination levels and duration of episodes, avoiding the overcoming of hourly limit values and alert threshold.

For this reason, a division is established in the municipal territory, in such a way that in alert situations, measures can be defined depending on the population density of each area. Also, depending on the levels achieved and the duration of episodes, traffic restrictions in the city and in its accesses can be implemented in order to reduce contamination levels.

The last protocol related to these measures, is taking effect since 1st February 2016⁵.

The zoning of the municipality (Figure 27 Municipal division for pollution management) is made considering:

- Population distribution.
- Type and distribution of vigilance air quality stations.
- Traffic infrastructure, in order to facilitate the implementation of the restrictions.



⁵ Measurement protocol during high nitrogen dioxide concentration episodes. Madrid City Council.

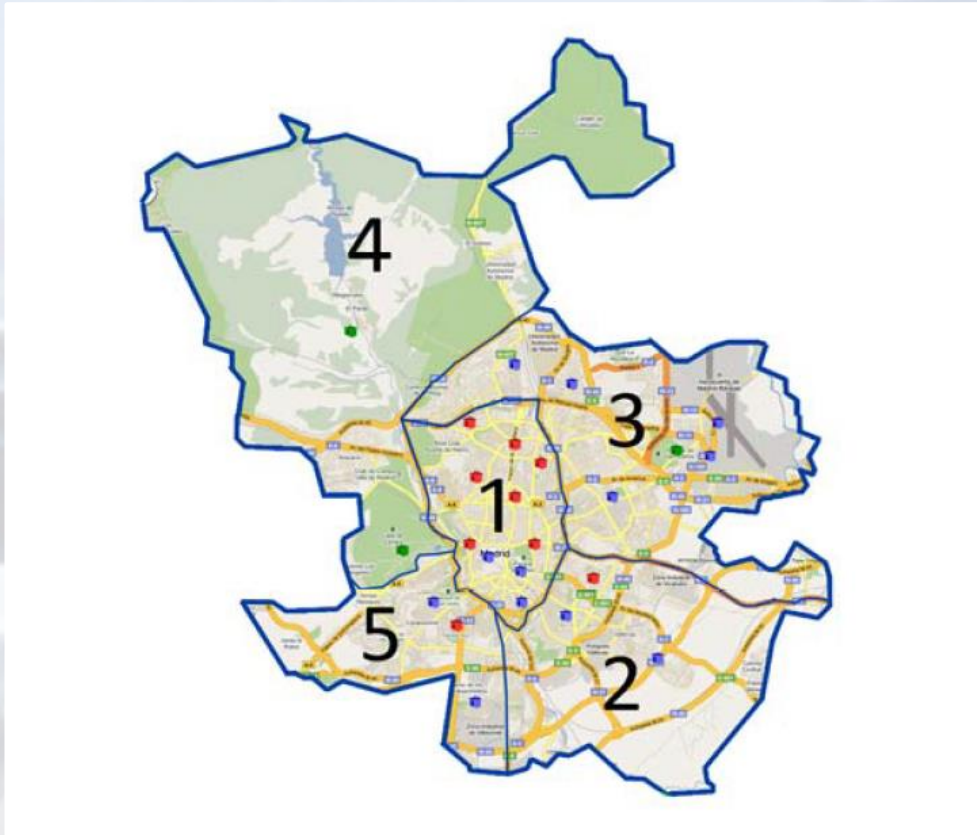


Figure 27 Municipal division for pollution management

There are three action levels depending on the nitrogen dioxide concentrations:

- Pre-warning: when in two stations of the same zone, concentration levels overcome 180 micrograms/m³ during two consecutive hours.
- Warning: when in two stations of the same zone, concentration levels overcome 200 micrograms/m³ during two consecutive hours.
- Alert: when in three stations of the same zone (or two if it is zone four), concentration levels overcome 400 micrograms/m³ during three consecutive hours.

Once one of these levels has been overcome and, if the meteorological prediction is not favourable, an episode of contamination will be considered as started. The measures for each scenario are explained on the following page:

- Scenario 1. One day with overcoming pre-warning level.
 - Informative measures 1⁶
 - Traffic speed restriction to 70 km/h in M-30 and accesses.
 - Promotional measures of public transport.
- Scenario 2. Two consecutive days with overcoming pre-warning level or one day with overcoming of warning level.
 - Informative measures 1 and 2⁷
 - Traffic speed restriction to 70 km/h in M-30 and accesses.
 - Prohibition of parking in SER (regulating parking service) places inside M-30.
 - Promotional measures of public transport.
- Scenario 3. Two consecutive days with overcoming warning level.
 - Informative measures 1 and 2
 - Traffic speed restriction to 70 km/h in M-30 and accesses
 - Prohibition of parking in SER (regulating parking service) places inside M-30
 - Traffic restrictions inside the central core (interior area of M-30) of the 50% of all vehicles
- Promotional measures of public transport
- It is not recommended the circulation of free taxis, except Ecotaxis and Eurotaxis inside the central core, being these vehicles authorised to park in SER places in addition to in its habitual stops.
- Scenario 4. Three consecutive days with overcoming warning level or one day with alert level.
 - Informative measures 1 and 2
 - Traffic speed restriction to 70 km/h in M-30 and accesses
 - Prohibition of parking in SER (regulating parking service) places inside M-30
 - Traffic restrictions inside the central core (interior area of M-30) of the 50% of all vehicles
 - Traffic restrictions in M-30 for the 50% of all vehicles
 - Promotional measures of public transport
 - It is not recommended the circulation of free taxis, except Ecotaxis and Eurotaxis inside the central core, being these vehicles authorised to park in SER places in addition to in its habitual stops

⁶ The information will be accessible for the population, with simultaneous warnings to politicians, municipal departments and organizations related to health and environment. It will inform about the values achieved, the hour and the place where the levels have been registered, as well as a prediction of the evolution and recommendations. In the same way, traffic restrictions and promotional measures of public transport will be announced.

⁷ In addition to informative measures 1, Health Environmental Alert System will be activated.

All these measures are applied as soon as possible after being achieved any of the described scenarios. Promotional measures of public transport are applied simultaneously to traffic restrictions. And finally, all these actions are deactivated when the concentrations achieve normal values.

2.1.5.1.3 Vehicle classification according to its polluting potential

Since April 2016, there is a resolution of the DGT which includes the complete classification of the vehicle fleet regarding to the level of emission of the fleet vehicle. The 50% with lower emissions (about 16 million) were identified with a badge.

This classification has its origin on the National Air Quality and Air Protection Plan (specific objective in transport – traffic and mobility TRA6) which states that the main emission source of particulates and nitrogen dioxide is road traffic and proposes the classification of vehicles according to the levels of pollution they emit.

The Royal Decree 100/2011, by which update the list of potentially polluting activities in the atmosphere and establish the basic provisions for its application, includes a list of vehicles in the annexes, taking into account the technology and the standardization rules.

The categorization of the vehicle fleet aims to discriminate positively the vehicles more respectful with the environment and to be an effective instrument in municipal policies. The classification of the vehicles is recorded in the national registry of vehicles of the DGT and its access is available in real time to the bodies with competence in terms of mobility, road safety, environment, etc.

This is the categorization of the vehicle fleet currently implemented: with badge:

ZERO EMISSIONS



- Mopeds
- Tricycles
- Quadricycles
- Motorcycles
- Cars
- Light vans
- Vehicles with more than 8 seats
- Vehicles for the transport of goods classified in the DGT Vehicle Register as:
 - Electric battery vehicles (BEVs)
 - Extended autonomous electric vehicle (REEV)
 - Plug-in hybrid electric vehicle (PHEV) with A minimum range of 40 kilometers
 - Fuel cell vehicles

ECO



- Cars
- Light vans
- Vehicles with more than 8 seats
- Vehicles for the transport of goods classified in the DGT Vehicle Register as:
 - Hybrid plug-in vehicles with a range of < 40 km
 - Non-plug hybrid vehicles (HEV)
 - Natural gas powered vehicles
 - Natural gas powered vehicles (CNG and LNG) or liquefied petroleum gas (LPG)In any case, they must comply with the criteria of label C.

C



- Cars and gasoline light vans registered since January 2006 and diesel since 2014
- Vehicles with more than 8 seats and freight transport, both gasoline and diesel, registered since 2014. Therefore, the gasoline ones must comply with Euro 4,5 and 6 standard and the diesel ones with Euro 6.

B



- Cars and gasoline light vans registered since January 2000 and diesel since January 2006
- Vehicles with more than 8 seats and freight transport, both gasoline and diesel, registered since 2005. Therefore, the gasoline ones must comply with Euro 3 standard and the diesel ones with Euro 4 and 5.

The criteria for classifying the vehicle fleet are the result of a long and deliberate work led by the DGT and in which had participated the Madrid City Hall, the Barcelona City Hall, the Royal Automobile Club of Catalonia (RACC), The National Association of Manufacturers of Automobiles and Trucks (ANFAC), the Ministry of Agriculture, Food and Environment and the Ministry of Industry, Energy and Tourism.

Each authority with competence in terms of taxation, mobility or environment may decide at any time what incentives offers to less polluting vehicles within its sphere of competence. For example, the DGT already allows to circulate in the bus lane VAO to vehicles "Zero emissions".



2.2 Priority area II. Continuity of traffic and freight management ITS services

The projects and activities described at this Priority area aims to improve the competitiveness and safety of the freight transport by road. It is focus on speeding up the administrative processes using IT's and to track the freight transports, mainly for euro modulars transport system, special transports and high occupancy of vehicles (in case of adverse weather conditions).

2.2.1 Description of the national activities and projects

The ITS Directive states that the specifications and standards for the continuity and interoperability of traffic and freight management in services, shall include:

- The definition of the necessary measures to develop an EU ITS Framework Architecture.
- The definition of the minimum necessary requirements for the continuity of ITS services.
- The definition of the minimum necessary requirements for the continuity of ITS services for the management of freight along transport corridors and across different modes of transport.
- The definition of the necessary measures in the realisation of ITS applications.
- The definition of the necessary interfaces to ensure interoperability and compatibility between the urban ITS architecture and the European ITS architecture.

There are some activities and initiatives associated with these topics:



Figure 28 Priority Area II

2.2.1.1 *TRAZA*

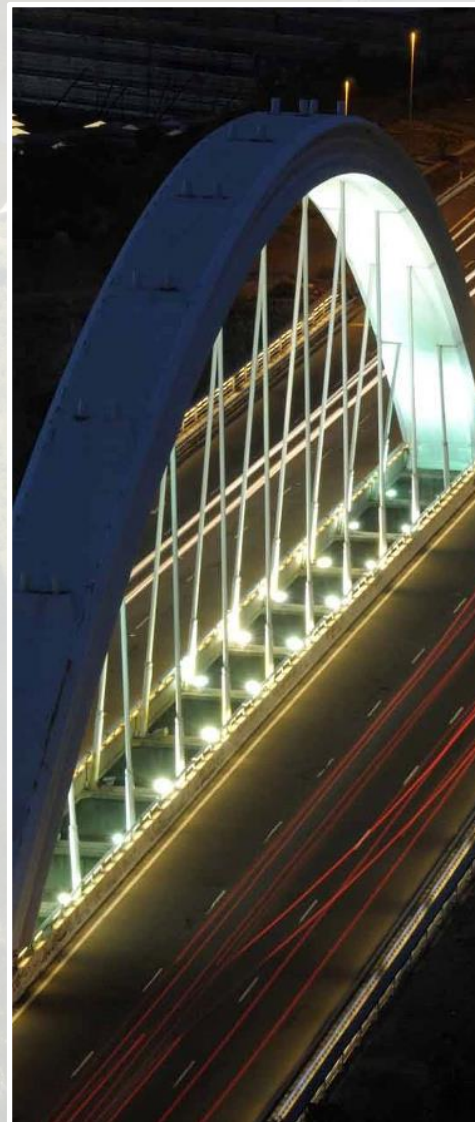
TRAZA is an application developed by the Ministry of the Interior for the telematic management of authorizations for the rapid freight transport through the Spanish national road network and for the management of requests for road cuts for works. It is a way to speed up the administrative process and communication of the trips to the Traffic Police in case an escort is required or if required by regulation. Link to this administrative process it is possible to track the position of the fleets of especial vehicles (oversized and exceed mass limit)

2.2.1.2 *Digital Tachograph*

In accordance with European regulations, the use of the digital tachograph has been implemented for new registration in 1st of January on 2006 and the inclusion in older vehicles has been encouraged.

Analog tachograph discs have been replaced by smart cards, based on a chip, which store the driving information and give access to certain functions according to the user profile (driver, company, control body or workshop). The information stored will be the same in terms of times and speeds that currently appears in analog tachographs, but will be virtually impossible to manipulate.

The vehicle unit will be installed inside the driver's cab so driver can visualize and operate it. This is communicated with the sensor, which is installed in the gearbox, connected to the unit by a cable. The installation is sealed so that it can not be replaced by unauthorized persons.



2.2.2 Progress since 2014

2.2.2.1 Transport monitoring

In relation with the special freight transport authorization, as above-mentioned there is a national work about communication about the GPS reference of these transports to other users. The tracking of these big vehicles in the way it is available to predict possible incidents, traffic congestions, advice users making it available in the NAP and by advertising with the use of VMS.

2.2.2.2 Transport Information Portal

The use of new technologies in the management of traffic for road transport continues being extended, optimizing existing capacities and LOS.

As explained on section 2.1.2.2 Land transport management specifically on the first subsection, 2.1.2.2.1 Provision of information services on multimodal movements, and within the context of the Ministry of Public Works and Transport, the "Transport Information Portal" is the key for the proper operation and management of all modes of transport.

In addition to the "Transport Information Portal", more initiatives are being considered for optimizing the continuity of traffic. Some of these ideas or potential

functionalities are explained on the following paragraphs.

The Authorities are giving support to multimodal initiatives developing the creation of "Integrated Multimodal Tickets" and boosting the implementation of the "Spanish Contactless Card" for the payment of public transport and "NFC Technology" for payment.

Besides, the so-called "Last Mile" will be incorporated into the integrated ticket sale. Metropolitan areas have already introduced, through the Consortia, the integrated transport titles. It will promote the formalization of agreements between the main intercity transport operators and the Consortia or metropolitan transport authorities (ATM), for the incorporation in the purchase of the long-distance ticket of a metropolitan transport title.

Regarding the "electronical administration", the remove of physical documents and the incorporation of telematic processing, both authorizations and licenses, is being implemented, and also the development of electronic communications between administrations and companies with an automatic verification of the existence of first registrations in transport authorizations.

With regard to the "Promotion of I+D+i", series of measures have been prepared to promote innovation and implementation of NNTTs in the land transport sector with a "NNTT Impact Action Plan". Also, measures in the short and medium term which will contribute to a more rational and efficient use of the transmission networks, which have a direct impact on the reduction of emissions, increased safety and cost reduction.

Finally, the PITVI⁸ introduces the "NNTT in the Road Infrastructures" that allow to improve the efficiency of the operation of the road infrastructures. It will improve the service to the user in particular and to the citizen in general as in the case of the implementation of "Safe car parks for trucks" in the Trans-European high-capacity network.

2.2.2.2.1 Spanish Contactless Card

For the implementation of "Spanish Contactless Card" (TES), the "Spanish Contactless Card Committee" (TESC), holds periodic meetings. Its objective is to facilitate the interoperability of the many existing cards and the incorporation of new Transport Authorities that do not have it.

The "Spanish Contactless Card" used is a M Card / Fidesmo with Maifare Classic, loaded with minimum information. It needs an Identifier of the Managing Entity (TESC) and a verification firm. Cards includes a MAC algorithm D accompanied by an NXP list to make the interoperability of the cards.

The use of this card would integrate private companies, including taxis or school transportation, in order to add new travelers to the network. TES is currently being implemented in several Spanish regions. In the "País Vasco" interoperability has been achieved between the three provincial cards.

2.2.2.2.2 NFC Technology

In the case of NFC technology, mobile phone certification protocols are used which, through an approval process, allows them to download an App with the Móbilis⁹ virtual transport card. This technology is implemented in Valencia.

The law draft was published in September 2016, as a regulation of the communication of mobile phones with NFC technology with the public transportation environment.

⁸ PITVI: <https://www.fomento.gob.es/MFOM/LANG-CASTELLANO/PLANES/PITVI/>

⁹ Móbilis: <http://www.tarjetamobilis.es/>

2.3 Priority area III. ITS road safety and security applications

Advances in the field of road safety in Spain have made it possible to achieve figures in 2016 that place it at the third country in the European Unión with lower rate of fatalities per million capita in traffic accident, 37 against the 50 of the EU average. However, the current trend is sustaining the numbers of accidents, so it is required to continue looking for solutions that alter this trend towards the decline of victims and reach the goal of zero fatalities in traffic accidents.

In this framework, ITS have a key role and therefore, since Spain is committed to the deployment of these systems that will without doubt continue facilitating citizen trips in a safe way.

2.3.1 Description of the national activities and projects

This priority area is focused in describe the specifications and standards for ITS road safety and security applications. This priority area includes the following priority actions:

- Priority action (d): definition of the necessary measures for the harmonised provision of an interoperable EU-wide eCall.
- Priority action (e): definition of the necessary measures to provide ITS based information services for safe and secure parking places for trucks and commercial vehicles, in particular in service and rest areas on roads.
- Priority action (f): definition of the necessary measures to provide ITS based reservation services for safe and secure parking places for trucks and commercial vehicles.

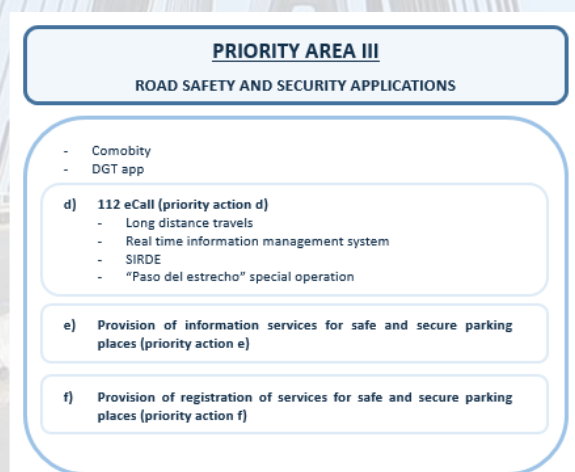


Figure 29 Priority Area III

2.3.1.1 Comobity

As an example of road safety applications that had been introduced in Spain during the last 3 years, Comobity is an application developed by DGT in 2015, whose main objective is to provide intelligent connectivity services to move towards safe and healthy sustainable mobility.



Figure 30 Comobity - Application Logotype

In a simple and free way, the driver is informed sufficiently in advance by voice announcements (avoiding any interference in driving) of the presence of vulnerable users (cyclists and pedestrians) and traffic incidents (works, stationary vehicles, etc).

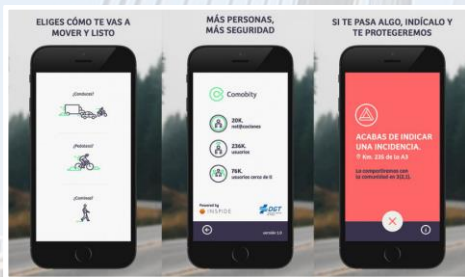


Figure 31 Comobity - Functionalities

The application is simple, intuitive, anonymous (guaranteeing at all times the privacy of the users) and free for both Android and IOS. It can be used on any interurban roads throughout the country.

This new service is the first step towards intelligent mobility based on new technologies, in which all the actors involved in a joint and collaborative way, the users (pedestrian, driver, cyclist...), cars and the mobility manager, providing added value traffic information in real.



2.3.2 Progress since 2014

2.3.2.1 DGT APP

In parallel with Comobity, and with the purpose of contributing incident detection improvement, incident info dissemination, supporting traffic supervision and providing safety related information to road users, the DGT APP continues working nowadays.

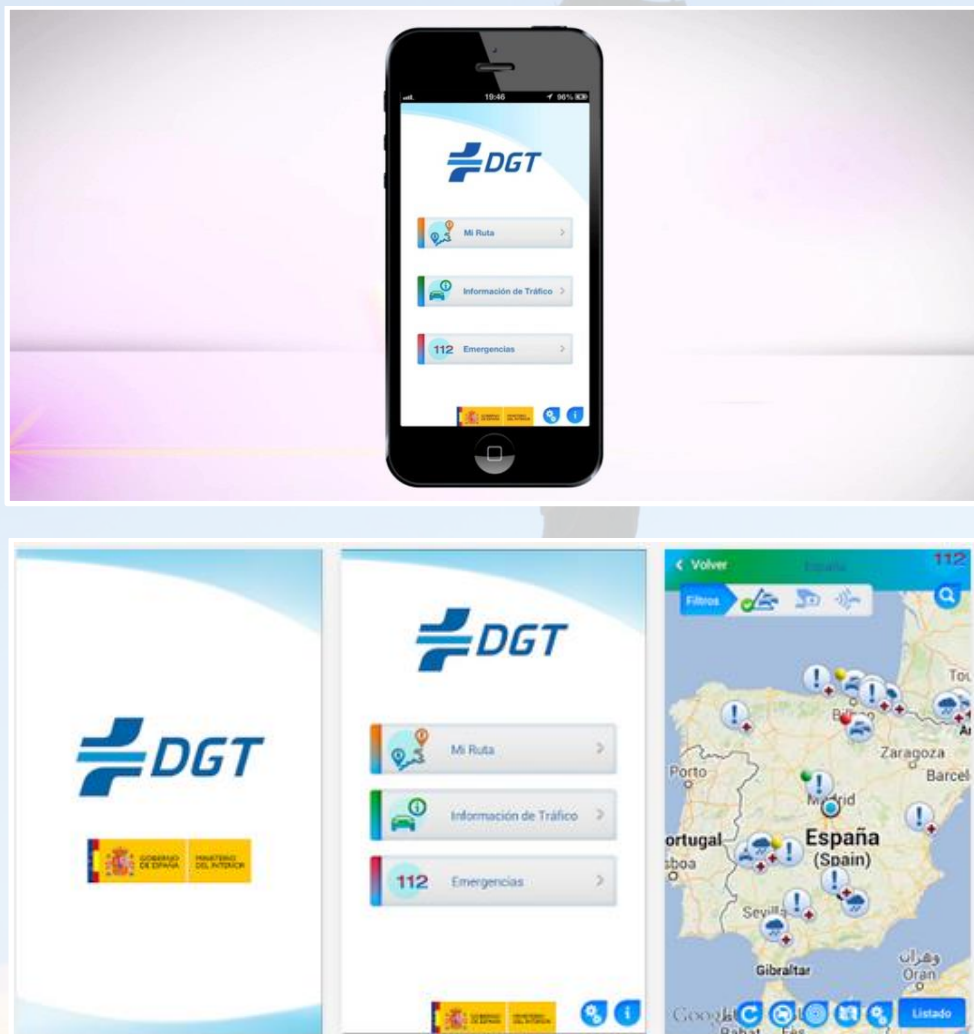


Figure 32 DGT APP - Main interface

2.3.3 112 eCall (priority action d)

For Spain, the harmonized provision for an interoperable EU-wide eCall service constitutes a priority action and shares the vision that it would contribute to the reduction of the number of fatalities in the European Union as well as the severity of injuries caused by road accidents by reducing the response time of the emergency services.

Regarding the status of deployment, the nineteen (19) 112 regional PSAPs (Public Service Answering Points) had expressed their commitment in fulfilling the requirements for eCall PSAPs included in the Commission Delegated Regulation (EU) No 305/2013 of 26 November 2012 supplementing Directive 2010/40/EU of the European Parliament and of the Council regarding the harmonized provision for an interoperable EU-wide eCall, subject to the compliance of the other stakeholders involved (mobile network operators, car manufactures, ...)

112 regional PSAPs are currently working in their projects of deployment.

It is envisaged an approach in which the conformity of the operations eCall PSAPs is assessed but avoiding extra costs for the Spanish Public Authorities.

112 Regional PSAPs had expressed their commitment of a self-assessing of the conformity operations of each eCall PSAP, in the same way as they currently work with E112 calls handling. The list will be provided, in any case, no later than 1st October 2017.

eCall PSAP's will be deployed in the 17 autonomous regions and the autonomous cities of Ceuta y Melilla, which means a complete coverage of the Spanish territory:

- Andalucía
- Aragón
- Asturias
- Baleares
- Canarias
- Cantabria
- Castilla-La Mancha
- Castilla y León
- Cataluña
- Extremadura
- Galicia
- La Rioja
- Madrid
- Murcia
- Navarra
- País Vasco
- Valencia
- Ceuta
- Melilla

All of these PSAPs' infrastructure are being upgraded in order to allow the proper receipt and handling of eCalls (automatic and manual) using the 112 number.

The geographical coverage of each eCall PSAP includes the respective territory of the Autonomous Region or Autonomous City.

The description of the conformance tests has not been defined yet, but the work is in progress to be available by 1st October 2017.

This conformity assessment will be based on the part of the standard Intelligent transport systems -eSafety- eCall end to end conformance testing (EN 16454) that relates to PSAPs conformance to pan-European eCall.

eCall procedures in Spain related to privacy and data protection included in Delegated Regulation 305/2013 article 6 will comply with the Spanish Law on Personal Data Protection (LOPD.- Ley Orgánica de Protección de Datos de Carácter Personal de España) approved on 13th December 1999, in the same way as they currently work with E112 calls handling.



Figure 33 eCall Logotype

2.3.4 Reporting obligation under Delegated Regulation (EU) No 885/2013 on the provision of information services for safe and secure parking places for trucks and commercial vehicles (priority action e)

As part of the framework for deployment of intelligent transport systems on roads, pursuant to ITS Directive 2010/40/EU and Directive 2008/96/EC on the management of road network safety, respectively transposed to the Spanish legal system with Royal Decree 662/2012 of April 13, establishing the framework for deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transportation and Royal Decree 345/2011, of March 11, on the management of road network safety in the National Road Network of Spain, in order to avoid unsuitable parking, contribute to the safety of drivers and freight, aid compliance with mandatory rest periods, the aforementioned EU regulation established the priority action “e” on the provision of information services for safe and secure parking places.

Pursuant to Commission Delegated Regulation (EU) 885/2013 with regard to the provision of information services for safe and secure parking places for trucks and commercial

vehicles, and Law 37/2015, of September 29, on Roads, in Articles 26 and 27.5, the General Director of Roads resolved to implement the National Access Point for information, managed by D. D. of Road Management and Operation, on the current safe and secure parking places in the National Road Network of Spain.



Actually, the list of safe and secure parking is:

PARKING	MUNICIPALITY	VERIFIED
Centro Benaventano de Transportes, S.A	Benavente	Yes
Ciudad del transporte de Molina de Segura	Molina de Segura	Yes
Ciudad del Transporte de Pamplona	Imarcoain	Yes
La Tortuga Service Area	La Jonquera	Yes
Parking Exit 3 AP-7	Llers NO	No
Repsol Security Parking Albatera	San Isidro de Albatera	Yes
Repsol Security Parking Fontioso	Fontioso	Yes
Repsol Security Parking Guarromán	Guarromán	Yes
Repsol Security Parking La Junquera	La Junquera	Yes
Repsol Security Parking Mirabueno	Mirabueno	Yes
Repsol Security Parking Mérida	Mérida	Yes
Repsol Security Parking Valdecarpinteros	Valdecarpinteros	Yes
Repsol Security Parking Venta del Moro	Caudete de las Fuentes	Yes
Repsol Security Parking Zaragoza Plaza	Zaragoza	Yes
Truck Park Montseny	Llinars del Valles	Yes
Truck Park Porta Barcelona	Castellbisbal	Yes

Table 47 List of safe and secure parking places in the National Road Network of Spain



Figure 34 Safe and secure parking locations

The information showed of these parking is:

- Name of facility.
- Location.
- Access road.
- Longitude/latitude coordinates.
- Number of parking places.
- Parking rate.

- LABEL security and service levels.
- Available security equipment.
- Available service equipment.
- Phone number.
- Facility website.

The owners of facilities who want information on their parking areas to be accessible on the National Point can request they be included:

- Affidavit.
- Self-assessment form.

To classify facilities, a dual-classification system has been adopted, Service Levels and Security Levels, which is established as part of the European project Label.

On the other hand, the application WRD has the singularity to reflect the occupancy rate of emergency parking areas. These areas are intended to store vehicles diverted by cuts on roads affected by severe winter episodes. This information, in addition to providing a clear view of the adverse weather conditions in relation to the road network, makes it possible to optimize journeys and decisions in emergency situations.



2.3.5 Registration of services for safe and secure parking places for trucks and commercial vehicles (priority action f)

2.3.5.1 Current status as overview

Regarding specifications for priority action (f) on the provision of reservation services for safe and secure parking places for trucks and commercial vehicles, the Commission conducted several consultations with Member State experts and the main stakeholders. The discussions highlighted that there is a low number of parking areas that could offer reservation services, and that there was, therefore, currently no need for specifications and standards on reservation of parking areas. However, further developments will be monitored and, if appropriate, the issue reconsidered in this perspective. Should standardisation activities be needed, they might be considered in the broader context of the forthcoming e-Freight initiative. In Spain, with respect to reserved places as parking spaces, it evolves in line with Priority Action E. One first phase of short-term deployment is carried out, followed by a phase of improvement of all certified parking areas.

Actually, almost 6% of the heavy traffic vehicles that circulate on Spanish national roads are vehicles from other EU countries, usually

occupied by drivers who don't know the itinerary or the situation of the road, so they are in a situation of vulnerability. It is therefore sought to provide a reservation service that allows to provide a safety to all these drivers.

The offer of parking places does not cover all the existing demand, so what is sought is to expand this service and create a common reservation platform to facilitate access to the service without the need to use different access points according to the provider.



2.3.5.2 New parking areas in Spain

A new provider is in undertaking a deployment of a series of safe and secure parking areas under the umbrella of LABEL UE project.

Projects in this area are being carried out under the framework of the EU LABEL project. New suppliers are expected to provide new services, so seek to create a standardization for all companies so that they all meet a minimum level in the service offered.

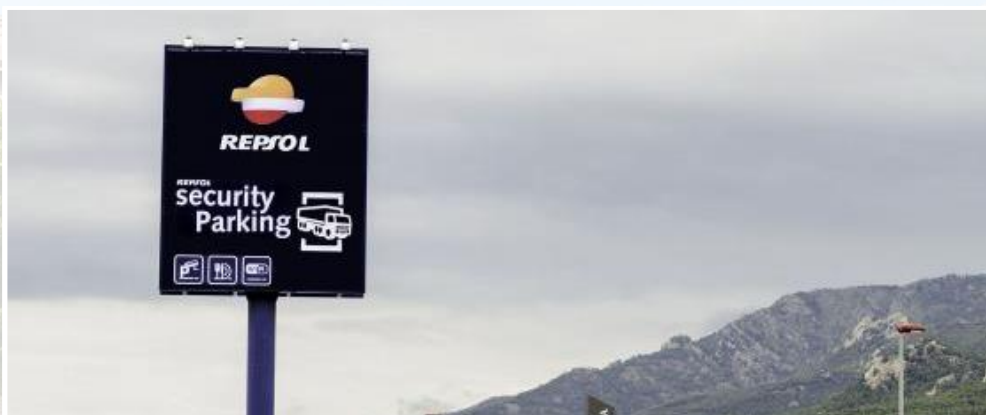


Figure 35 New parking sites for heavy and commercial vehicles in Spain

2.3.5.3 Reservation services scheme

There are currently companies that can make reservations from their website by streamlining the service utilization process, such as REPSOL:

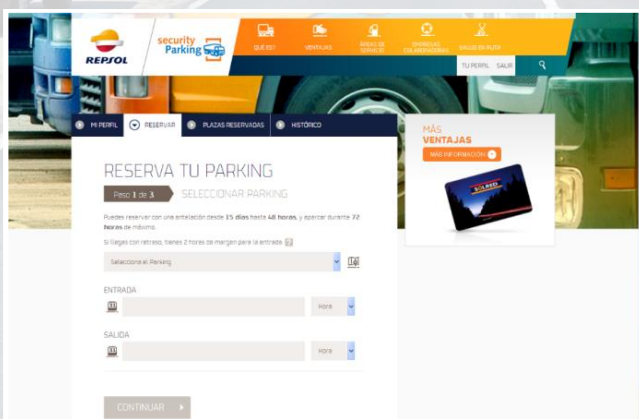


Figure 36 Reservation web (source: REPSOL)

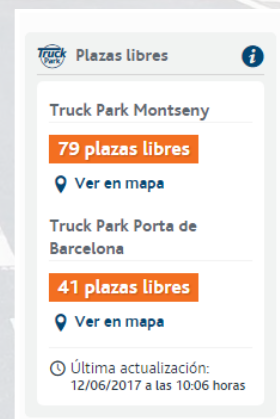


Figure 37 Information of free places (source: autopistas)

Other companies provide to the user a list of free places that exist in their service areas. By means of this information user can organize his route in the short term to be able to use this specialized area.

This website does not allow reservations but there, user can purchase a card linked to the user bank account that allows to access without waiting for the parking area.



2.4 Priority area IV. Linking the vehicle with the transport infrastructure.

According to the 2014 report of the information society in Spain, Spanish people are the most connected in Europe, being eight of every 10 Mobile smartphones, living in addition more than 23 million active users of Apps making 3.8 million downloads of application, customers per day.

And a definitive fact, Spanish people give the vehicle the place of honour as a favourite device of connection to Internet. In consequence, the society is demanding, and technology is enabling, that the concept of connected vehicle ceases to be a goal to conquer, to start to become a daily reality. In this context, where the new technologies offer exchange capacity of large amount of data in real time, contrasting security mechanisms and

possibilities of absolute personalization of services, it is necessary to accept the challenge of becoming digital and personal partner for every citizen, offering new use cases which will enhance transport safety and efficiency.

This priority area describes the specifications and standards for linking vehicles with the transport infrastructure.

These specifications shall include:

- The definition of necessary measures to integrate different ITS applications on an open in-vehicle platform.
- The definition of necessary measures to further progress the development and implementation of cooperative (vehicle-vehicle, vehicle-infrastructure, infrastructure-infrastructure) systems.

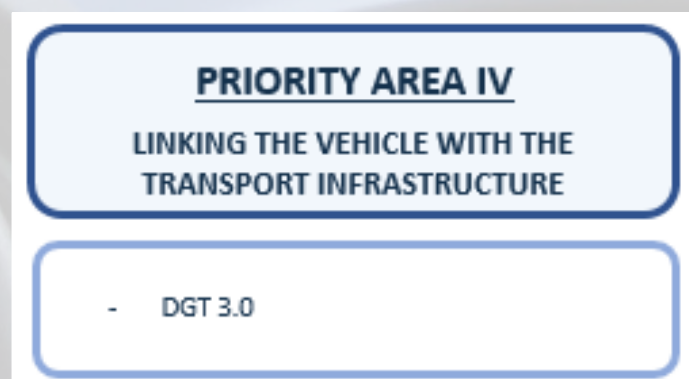


Figure 38 Priority Area IV

2.4.1.1 DGT 3.0

Based on a collaborative environment, this project will analyse the implementation of Day 1 and Day 1,5 C-ITS services through an IoT platform, allowing the interconnection of all actors involved in the traffic and mobility ecosystem.

DGT 3.0 aims to provide road safety and mobility services based on cellular 3G and 4G/LTE communication technologies. Promoted by the General Directorate of Traffic includes the participation of different stakeholders.



Figure 39 DGT 3.0 ecosystem

This project will analyse the real-time performance capacity requirements that enable the reception and processing of large amounts of data and the introduction of logics that will benefit road safety, thereby disseminating them by making them available to road users which may be interested because of its direct impact on the prevention and reduction of accident figures.

In the development, planning, analysis, design, codification and implementation of “Day 1” and “Day 1.5” use cases development will take place. These are necessary to create the algorithms that will allow, based on the information generated in the Spanish road network, real-time decision-making and the dissemination of road information to other road users affected by it.

The following figure shows the structure of the platform:

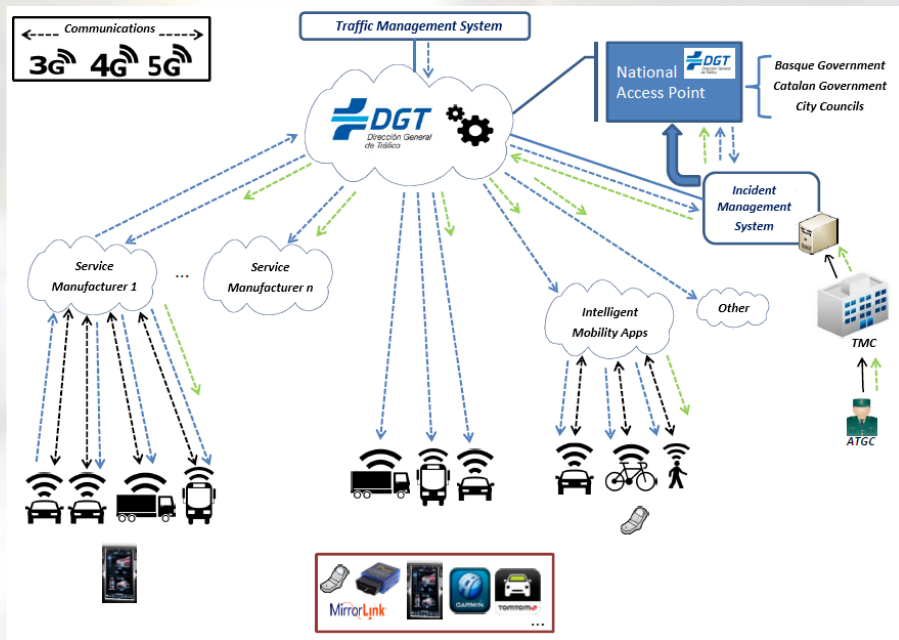


Figure 40 DGT 3.0 - Structure of the pilot

DGT 3.0 will be developed in the entire road network of the Member State. It will consider the following services:

- Day 1
 - Slow and stationary vehicle(s)
 - traffic ahead warning
 - Road works warning
 - Weather conditions
 - Emergency vehicle approaching
 - Other hazardous notifications
 - In-vehicle speed limits
 - Probe vehicle data: CAM Aggregation
 - Shockwave Damping
- Day 1.5
 - Information on fuelling & charging stations for alternative fuel vehicles
 - Vulnerable Road user protection
- On street parking management & information
- Off street parking information
- Park & Ride information
- Traffic information & smart routing
- Communication technologies used: cellular 3G and 4G/LTE
- The use cases will address the following end-users:
 - Long distance transit road users, both cars and HGV - Heavy Goods Vehicles-
 - Local commuters, notably in the access to big cities
 - Cyclists and pedestrians
 - Emergency vehicle fleets
- Estimated number of users considered in the pilot: 10.000
- Sections covered: all roadnetwork in Spain.

2.5 Other initiatives / highlights

2.5.1 Description of other national initiatives / highlights and projects not covered in priority areas 1-4:

Spain contributes to other projects, initiatives and platforms, related with the four priorities areas:



Figure 41 Other Initiatives

2.5.1.1 EU EIP

The EU ITS Platform (EU EIP) is the place where National Ministries, Road Authorities, Road Operators and partners from the private and public sectors of almost all EU Member States and neighbouring countries, cooperate in order to foster, accelerate and optimize current and future ITS deployments in Europe in a harmonized way.

The EU ITS Platform is co-financed by European Union under the CEF call 2014-EU-TM-0317-S. In order to foster cooperation and the necessary consensus between EU Member States, the EU ITS Platform looks for the establishment of a commonly understood state of the art as well as the promotion of the actual take-up of EU specifications, guidelines, best practices and/or methodologies.

Nowadays, DGT as a representation of Spain, is actively participating in some of the working groups which comprise the EU EIP project, specifically on the following ones which are underlined:

- Activity 1 – EU ITS Platform Governance and Management
 - Sub-Activity 1.1: Member State Supervision Assembly
 - Sub-Activity 1.2: Project Management
 - Activity 2 – Monitoring and Dissemination (including ITS Deployment Guidelines)
 - Activity 3 – Feasibility study East-West Corridor and first pilot implementation.
- 
- Figure 42 European ITS Platform - Logotype*
- Activity 4 – Harmonization Cluster
 - Sub-Activity 4.1: Determining Quality of European ITS Services

The scope of this sub-activity is the development of quality requirements and quality assessment practices for all ITS Directive priority services involving the road authorities and operators in a major role, building up on results from EIP and EIP+, widening the scope to other priority services than for priority actions b) and c).
 - Sub-Activity 4.2: Facilitating automated driving

With the current growth and investment in automated driving it is important that

road authorities and operators are participating and informed. The scope of this activity is to prepare road authorities and operators to make decisions on facilitating automated driving and automating their own core business.

- Sub-Activity 4.3: ITS Deployment Road Map Update
- Sub-Activity 4.4: Cooperative ITS Services Deployment Support
- Sub-Activity 4.5: Liaison and harmonization on interfaces for data exchange
- Sub-Activity 4.6: Monitoring and Harmonisation of Single Point of Access
- Sub-Activity 4.7: Provision of updates of ITS spatial road data
- Activity 5 – Evaluation

2.5.1.2 SCOOP@F Part 2

SCOOP@F is a Cooperative ITS pilot deployment project that intends to connect approximately 3000 vehicles with 2000 kilometres of roads. Its objective is to improve the safety of road users and road operating staff. It must also help to improve traffic management and multimodality.

SCOOP@F Part 2 includes the validations of C-ITS services in open

roads, cross border tests with other EU Member States (Spain, Portugal and Austria) and development of a hybrid communication solution (3G-4G/ITS G5). SCOOP@F Part 2 will cooperate with ongoing European pilot projects and the EU C-ITS platform.

The project, co-financed by European Union under the CEF call 2014-EU-TA-0669-S, aims at reaching a critical mass in the number of tested vehicles, roads and services, in order to provide a representative evaluation of C-ITS. It also intends to stimulate the collaboration between automotive manufacturers and road operators, the exchange of best practice and innovation in solving common problems.



Figure 43 SCOOP@F - Logotype.

2.5.1.3 SISCOGA

SISCOGA (SIStemas COoperativos Galicia), launched by DGT and the Technological Automotive Centre of Galicia, proposes the creation of intelligent infrastructures, which provide in real time information adapted to each vehicle, improving road safety in journeys.

SISCOGA is part of two European pilot projects:

- Compass4D, which aims to improve safety and energy efficiency for sustainable mobility in urban environments, especially in intersections.
- CO-GISTICS, which analyses how to improve truck logistics in cities in terms of energy efficiency using cooperative systems.

For the development of the tests and the prototypes, 20 vehicles have been equipped with custom-made computer devices (on-board communication units, HMI and GPS systems with specific maps) and a motorway zone in the surroundings of Vigo has been chosen (AP9, A55 and A52). Along these roads, the project considers the deployment of a fibre optic ring, 30 vehicle-road communication units, 21 cameras, 19

information panels and 10 weather stations.

All this technological infrastructure provides information, which once treated by the technological systems, can display in an information panel placed in each vehicle varied information of interest for the drivers: the incorporation of cars in accesses, the optimum speed of approach to traffic lights, variable speed limits, approaching emergency vehicles, or any notice related to congestion and weather conditions.

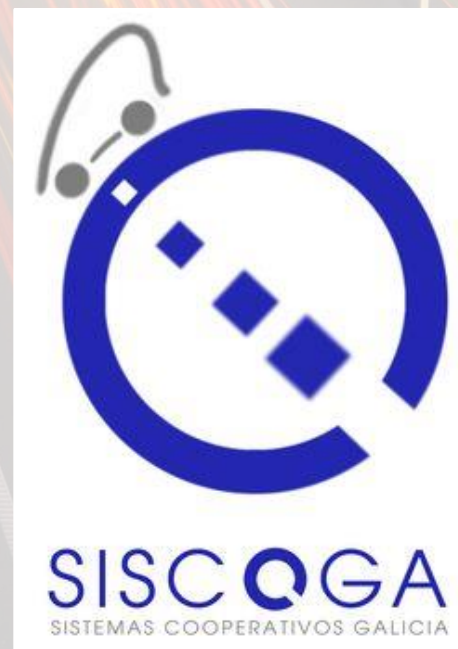


Figure 44 SISCOGA - Logotype

2.5.1.4 *AUTOCITS*

Another European project in which Spain is involved is Auto C-ITS. The aim of this study is to contribute to the deployment of C-ITS in Europe by enhancing interoperability for autonomous vehicles as well as to boost the role of C-ITS as catalyst for the implementation of autonomous driving. This Project is co-financed by European Union under the CEF call 2015-EU-TM-0243-S.

For achieving these goals, pilots will be implemented in three major Core Urban nodes: Paris, Madrid, Lisbon, the three of them located along the Core network Atlantic Corridor in different Member States.

The Action consists of Analysis and design, Pilots deployment and assessment, Dissemination and communication as well as Project Management and Coordination.

The three pilots will test and evaluate C-ITS services for autonomous vehicles under the applicable traffic regulation, study its extension to other European countries and contribute to the C-Roads and C-ITS platform as well as to other European standards organizations.



Figure 45 Auto C-ITS - Logotype

2.5.1.5 CONCORDA

The CONCORDA (CONnected CORidors Driving Automation) project, initiated by EATA (European Automotive Telecom Alliance), aims at enhancing and upgrading the environment for existing pilot projects for three main use cases: automated highway chauffeur, truck platooning and automated collision avoidance functionalities. CONCORDA is co-financed by European Union under the CEF call 2016-EU-TM-0327-S.

The concept is to integrate communication services in practical, real-life and complex environments adapted for connected automated driving services with hybrid communication architecture, including the newest communication technologies and guarantee their coexistence

This study is supported by the EU's ambition to share best practices by providing large-scale, cross border test options in Europe, for example by facilitating the exchange of best practices between and within the

Member States emphasising the added-value of the coordinated approach amongst all stakeholders and investments along a common roadmap and shared learnings.

The communication technologies available into the project will be used for feeding the AD functionalities in order to improve their performances in terms of robustness. The information received through the wireless interface will be fused with those provided by different on-board sensors (like, e.g., camera, RADAR, LIDAR, ...) with the aim of creating a map of the surrounding obstacles, the so-called Local Dynamic Map (LDM).

In addition, the telecommunication infrastructure will contribute to the improvement of accuracy and integrity of the car localization by broadcasting offset factors.

Spain, as a partner of this activity, looks for an active participation in order to address the practical, organisational and technical challenges faced by connected and automated vehicles.

2.5.1.6 C-ROADS

C-Roads Platform is an initiative of different Member States and road operators wishing to collaborate in order to achieve the deployment of harmonised and interoperable C-ITS services throughout Europe. C-Road is a project co-financed by European Union under the CEF call 2016-ES-TM-0272-S.



Figure 46 C-Roads - Logotype

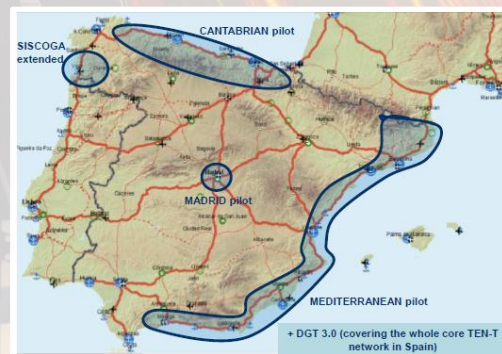
The official launch of the C-Roads Platform took place in Brussels on 12th of December 2016, and a first wave of 8 Member States have joined the initiative so far (Austria, Belgium, Czech Republic, France, Germany, The Netherlands, United Kingdom and Slovenia), but it is open for interested authorities in all Member States.

The main objectives of C-Roads Platform are:

- Demonstrations of C-ITS deployment through national pilots
- Harmonisation of initiatives
- Advance to large-scale deployment

Spain presented a proposal with the intention of being an active participant of this platform earlier this year. The proposed action consists of several studies in 5 local test sites along the TEN-T core network in several Spanish areas (regions of Galicia, Madrid, and Cantabrian and Mediterranean coasts), including parts of the Mediterranean and Atlantic TEN-T corridors and urban nodes. It also considers launching a test IoT Platform to provide common C-ITS services to the whole road network and the development of cross-border tests conducted with other C-Roads Member States (like France or Portugal).

The resolution with the acceptance or the refusal of the request it has been published in June 2017. The proposal has been accepted by the Connecting Europe Facility Coordination Committee.



2.5.1.7 DATEX II

DATEX II is a standardised e-language for traffic and travel data exchange between traffic control centres, traffic information centres and service providers. The European Commission describes the DATEX II standard as preferred in several Delegated Acts supporting the ITS Directive and ITS Action Plan.

Datex II is part of the Program Support Action co-financed by European Union under the CEF call 2015 CEF/PSA/SI2.733309

The DATEX II organisation is hosted by CEDR. CEDR is the platform of the European National Road Administrations. In their aim to develop a sustainable ITS infrastructure, supporting their responsibilities as road operator, providing DATEX II a home was a natural step. The DATEX II organisation is open to all stakeholders in the ITS industry. Depending on the level of active contribution each organisation can find a natural status in the DATEX II organisation.



Figure 47 Datex II - Logotype

Spain is a member state of this European platform, active participant in the Steering Group and in the Technical Management Group, assisting to the meetings and cooperating in some tasks of Datex II activities.

These activities are:

- Activity 0: Project Management
- Activity 3: Enhance location referencing
- Activity 4: Integrate the urban dimension of ITS
- Activity 6: Enhanced usability of DATEX II
- Activity 7: C-ITS harmonisation
- Activity 8: Maintenance and input to standardisation

The aim is to improve the interoperability between traffic centres (national, international, urban, public and private) across Europe while reducing the costs and providing extra business opportunities for service providers and ITS industries. The DATEX II modelling of its parameters also enhances the ITS systems as such, not only the exchange of data between them. I.e. the same definition of parameters is used in centres all over Europe. This enables and improves the European wide harmonisation and coordination of ITS measures and ITS developments. Standardisation of the data model for both the data

exchange and the parameters within ITS systems enables many more ITS industries to enter this market and thus create a level playing field.

2.5.1.8 *MedTIS II*

MedTIS II is a deployment project with objective to implement Traveller Information Services on the TEN-T Mediterranean Corridor. MedTIS II takes onboard TEN-T priorities and EC policy objectives to deliver high-level Travel Time Services and enhanced Traveller Information services including road user awareness to European travellers. MedTIS II is cofinanced by European Union under the CEF call 2014-EU-TM-0588-W.

Along six thousand and eight hundred kilometres (6.800 km) Corridor MedTIS II Action involves four (4) Member States from the European Union: France, Italy, Spain and Portugal. Twenty two (22) road operators from these four (4) countries are in charge of the onsite deployments of services and systems.

MedTIS II supports the following objectives:

- Well informed travellers: pre-trip and on-trip, with positive impacts on bottlenecks
- Support road-user decision making: displaying alternative

roads and solutions to support wise decisions making

- Enhanced road users safety in normal and abnormal situations
- Coordinated road operators supporting operational excellence
- Interoperability through the implementation of ITS standards among which DATEX II, Mare Nostrum and the EasyWay 2012 Deployment Guidelines
- Continuity of service on strategic bottlenecks such as cross-border areas
- Maintain network efficiency in all conditions once users' safety is ensured
- Enhanced freight traffic management: optimised use of truck park infrastructures



Figure 48 MedTIS Logotype

2.5.1.9 *Arc Atlantique II*

The Arc Atlantique II Corridor delivers improvements to the Trans-European Road Network stretching from Ireland to Spain through the wider deployment of ITS systems and services. The deployments will consist of a series of proven ITS technologies and services which have known and proven impacts on the efficiency of the road network. It will include traffic management systems and

services, and traffic information services that support traffic managers in directing traffic operations. The services implemented along the corridor will support all traffic users including HGV's as well as addressing cross-border issues and traffic bottlenecks. Arc Atlantique II is co-financed by European Union under the CEF call 2014-EU-TM-0597-W.

The deployments will be in accordance with the EasyWay ITS Deployment Guidelines and achieved through mutual cooperation of neighbouring National Road Authorities and operators to establish a coordinated traffic management corridor. The Arc Atlantique II Action involves six (6) Member States: Ireland, United Kingdom, France, Belgium (Flanders and Wallonia), Netherlands and Spain.

The main objectives of the Project are to:

- Improving interoperability that will impact the continuity of travel on the corridor network, at the urban / inter urban interface and at nodes ;
- Further developing harmonised services across Europe from the end user perspective ;
- Increasing the operational and cost efficiency of network from both the road user and traffic manager perspectives.



Figure 49 Arc Atlantique Logotype

2.5.1.10 National database for traffic information

DGT has a national database for traffic information called "Intercentros", where each Traffic Management Centre dumps traffic and meteorological data from all the ITS equipment installed on the road network.

This information is stored taking into account the guidelines established for each device and considering the type of data collected.

Nowadays, the DGT is working in a new version of this database, with the aim of improving it and providing better information of what is going on in our road networks. To develop this improvement DGT is working on two PNE:

- PNE 1: This standard has been developed by the Subcommittee 15 "Data quality" of the AEN / CTN 199 "Equipment for traffic management" with the objective of providing a standardized platform to store traffic

parameters, meteorology and real-time signaling, as well as any other information likely to be used in traffic management. This will allow various systems to exchange information and consult historical and statistical information.

- PNE 2: This standard has been elaborated by Subcommittee 15 "Data quality" of AEN / CTN 199 "Equipment for traffic management" and defines a method for the exchange of information between traffic control centers in an area or region (Zonal Center) and a central traffic control center (Center of Centers) with the aim that the operators, as well as the other users susceptible to exploit this information of the Zonal Centers as of the Center of Centers, have more information of support For traffic management.

The continuous development of new technologies (new features in sensors, new equipment, etc) and the emergence of new ways of being connected (Bluetooth, 4G, 5G, etc), makes necessary the inclusion of more tables and fields on the database with the purpose of guaranteeing that, after data processing, the parameters reflect a correct view of reality.



3 Key Performance Indicators (KPIs)

3.1 Deployment KPIs

3.1.1 Information gathering infrastructures / equipment (road KPI)

Information gathering infrastructures / equipment means any road based or mobile ITS enabling traffic monitoring, weather or environmental conditions monitoring, emissions monitoring, or forecasting of traffic conditions. It includes for instance sensors, cameras / CCTV, traffic control centers, floating car data.

It is acknowledged that technologies can differ from one country / network / area to another.

It is acknowledged that such infrastructures / equipment can serve several purposes (from traffic measures to information services).

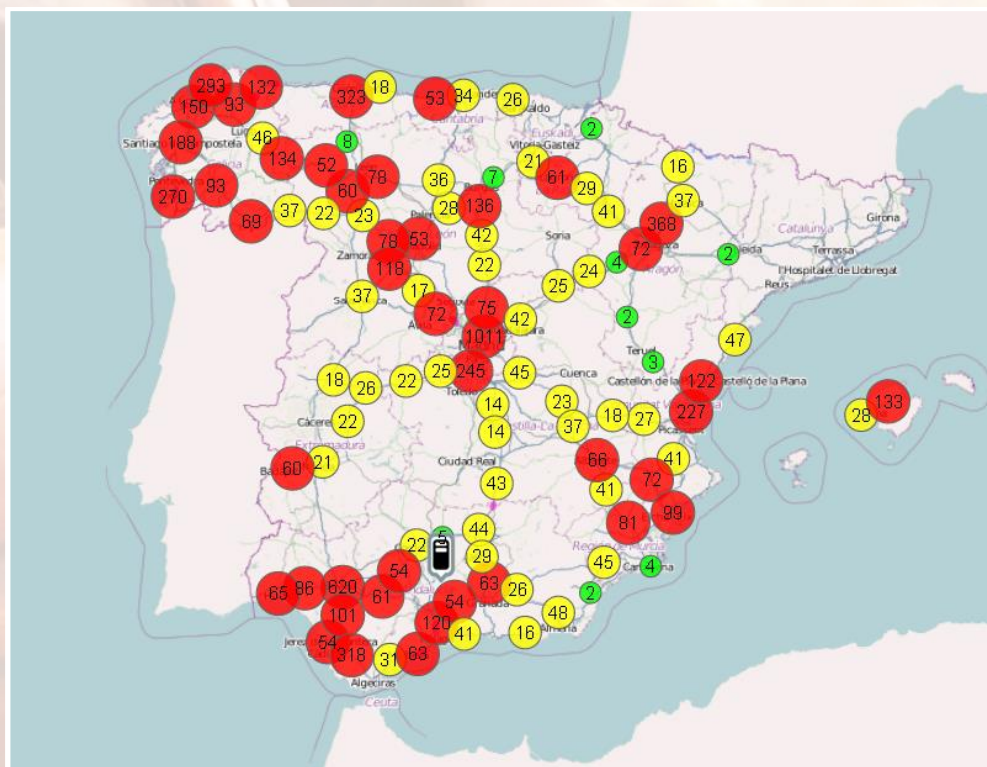


Figure 50 Equipment for Information gathering infrastructures - KPI. TEN-T Core and Comprehensive

3.1.1.1 *TEN-T Core*

- Length of road network type /road sections (in km) equipped with information gathering infrastructures: 4529 Km.
- Total length of this same road network type (in km): 5794 Km.
- KPI = (kilometres of road network type equipped with information gathering infrastructures / total kilometres of same road network type) x 100: 78%.

3.1.1.2 *TEN-T Comprehensive*

- Length of road network type /road sections (in km) equipped with information gathering infrastructures: 3017 Km.
- Total length of this same road network type (in km): 6152 Km.
- KPI = (kilometres of road network type equipped with information gathering infrastructures / total kilometres of same road network type) x 100: 49%.

3.1.1.3 *Other national roads*

- Length of road network type /road sections (in km) equipped with information gathering infrastructures: 6885 Km.
- Total length of this same road network type (in km): 34337 Km.
- KPI = (kilometres of road network type equipped with information gathering infrastructures / total kilometres of same road network type) x 100: 20%.



3.1.2.3 *Other national roads*

- Length of road network type / road sections (in km) equipped with ITS to detect incident: 2153 Km.
- Total length of this same road network type (in km): 34337 Km.
KPI = (kilometres of road network type equipped with ITS to detect incident / total kilometres of same road network type) x 100: 6%.



3.1.3 Traffic management and traffic control measures (road KPI)

Traffic management and traffic control measures means any measures derived from road based ITS enabling the control of traffic movements. It includes for instance hard shoulder running, ramp metering, dynamic lane management, HGV overtaking ban, variable speed limits, as well as parking management, vehicles / fleet prioritization.

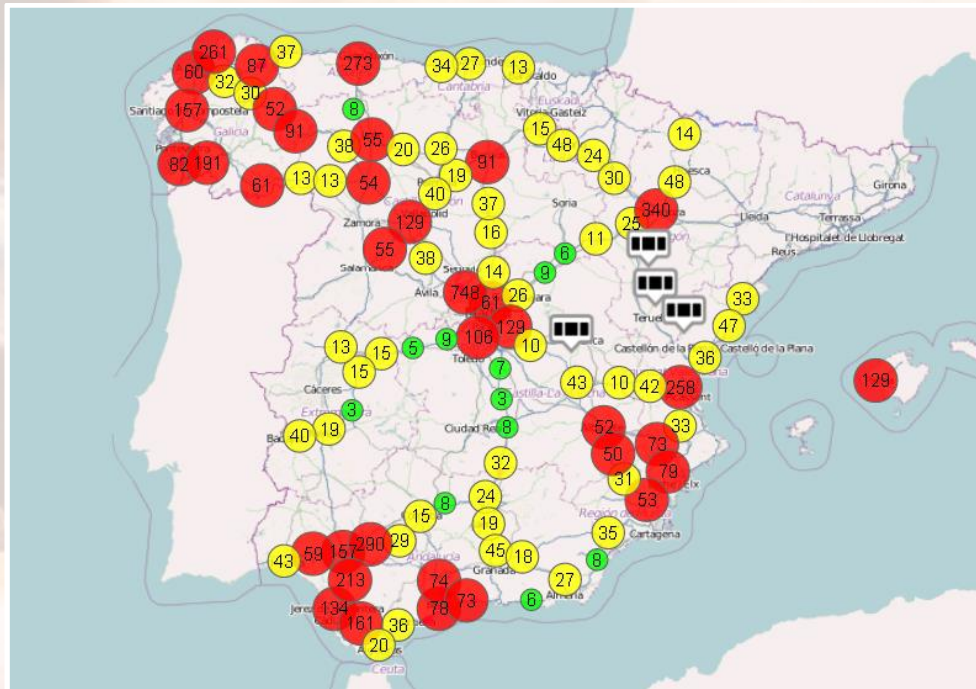


Figure 52 Equipment for Traffic management and traffic control measures - KPI. TEN-T Core and Comprehensive

3.1.3.1 TEN-T Core

- Length of road network type / road sections (in km) covered by traffic management and traffic control measures: 4247 Km.
- Total length of this same road network type (in km): 5794 Km.
- KPI = (kilometres of road network type covered by traffic management and traffic control measures / total kilometres of same road network type) x 100: 73%.

3.1.3.2 *TEN-T Comprehensive*

- Length of road network type / road sections (in km) covered by traffic management and traffic control measures: 3221Km.
- Total length of this same road network type (in km): 6152 Km.
- KPI = (kilometres of road network type covered by traffic management and traffic control measures / total kilometres of same road network type) x 100: 52%.

3.1.3.3 *Other national roads*

- Length of road network type / road sections (in km) covered by traffic management and traffic control measures: 6814 Km.
- Total length of this same road network type (in km):34337 Km.
- KPI = (kilometres of road network type covered by traffic management and traffic control measures / total kilometres of same road network type) x 100: 20%.



3.1.4 Cooperative-ITS services and applications (road KPI)

Cooperative-ITS services or applications means road based ITS infrastructure enabling services or applications using vehicle to vehicle or vehicle to infrastructure communication.

- $KPI = (\text{kilometres of road network type covered by C-ITS services or applications} / \text{total kilometres of same road network type}) \times 100: 0\%$.

3.1.4.1 TEN-T Core

- Length of road network type / road sections (in km) covered by C-ITS services or applications: 616 Km.
- Total length of this same road network type (in km): 5794 Km.
- $KPI = (\text{kilometres of road network type covered by C-ITS services or applications} / \text{total kilometres of same road network type}) \times 100: 11\%$.

3.1.4.2 TEN-T Comprehensive

- Length of road network type / road sections (in km) covered by C-ITS services or applications: 174 Km.
- Total length of this same road network type (in km): 6152 Km.
- $KPI = (\text{kilometres of road network type covered by C-ITS services or applications} / \text{total kilometres of same road network type}) \times 100: 3\%$.

3.1.4.3 Other national roads

- Length of road network type / road sections (in km) covered by C-ITS services or applications: 10 Km.
- Total length of this same road network type (in km): 34337 Km.



3.1.5 Real-time traffic information (road KPI)

Real-time traffic information means information derived from any road and traffic data, or their combination thereof, provided by any road authorities, road operators or service providers to road users through usual communication channels.

Real time traffic information relates to current traffic conditions on the road network. Such information includes for instance accident locations, incident warnings (incl. safety related events / conditions), road works, congestion hotspots, travel times / delays. Such services fall within the scope of delegated Regulations 886/2013 & 962/2015.

3.1.5.1 TEN-T Core

- Length of road network type / road sections (in km) with provision of real-time traffic information services: 5794 Km.
- Total length of this same road network type (in km): 5794 Km.
- KPI = (kilometres of road network type with provision of real-time traffic information services / total kilometres of same road network type) x 100: 100%.

3.1.5.2 TEN-T Comprehensive

- Length of road network type / road sections (in km) with provision of real-time traffic information services: 6083 Km.
- Total length of this same road network type (in km): 6152 Km.
- KPI = (kilometres of road network type with provision of real-time traffic information services / total kilometres of same road network type) x 100: 99%.

3.1.5.3 Other national roads

- Length of road network type / road sections (in km) with provision of real-time traffic information services: 34337 Km.
- Total length of this same road network type (in km): 34337 Km.
- KPI = (kilometres of road network type provision of real-time traffic information services / total kilometres of same road network type) x 100: 100%.

3.1.6 Dynamic travel information (multimodal KPI)

Dynamic travel information means up to date information derived from any travel data provided by any transport operators or service providers through usual communication channels. Such services fall within the scope of delegated Regulation on multimodal travel information services currently in preparation.

Dynamic travel information relates to pre-trip and on-trip information to any travelers. Such information includes for instance disruptions, travel times / delays, vehicles positioning, accessibility of nodes and vehicles. Any information available to users should be provided in such a form so that it can be received in full also by users might have specific requirements related to the data, for example people with reduced mobility, orientation and/or communication.

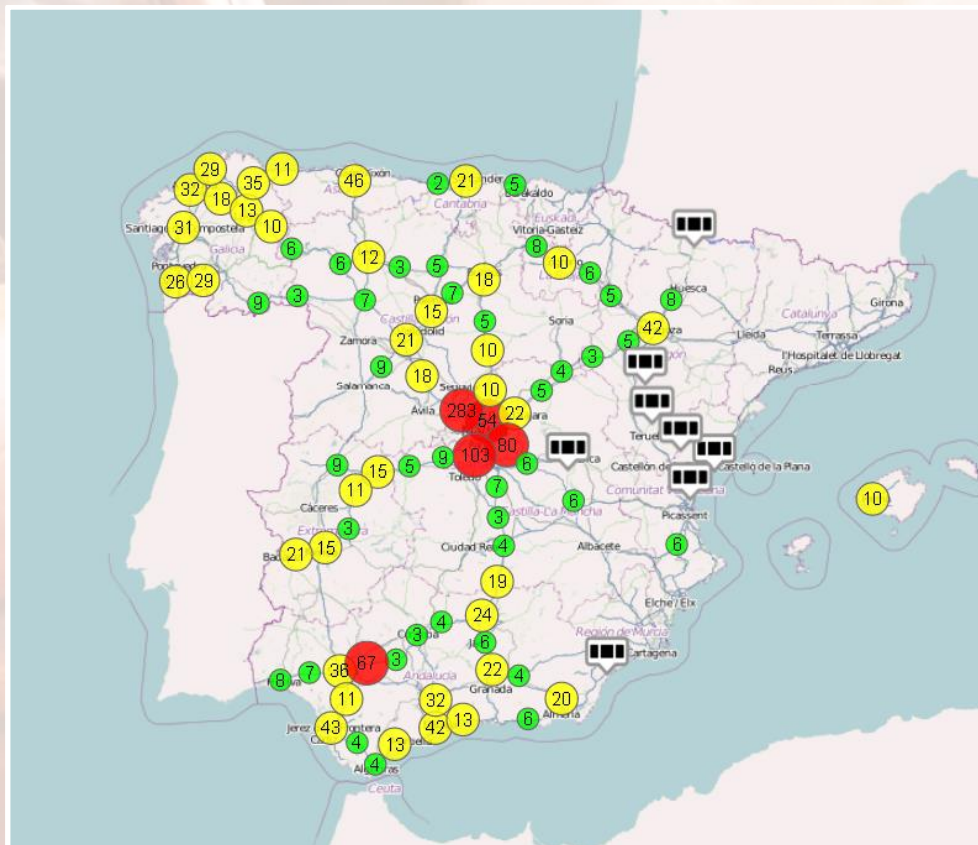


Figure 53 Equipment for Dynamic travel information - KPI. TEN-T Core and Comprehensive

3.1.6.1 *TEN-T Core*

- Length of transport network type (in km) with provision of dynamic travel information services: 1519 Km.
 - Total length of this same transport network type (in km): 5794 Km.
 - $KPI = (\text{kilometres of transport network type with provision of dynamic travel information services} / \text{total kilometres of same transport network type}) \times 100$: 26%.
 - Number of transport nodes (e.g. rail or bus stations) covered by dynamic travel information services: not enough data available to obtain a real comparison.
 - Total number of the same transport nodes: not enough data to obtain a real comparison.
 - $KPI = (\text{number of transport nodes with provision of dynamic travel information services} / \text{total number of same transport nodes}) \times 100$: not enough data available to obtain a real KPI.
- Number of transport nodes (e.g. rail or bus stations) covered by dynamic travel information services: not enough data available to obtain a real comparison.
 - Total number of the same transport nodes: not enough data available to obtain a real comparison.
 - $KPI = (\text{number of transport nodes with provision of dynamic travel information services} / \text{total number of same transport nodes}) \times 100$: not enough data available to obtain a real KPI.

3.1.6.2 *TEN-T Comprehensive*

- Length of transport network type (in km) with provision of dynamic travel information services: 861 Km.
- Total length of this same transport network type (in km): 6152 Km.
- $KPI = (\text{kilometres of transport network type with provision of dynamic travel information services} / \text{total kilometres of same transport network type}) \times 100$: 14%.



3.1.6.3 Other national roads

- Length of transport network type (in km) with provision of dynamic travel information services: 1504 Km.
- Total length of this same transport network type (in km): 34337 Km.
- $KPI = (\text{kilometres of transport network type with provision of dynamic travel information services} / \text{total kilometres of same transport network type}) \times 100$: 4%.
- Number of transport nodes (e.g. rail or bus stations) covered by dynamic travel information services: not enough data available to obtain a real comparison.
- Total number of the same transport nodes: not enough data available to obtain a real comparison.
- $KPI = (\text{number of transport nodes with provision of dynamic travel information services} / \text{total number of same transport nodes}) \times 100$: not enough data available to obtain a real KPI.



3.1.7 Freight information (multimodal if possible or road KPI)

Freight information means static and dynamic information tailored to the needs of the freight industry. Such information includes for instance parking / loading availability and cost, access restrictions, incident warnings and disruptions, travel times / delays, vehicles positioning.

3.1.7.1 TEN-T Core

- Length of road network type / road sections (in km) with provision of freight information services: 5794 Km.
 - Total length of this same road network type (in km): 5794 Km.
 - KPI = (kilometres of road network type with provision of freight information services / total kilometres of same road network type) x 100: 100%.
 - Total number of the same freight nodes: not enough data available to obtain a real comparison.
 - KPI = (number of freight nodes with provision of freight information services / total number of same freight nodes) x 100: not enough data available to obtain a real KPI.
- Total length of this same road network type (in km): 6152 Km.
 - KPI = (kilometres of road network type with provision of freight information services / total kilometres of same road network type) x 100: 100%.
 - Number of freight nodes (e.g. ports, logistics platforms) covered by freight information services: not enough data available to obtain a real comparison.
 - Total number of the same freight nodes: not enough data available to obtain a real comparison.
 - KPI = (number of freight nodes with provision of freight information services / total number of same freight nodes) x 100: not enough data available to obtain a real KPI.

3.1.7.2 TEN-T Comprehensive

- Length of road network type / road sections (in km) with provision of freight information services: 6152 Km.



3.1.7.3 Other national roads

- Length of road network type / road sections (in km) with provision of freight information services: 34337 Km.
- Total length of this same road network type (in km): 34337 Km.
- $KPI = (\text{kilometres of road network type with provision of freight information services} / \text{total kilometres of same road network type}) \times 100$: 100%.
- Number of freight nodes (e.g. ports, logistics platforms) covered by freight information services: not enough data available to obtain a real comparison.
- Total number of the same freight nodes: not enough data available to obtain a real comparison.
- $KPI = (\text{number of freight nodes with provision of freight information services} / \text{total number of same freight nodes}) \times 100$: not enough data available to obtain a real KPI.

3.1.8 112 eCalls (road KPI)

Automatic and manual 112 eCalls as defined by EU Legislation.

False calls as defined in COCOM questionnaire on 112: False calls are calls which are not followed up with intervention or assistance from the PSAP or the emergency services. Calls that report an emergency event which has already triggered intervention or assistance from the

part of the PSAP, therefore not triggering separate intervention or assistance, will not be considered false calls.

N.a. – will be provided through the COCOM 112 questionnaire.



3.2 Benefits KPIs

3.2.1 Change in travel time (road KPI)

% change in peak period travel time along routes / within areas where ITS has been implemented or improved.

Peak period means the hour with the highest traffic flow during a week day. It is defined for each route / area individually. An aggregated average can be calculated for estimation of consolidated results at road network level.

Routes / areas where ITS has been implemented or improved should be specified. Length along / area within which the change in travel time is measured should be long / wide enough to be representative.

$$\text{KPI} = \frac{(\text{travel time before ITS implementation or improvement} - \text{travel time after ITS implementation or improvement})}{\text{travel time before ITS implementation or improvement}} \times 100$$
: not enough information available to obtain a real KPI.

3.2.2 Change in road accident resulting in death or injuries numbers (road KPI)

Annually, DGT makes an inventory with the number of accidents on national roads. These accidents are classified according to the route where they happen and the severity of the accident.

In addition to this data, accidents are listed according to the kind of accident suffered and the personal characteristics of the victim:

- *Personal characteristics:*
 - *Age of the victim*
 - *Gender of the victim*
 - *Pedestrian/Driver/Passenger*
- *Accident characteristics:*
 - *Province where the accident happens*
 - *Infringement committed*
 - *Luminosity and atmospheric factor*
 - *Status and kind of vehicle involved*
 - *Antiquity of vehicles involved*



3.2.2.1 Interurban roads

3.2.2.1.1 Accident with victims

- Number of road accident resulting in death or injuries before ITS implementation or improvement: 49820.
- Number of road accident resulting in death or injuries after ITS implementation or improvement: 34558.
- $KPI = ((\text{Number of road accident resulting in death or injuries before ITS implementation or improvement} - \text{Number of road accident resulting in death or injuries after ITS implementation or improvement}) / \text{number of road accident resulting in death or injuries before ITS implementation or improvement}) \times 100$: 30,63%.

3.2.2.1.2 Accident victims

- Number of accidental victims resulting in death or injuries before ITS implementation or improvement: 146344.
- Number of accidental victims resulting in death or injuries after ITS implementation or improvement: 136144.
- $KPI = ((\text{Number of accidental victims resulting in death or injuries before ITS implementation or improvement} - \text{Number of accidental victims resulting in death or injuries after ITS implementation or improvement}) / \text{Number of accidental victims resulting in death or injuries before ITS implementation or improvement}) \times 100$: 6,97%.

ITS implementation or improvement)
x 100: 6,97%.

3.2.2.1.3 Fatalities

- Number of fatalities before ITS implementation or improvement: 3823.
- Number of fatalities after ITS implementation or improvement: 1689.
- $KPI = ((\text{Number of fatalities before ITS implementation or improvement} - \text{Number of fatalities after ITS implementation or improvement}) / \text{Number of fatalities before ITS implementation or improvement}) \times 100$: 55,82%.

3.2.2.1.4 Seriously injuries

- Number of seriously injured before ITS implementation or improvement: 19295.
- Number of seriously injured before after ITS implementation or improvement: 9495.
- $KPI = ((\text{Number of seriously injured before ITS implementation or improvement} - \text{Number of seriously injured after ITS implementation or improvement}) / \text{Number of seriously injured before ITS implementation or improvement}) \times 100$: 50,79%.

3.2.2.1.5 Minor injuries

- Number of slightly injured before ITS implementation or improvement: 123226.
- Number of slightly injured before after ITS implementation or improvement: 124960.
- KPI = ((Number of slightly injured before ITS implementation or improvement – Number of slightly injured after ITS implementation or improvement) / Number of slightly injured before ITS implementation or improvement) x 100: (-1,41%).

3.2.2.2 Urban roads

3.2.2.2.1 Accident with victims

- Number of road accident resulting in death or injuries before ITS implementation or improvement: 50668.
- Number of road accident resulting in death or injuries after ITS implementation or improvement: 63918.
- KPI = ((Number of road accident resulting in death or injuries before ITS implementation or improvement – Number of road accident resulting in death or injuries after ITS implementation or improvement) / number of road accident resulting in death or injuries before ITS implementation or improvement) x 100: (-24,64%).

3.2.2.2.2 Accident victims

- Number of accidental victims resulting in death or injuries before ITS implementation or improvement: 66474.
- Number of accidental victims resulting in death or injuries after ITS implementation or improvement: 82116.
- KPI = ((Number of accidental victims resulting in death or injuries before ITS implementation or improvement – Number of accidental victims resulting in death or injuries after ITS implementation or improvement) / Number of accidental victims resulting in death or injuries before ITS implementation or improvement) x 100: (-23,53%).



3.2.2.2.3 Fatalities

- Number of fatalities before ITS implementation or improvement: 441.
- Number of fatalities after ITS implementation or improvement: 741.
- $KPI = ((\text{Number of fatalities before ITS implementation or improvement} - \text{Number of fatalities after ITS implementation or improvement}) / \text{Number of fatalities before ITS implementation or improvement}) \times 100$: 40,49%.

improvement – Number of slightly injured after ITS implementation or improvement) / Number of slightly injured before ITS implementation or improvement) x 100: (-23,53%).

3.2.2.2.4 Seriously injured

- Number of seriously injured before ITS implementation or improvement: 6094.
- Number of seriously injured before after ITS implementation or improvement: 4751.
- $KPI = ((\text{Number of seriously injured before ITS implementation or improvement} - \text{Number of seriously injured after ITS implementation or improvement}) / \text{Number of seriously injured before ITS implementation or improvement}) \times 100$: 22,04%.

3.2.2.2.5 Slightly injured

- Number of slightly injured before ITS implementation or improvement: 59639.
- Number of slightly injured before after ITS implementation or improvement: 76924.
 - $KPI = ((\text{Number of slightly injured before ITS implementation or improvement} - \text{Number of slightly injured after ITS implementation or improvement}) / \text{Number of slightly injured before ITS implementation or improvement}) \times 100$: (-28,84%)



3.2.3 Change in traffic-CO2 emissions (road KPI)

Traffic CO2 emission means the amount of CO2 emitted collectively by road vehicles utilising a route / circulating within an area. This should be aggregated up to produce an annual figure. CO2 emissions are typically estimated based upon traffic flows and speeds coupled with assumptions regarding fuel consumption and/or average vehicle efficiency per kilometre for the different vehicle types using a route / circulating within an area.

Routes / areas where ITS has been implemented or improved should be specified. Length along / area within which the change in CO2 emissions is calculated should be long / wide enough to be representative.

KPI = ((traffic CO2 emissions before ITS implementation or improvement – traffic CO2 emissions after implementation or improvement) / traffic CO2 emissions before ITS implementation or improvement) x 100: not enough data available to obtain a real KPI.



3.3 Financial KPIs

ITS includes any types of systems and services altogether.

- Annual investment in road ITS: 8,60 M€.
- Annual operating & maintenance costs of road ITS (in euros per kilometre of network covered):
 - Annual cost: 60,00 M€
 - Total kilometres network: 15000 km
 - KPI = 4000 €/km



4 Contributions

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- Ministry of Public Works and Transport
- Spanish Highway Association
- Madrid City Council
- Regional Transport Consortium CAM
- Servei Català de Trànsit
- Traffic Directorate of the Basque Government
- Provincial Government of Bizkaia
- Provincial Government of Gipuzkoa
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- ITS Spain
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- ETRA
- Abertis
- Europistas
- Audenasa
- Henarsa
- Sacyr Concesiones
- Cintra
- Aucalsa
- Interbiak

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- Commission Delegated Regulation (EU) No 886/2013 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to data and procedures for the provision, where possible, of road safety-related minimum universal traffic information free of charge to users
- Commission Delegated Regulation (EU) No 305/2013 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall
- Commission Delegated Regulation (EU) No 885/2013 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of information services for safe and secure parking places for trucks and commercial vehicles
- ROYAL DECREE 662/2012 of April 13th, establishing the framework for deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transportation
- ROYAL DECREE 362/2017, of April 8th, which develops the basic organic structure of the Ministry Public Works and Transport
- ROYAL DECREE 400/2012, of February 17th, which develops the basic organic structure of the Ministry of the Interior
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