Second Progress Report on the Czech Republic's Activities and Projects Regarding ITS Priority Areas

This Report has been drawn up in accordance with Article 17(3) of 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, Under that provision, Member States report to the European Commission on the progress they have made every three years.

This Progress Report on the Czech Republic's Activities and Projects Regarding ITS Priority Areas follows up on the previous 2011 report and, by comparison with that report, presents basic information on progress made in ITS deployment.

Report structure, based on the European Commission's requirements:

    I.   Description of the strategy on the development and deployment of ITS, including its main objectives;

    II.   Description of the organisational and legal framework applicable to the development and deployment of ITS;

    III.   Description of the ITS deployment activities required;

    IV.   Description of the national priority areas for actions and related measures, including an indication of how these are related to the priority areas laid down in Article 2 of the ITS Directive, i.e. Directive 2010/40/EU

    V.   The implementation of current and planned actions covering:

- instruments;
- resources;
- consultation and active stakeholders;
- milestones;
- monitoring.

Annex 1 – Significant ITS projects implemented in the Czech Republic in the reporting period

Annex 2 – Deployment map – ITS sensors and actuators in the Czech Republic

I. Strategy of ITS development and deployment in the Czech Republic

Transport Policy

On 12 June 2013, the Czech Government approved a fundamental strategy document for the development of transport in the Czech Republic – the 'Transport Policy for 2014–2020 with an Outlook up to 2050'. The Transport Policy is the Czech Government's top-level strategy document for the transport sector. The institution responsible for implementing it is the Ministry of Transport. Transport Policy sets out principles for the development of different areas of the transport sector, but does not address specific projects. Individual areas of the Transport Policy are developed by follow-up sectoral strategies, including the 'Transport Sector Strategy', which covers the completion of the transport infrastructure, and the 'ITS Development Action Plan'. These documents will be discussed in more depth detailed under 'National priorities' below.

One of the priorities of the Transport Policy is 'Modern technology, research, development and innovation, space technology'. This priority supports the deployment of modern technologies, including intelligent transport systems. Here, according to the Transport Policy, the use and deployment of modern traffic management and control systems, information systems, ITS systems and global navigation satellite systems must become an integral component of transport development. This priority promotes the development of the priority areas referred to in Article 2 and the priority actions set out in Article 3 of the ITS Directive (Directive 2010/40/EU).

The Transport Policy's main objectives, which are expected to be achieved with ITS use, include continuity across different modes of transport, increased transport safety and better awareness among transport users.

II. Organisational and legal framework applicable to ITS development and deployment

The Ministry of Transport of the Czech Republic (the 'Ministry') is responsible for creating conditions so that intelligent transport systems (ITS) can be deployed in all modes of transport. In 2012, the ITS Coordinating Council of the Minister for Transport was established under a Ministry of Transport decision as a standing coordinating, initiative and advisory body to the Minister for Transport for systematic ITS development. The Coordinating Council, in accordance with legislation of general application, proposes, coordinates and regulates conceptual issues and tasks associated with ITS development in the Czech Republic and with the establishment of national legislation of general application required to ensure the proper implementation of the relevant EU legal acts relating to procedures for putting ITS into operation. Coordinating Council members are representatives of the Ministry's relevant services and subordinate organisations, as well as representatives of the academic sector and professional associations dealing with ITS.

The Coordinating Council's tasks include:
- the coordination of the activities of ministries, other administrative authorities and other entities who contribute, through their activities, to ITS development; the Coordinating Council is responsible for running checks on the measures adopted;
- the discussion of proposals for fundamental ITS development measures and the submission thereof to the Minister for Transport or the Czech Government;
- cooperation in the formulation and coordination of relevant European and national research and development programmes and other programmes and projects related to ITS and the application thereof;
- recommendations measures for systemic ITS development to public authorities and other entities;
- the discussion of opinions on relevant draft legislation and fundamental measures related to ITS;
- cooperation with the media to disseminate information among professionals and the general public about ITS and related activities.

The Road and Motorway Directorate is responsible for ITS development on motorways, expressways and class I roads. It is actively involved in building all types of new ITS systems and applications and in their integration with existing applications and systems to enhance efficiency in the usability thereof.

ITS implementation was legislatively covered by Act No 13/1997 on roads, as amended, which sets out an ITS service provider's obligation to use only those parts of ITS which are consistent with specifications issued by the European Commission (Section 39a(2) of the Act).

ITS development is also coordinated by regional and local government institutions in all regions and chartered cities, particularly large urban centres with heavy traffic, such as Prague, Brno, Ostrava and Plzeň. In the deployment of ITS, regions and, especially, large urban centres adhere to their own strategy documents on the development of ITS applications.

III. National priorities

Transport Sector Strategies, Stage 2 – Medium-term Transport Infrastructure Development Plan with a Long-term Outlook

The document 'Transport Sector Strategies, Stage 2' was approved by the Czech Government on 13 November 2013. The main aim of this document is to draw up Transport Policy objectives for the maintenance, development and financing of the transport infrastructure. It is also a strategic starting point in the pursuit of key transport areas set out in the Operational Programme Transport. One of the priorities of the Operational Programme Transport for 2014–2020 is a greater focus on maximum use of intelligent traffic control solutions, including Galileo services. The document 'Transport Sector Strategies, Stage 2' is a basic ministerial concept drawn up by the Ministry of Transport to formulate priorities and objectives related to transport infrastructure development in the medium term up to 2020 and, generally, in the long term up to 2050. The ITS-related part of the document centres on the introduction of the European Electronic Toll Service (EETS), arrangements for the further functionality of the toll system when the contracts with the current general contractor come to an end after 1 January 2017, and the implementation of 'priority actions' defined by Directive 40/2010/EU. Under transport sector strategies, actions for coordinated ITS deployment and application across Europe are considered a priority for ITS development. The Highways Act lays down the ITS service provider's obligations to use only those ITS components which are in keeping with the specifications issued by the European Commission. In the coming period, ITS development in the road and motorway network in the Czech Republic (apart from the electronic toll system, which is dealt with separately) will focus on:
- data collection;
- the provision of traffic information and control;
- the interoperable eCall service.

The transport sector strategies also include a medium-term transport project financing forecast and an outline long-term financing plan. Further ITS infrastructure and, in particular, non-infrastructure projects will be covered in detail by a follow-up transport-policy strategy document, called 'ITS Development Action Plan', which is currently being prepared and will be submitted to the Czech Government for discussion by 31 December 2014.

The transport sector strategies included the establishment of packages of ITS systems in the different modes of transport, encompassing main priorities and targets in the development of ITS systems, which impose **requirements on transport infrastructure facilities** and in respect of which decisions are taken by the Ministry of Transport or its subordinate organisations – the State Transport Infrastructure Fund, the Road and Motorway Directorate, the Railway Infrastructure Administration and the Waterways Directorate, whose resources are also used to finance them.

The defined packages formed a basis for an estimate of investment intensity over the planned duration of the transport sector strategy. A detailed investment plan and timetable of specific measures will be prepared in the document 'ITS Development Action Plan.' The ITS-related part of the documentation also included recommendations on the theme and content of potential ITS-development support schemes in regions and municipalities. It is limited to recommendations because ITS development in urban areas is fully in the competence of the individual municipalities.

Some of the Czech Republic's larger cities already have an ITS-development strategy document (Prague, Brno, Ústí nad Labem, Pardubice, Ostrava, Liberec and Zlín). In their ITS development, municipalities tend to concentrate on installing and operating traffic lights, tackling parking problems, and developing public transport or cycling infrastructure.

The transport sector strategies set the following specific targets for ITS deployment:
1) Improve the traffic situation on roads, in urban centres and in public passenger transport;
2) Increase the mobility of persons and goods;
3) Improve the interoperability of the transport chain;
4) Improve traffic safety in the transport system.

In the wake of an analysis – based on a transport model – of the transport network load at future points in time (2020, 2035, 2050), and further to an analysis of bottlenecks, sections which, according to the transport sector strategies, should take priority in the deployment and development of ITS management and information systems on account of capacity shortages are listed below.

Motorways/road number	Section start	Section end		Road number	Section start	Section end
D1	km 0	km 18		7	R7 Junction 18	Panenský Týnec
D1	km 18	km 182		7	Toužetín	Bitozeves
D1	km 182	km 203		8	R63 Junction 1	Teplice intersection with I/13
D1	km 203	km 230		9	Intersection with II/268	Jiřetín pod Jedlovou
D5	km 0	km 28		11	Intersection with I/59 Šenov	Intersection with II/475 Havířov
R10	km 39	km 46		20	Intersection with D5 km 76	Intersection with I/19
R35	km 281	km 290		33	Intersection with I/35	Jaroměř
R1	Intersection with D5 km 0	Intersection with D1 km 10		33	Jaroměř	Czech/Polish state border
2	Uhříněves	Mukařov		34	Intersection with D1 km 90	Intersection with I/19 Pelhřimov
3	Intersection with D1	Intersection with D3 km 62		35	Holice	Intersection with II/366
27	End of four-lane	Švihov		38	Kolín (intersection with I/12)	Habry (intersection with II/346)
3	České Budějovice	Intersection with II/155		43	Lelekovice	Intersection with I/19
4	R4 Junction 41	Milín				

A key ITS development factor is multisource financing, combining funding from the central government budget, the budget of the State Transport Infrastructure Fund, the budgets of regions and chartered cities, resources from the relevant EU financial instruments, and private funds from

the business community and users. The amount of ITS development funding in the Czech Republic in the reporting period is detailed in Section V – ITS financing in the Czech Republic. A more precise estimate of funding required for further ITS development and a proposal on how to secure financing for the 2014–2020 period will be provided in the ITS Development Action Plan, which is to be submitted to the Czech Government for discussion by the end of 2014.

IV. ITS deployment in the Czech Republic in the reporting period

Traffic data from a small part of the road network are currently being collected in the Czech Republic for use in telematics systems or for statistics and planning purposes. Technological traffic data collection systems have now been deployed on a fraction (approximately 0.3%) of the overall length of the Czech Republic's road network. It is projected that, if this technology is to provide sufficient information about vehicle movements, it must cover at least the backbone roads, detours, selected urban roads and class I roads, i.e. approximately 7 000 km out of a total of 56 000 km of motorways, expressways and class I, II and III roads.

The deployment of management and information systems on the network of motorways, expressways and class I roads should help to fill gaps in information on the traffic situation and assist road network managers and users in their preparedness to respond and in their capacity to act. Newly built backbone routes are fitted with technological traffic data collection systems. The same systems are also being phased in on existing backbone roads.

The core structural elements of the traffic control system are traffic detectors (induction loops, microwave detectors, video detectors, etc.) installed at sectional points, portals with variable message signs situated above and to the sides of the lanes, and the necessary control system located along the route and at the control centre. To make control more efficient, weather sensors or video surveillance are added to these sections at selected points.

Traffic information is disseminated through various systems in the Czech Republic. The National Traffic Information Centre and the Uniform Traffic Information Collection System are significant in this respect. The National Traffic Information Centre is the central technical, technological, operational and organisational centre of the Uniform Traffic Information Collection System; it enables operators to respond to emerging issues affecting traffic flow and to coordinate measures to address those situations on roads via existing network equipment: variable message signs and traffic information devices, CCTV, public RDS-TMC broadcasting and a website (www.dopravniinfo.cz) showing the current traffic situation.

The state, via the Unified Traffic Information System, guarantees the collection, processing, sharing and dissemination of traffic information on the road situation to all users as a public service. A wide range of entities have been actively involved in the Uniform Traffic Information Collection System:

- public administration (the Czech Police, the Fire Rescue Service, the Emergency Medical Service, Road Administration Authorities, Road Managers, the Municipal Police, the Czech Hydrometeorological Institute, Network Managers, etc.);
- operators of traffic telematics applications (weather systems, tunnel systems, EFC, traffic detectors systems, etc.) designed to provide information support to processes;
- etc.

One extensive system in the Czech Republic is the DIS-SOS motorway information system. This is an independent system of emergency call stations on motorways and expressways in the Czech Republic that provides road users with an internal connection to the Czech Police operations centre or to the Fire Rescue Service. This system also plays a security role. Motorway information system stations are also used as a communication and connection point to hook up various ITS devices (weather stations, CCTV, traffic detectors, variable message signs, etc.). The stations have been developed on a digital communication platform and, besides the aforementioned primary functions, also now serve as a

digital backbone system for the collection of data from ITS devices. This new digital system is in use, for example, on the motorways D1 (the part near Prague), D3, D5 (parts) D8, D11, and D47 (D1), and on newly built expressways, e.g. the R1 (Prague Ring Road), R6, R7, R35, R48, and R55.

Another integral part of ITS development is the actual control of traffic on the road network. This optimises traffic flow on motorways or, by other suitable means, helps to keep traffic moving through urban areas. Processes to predict traffic situations on the basis of current and historical data with a view to eliminating foreseeable traffic problems are not yet sufficiently advanced. A travel time prediction system is currently in operation on the D1, D2, D5 and D8 motorways. This system has shown itself capable of reliably determining how long it will take to reach certain points if the roads are not congested. Although the system is not fast or reliable enough in situations where the traffic is disjointed, work is being carried out to remedy these shortcomings.

The Czech Republic needs to carry on implementing and refining the functions of the National Traffic Information Centre and to interconnect it with regional traffic control centres to guarantee mutual use of traffic information. Arrangements need to be made to harmonise the various existing centres and to ensure that, if necessary, they are interchangeable. It would be beneficial to interlink the Uniform Traffic Information Collection System with existing and newly developed telematic sub-systems which collect and distribute traffic information, e.g. by integrating a dynamic weighing-in-motion system. One of the main goals is to establish cooperation between the National Traffic Information Centre and similar centres abroad, especially those in neighbouring countries.

ITS deployment in road and public passenger transport

In **European Priority Area 1) 'Optimal use of road, traffic and travel data',** the following action has been taken

a) nationally:

In the road network, **16** stations housing **on-road sensors for permanent automatic traffic counts** have been reconstructed and **four** new ones have been built. On the **D2 motorway**, **10 rotating cameras, two weather stations, two traffic information devices/thermometers**, and a new power system for emergency call stations have also been installed, and a large-screen display and video server have been added at Podivín Motorway Administration and Maintenance Centre. On the **D5 motorway**, **63 emergency stations, 24 rotating cameras, 14 looping on-road sensors for permanent automatic traffic counts, 10 roadside weather stations, 26 variable message signs** and **three electronic security systems in bridges have been installed**. In addition, the necessary communication routes have been built and **20 power points** have been reconstructed for the information system. On the **D11 motorway**, the existing communication link for the motorway information system (DIS SOS) and the emergency call stations have been reconstructed and **15 cameras** have been installed.

Under **Priority Action a)** – the provision of EU-wide multimodal travel information services – the construction of a new **eRDIS content management** system has been in progress since 2011. The plan is for the system, by 2015, to provide the general motoring public with traffic news via all channels of distribution using new technology in the ITS, thereby enhancing the travel experience.

Under **Priority Action b)** – the provision of EU-wide real-time traffic information services – an **automatic voice traffic information system** has been tested for motorways and expressways. This system provides information in voice format about traffic on the roads tracked.

As part of the innovation of **ITS systems in public transport** (Project JSVD), analyses of prioritisation systems in operation in public transport, the technology, procedures and equipment used in the identification of fixed structures in public transport and ticketing systems in the Czech Republic and abroad were completed. Proposals were prepared for the development or upgrading of individual subsystems.

Within the scope of **public passenger transport (Project POLITE)**, policies continue to be made for the use of intelligent transport systems (ITS) in public transport. In response to the INTERREG IVC programme, the aim is to explore and make use of best practice from different cities and regions in order to increase the use and attractiveness of public transport by means of infomobility services and to encourage the coordinated and coherent deployment of interoperable ITS in the EU.

b) regionally:

The establishment of a system of Plzeň Card ATMs has been completed **in the Plzeň Region**. The range of self-service ticketing has been expanded and **83 ATMs and three payment terminals** have been modified to accept the Plzeň Card.

Following this, a **comprehensive service to activate prepaid fares on electronic carriers** has been completed. This project has given public transport users the opportunity to activate fares on their Plzeň Card throughout the Plzeň Region by means of modified ATMs **located** in **35 towns and municipalities** in the Plzeň Region.

The **expansion of the 'Plzeň Integrated Transport'** (IDP) system has also been completed. Arrangements have been made to implement a new regional zone role structure for the Plzeň Card, and the systemic integration of ticketing system solutions has also been ensured for other carriers involved in the IDP. This project has achieved full interoperability of the systems used by bus and coach carriers in the IDP, and a **further 197 municipalities** in the Plzeň Region have been **integrated** into the IDP.

The Plzeň Region's **complete geographical information system**, which has been phased in since 2001, remains to be completed. A major emphasis is placed on regional development, spatial planning, the environment, crisis management and, last but not least, transport and road management. The aim is to enhance the quality and efficiency of decision-making on structures in the territory, their spatial interrelationships, and associated processes.

The **promotion of a system facilitating communication with electronic travel documents** (the Plzeň Card), along with the tracking of public transport vehicle movements, including driver/control centre communication, was launched in 2013. This system is being implemented as part of the planned establishment of the Plzeň Integrated Transport control centre in connection with the development of the IDP throughout the Plzeň Region. By December 2019, all **501 municipalities** in the Plzeň Region will have been **integrated** into the IDP.

A Winter Road Maintenance Information Portal has been completed **in the South Bohemian Region.**

A digital public administration map has been completed **in the Karlovy Vary Region**. It comprises a system and services delivering a uniform digital vector map for the consistent performance of the relevant public administration agendas in the Karlovy Vary Region.

Since 2007, preparations have been underway for a **uniform public transport ticketing system**, under which a single smartcard can be used on public transport by the travelling public. This requires

supplies of ticketing devices to public transport vehicles, the establishment of customer centres, the distribution of self-service booths, and the creation of a Central Office and clearing centre for the distribution of sales receipts among the carriers.

In the **Liberec Region**, the **NISA GO** system has been completed. This system, building on the Central Timetables Information System, incorporates a route planner, public transport timetables in the Czech Republic and Germany, and a wide range of tourist and cultural attractions, sports activities, accommodation services and restaurants, including gourmet specialities.

In the **Moravian-Silesian Region**, a pilot project to create the uniform standardisation of conditions applicable to, and the structure of, a contactless smartcard to be used by public transport passengers has been completed. The main aim and purpose of both projects is to simplify travelling by public transport. Passengers in the region can use a uniform ticketing medium to use the services of any carrier subscribing to the system. A central control centre is responsible for coordinating operations between individual carriers in relation to both scheduled and non-scheduled services, and passengers are provided with real-time transport and pricing information.

In the **Zlín Region**, an **easy-to-use information system** is being set up **for passengers**, along with a smoothly operating control system to manage public transport operations. This will deliver flexible solutions to operating problems and guarantee that arrangements are in place for passengers to change from one mode of transport to another. The information system is due to be completed in **2015**.

The **South Moravian Region** has devoted itself to the project 'Modernisation of Passenger Ticketing in the South Moravian Regional Integrated Transport System – Electronic Passenger Ticketing'. Smartcards, in the form of prepaid tickets, were introduced in the first stage of the project. Subsequently, the system was linked to a mobile operator and mobile payments were also launched for passengers. The entire Electronic Passenger Ticketing project focuses on introducing a universal identifying, payment and memory medium based on a contactless smartcard accepted throughout the region as a carrier of prepaid and single tickets for transport services and as an electronic means of payment for transport and non-transport services, while also providing the service of a unique user identifier.

The project 'South Moravian Winter Road Conditions Information Portal' has established a public portal providing road users with information about the progress and status of winter maintenance, as well as road closures and restrictions in South Moravia.

In the **Hradec Králové** and **Pardubice Regions**, the 'Integrated Transport Ticketing System Modernisation' project included an action giving passengers the opportunity to activate fares (either prepaid or as an electronic wallet) using an IREDO card throughout the Hradec Králové Region.

c) at municipal level:

Public transport data monitoring was completed in **Pardubice**. This included the monitoring of routes, average speeds, timetables and electronic ticketing systems.

In **Prague**, a **route search application** is being rolled out as part of the multimodal passenger information service.

In **Plzeň**, a scheme to **install electronic information systems** with LED technology and brightness control at public transport stops has been completed. This system provides passengers at stops with up-to-date text and audio traffic information. The town of Chomutov, as part of the deployment of

its ticketing system, has implemented a system to monitor the operation of all passenger bus and trolley-bus services in real-time with online output for control-centre operations. Passengers have also been offered four machines, covering Chomutov and Jirkov, to recharge contactless smartcards. Large-scale LED electronic information systems displaying up-to-date information, including information on departures, have been installed at the central bus stations in Chomutov and Jirkov.

In **European Priority Area 2) 'Continuity of traffic and freight management ITS services'**, the following action has been taken

   a) *nationally:*

Several research activities have been carried out:

- Work is continuing on the **POSSE research project – Promoting Open Specifications and Standards in Europe**. It will result in underlying documentation for the implementation of open intersection traffic management specifications and in other open concepts successfully applied in German-speaking countries (the OCIT concept) and the United Kingdom (the UTMC concept). The project will be completed in **2014**.
- **Increased Use of Parking Capacity on Motorways Using Prediction Models** is another research project that, up to 2014, will focus on the creation of a system, working on the basis of input data from the toll system and other parameters, that will make short-term predictions of the availability of individual parking spaces for heavy goods vehicles in the motorway network. The idea is to provide information in order to optimise the use of current parking spaces.
- The research project **ViaZONE**, designed to **improve traffic flow** and **road throughput capacity** in places where temporary restrictions are in place on motorways and expressways via mobile cooperative ITS systems, has been pilot tested near Vyškov on the D1 motorway. The system which has been developed should become a means of eliminating the adverse effects of any intervention obstructing traffic flow due to essential repairs or upgrades.

   b) *regionally:*

In the Vysočina Region, four dynamic speed-deterrent traffic lights have been installed on class I and II roads.

In the **Moravian-Silesian Region**, the **vehicle positioning outputs** of all carriers involved in the integrated transport system have been concentrated **into a single central control centre** (CD ODIS). The CD ODIS ensures guaranteed continuity, focusing on bus/train transfer points.

   c) *at municipal level:*

In **Prague**, a **vehicle monitoring system** is in place. This system provides **real-time monitoring of public transport vehicles**, and enables passengers to obtain information about the current position of individual services. The pilot project will be completed in 2015.

In **Brno**, the **existing traffic light transport centre has been completely overhauled**. The contract encompasses installation and software work, as well as the putting of the renovated transport centre back into service, including successful trial operation. CROSS transport technology has been supplemented to include the necessary interface for connection with the renovated transport centre via an open communication protocol. The **traffic lights** in Masná – Křenová and Husova – Údolní

Streets, including fibre optics to the Besední car park, have been **renovated**. In the centre of Brno, the Veveří car park has been **fitted with an automatic barrier system**.

In **Plzeň**, morally and technically outdated transport equipment has been replaced with an **automatic traffic control system**. Strategic detectors have been added to **traffic light controllers** and superstructure control programming modules have been added to the transport centre's software. Technical components have been added to **30 traffic light controllers** to provide **active prioritisation for public transport vehicles**.

In **Liberec**, some traffic light controlled intersections have been connected to an optical network and the **transport management of such intersections** has been implemented on an ongoing basis since 2009. This investment project is due to remain ongoing until 2021.

In **European Priority Area 3) 'ITS road safety and security applications'**, the following action has been taken

a) nationally:

The pilot testing of the **eCall system** via the European project HeERO (Harmonised eCall European Pilot) has been completed.

A project to **implement an integrated information system for the road transportation of dangerous chemicals**, as a uniform information instrument able to provide users with structured, quality and guaranteed information about chemical transportation safety with a view to enhancing safety and increasing environmental protection in the operation of such transport, has also been completed.

Under the BaSIC project, designed to increase road safety via interoperable vehicle systems providing vehicle communication with other vehicles or with intelligent transport infrastructure, recommendations have been drawn up for the conceptual introduction of cooperative ITS systems in the Czech Republic.

b) at municipal level:

In **Prague**, the scheme to **enhance the quality of traffic monitoring and control has seen the completion of a project to optimise surveillance systems in Prague's road tunnels**. In addition, existing **traffic information devices** have been renovated and new ones have been added.

In **Liberec**, underlying documentation has been drawn up in the **multiple-vehicle collision prevention system**.

In **European Priority Area 4) 'Linking the vehicle with the transport infrastructure'**, the following action has been taken

a) nationally:

The national research and development project 'Telematics systems in public transport', including analyses of prioritisation systems in operation in public transport, the technology, procedures and equipment used in the identification of fixed structures in public transport and ticketing systems in the Czech Republic and abroad, has been implemented. Methods for the modern ticketing of passengers using public transport have also been proposed.

The project '**Increased road safety via interoperable vehicle systems providing vehicle communication with other vehicles or with intelligent transport infrastructure**' has been completed. The project has resulted in conceptual and implementation recommendations, along with pilot testing carried out in real conditions on the large Prague ring road. Test vehicles have communicated with the infrastructure and with each other in test driving.

b) at municipal level:

In **Plzeň**, an **automatic switching system** has been introduced to enhance traffic safety and minimise human error, while making the control of rail vehicles easier. Intersections have been fitted with units and software, and signal plans have been programmed to **prioritise public transport vehicles** via direct wireless communication. This system will result in less waiting time for public transport vehicles at traffic light controlled intersections.

In **Prague**, a system has been introduced to **monitor the operation of selected public transport vehicles**. **Buses and trams are prioritised at traffic lights** by an active prioritisation system that communicates with the traffic light controller in order to prioritise the passage of public transport vehicles.

In **Prague**, a system (Digital Map) working on the basis of Wi-Fi, GPS and INFRA has been tested since 2013. It is designed to locate precisely where trams are in the track network and automatically carry out services for the driver or, alternatively, control the vehicle with no need for driver intervention. The aim is to **automate certain driver activities currently carried out manually**.

Wireless data transmission from and to public transport vehicles (buses and trams) was introduced in 2013. Timetables and stop names are transmitted between a central server and vehicles.

In Brno, the project 'Deployment of intermodal transport telematics information services – CED development and Stage II of ELP (electronic information panel) installation' has been implemented. This project includes the supply of new transport telematics software services intended primarily to simplify traffic control and organisation and to improve passenger information about timetables. In Stage II of the project, 52 tram interchange terminals were fitted with electronic information panels (a total of 52 panels). These information panels can be used to display up-to-date information about departures. **Each mode of transport** uses **ITS** systems in line with its own needs and requirements, but under a **different 'legislative'** name. The following section describes the deployment of this technology in other modes of transport.

ITS deployment in rail transport

Telematics systems on the railways are being advanced in the Czech Republic as part of the European strategy for the development of the **European Rail Traffic Management System (ERTMS)**, aimed preparing and implementing individual systems in the European railway network. The integration of European railways has increasingly necessitated international rail transport safety cooperation within the European Union. One of the key tasks is to ensure the interoperability of the high-speed and conventional trans-European rail network. The target is to achieve interoperability on all routes included in the European railway system. The technical aspect of interoperability primarily involves the deployment of European control-technology systems, i.e. the level-two European Train Control System (ETCS), and digital mobile radio networks to provide voice and data services under the GSM-R (Global System for Mobile Communication – Railways).

Outdated, inconsistent and operationally costly signalling and communication equipment on many important lines does not match the needs of modern, efficient and safe rail transport. In this respect,

it is very important to deploy a single European Rail Traffic Management System (ERTMS) composed of two parts – the ETCS and GSM-R – especially as regards TEN-T lines. In response to Commission Decision 2012/88, ERTMS issues are addressed in the Czech Republic by the 'National ERTMS Implementation Plan'. The revised version will factor in the updated dates for the implementation of the individual sections, take account of the strategy for the development of the ETCS and GSM-R in the Czech Republic, and examine the possibility of deploying these systems on non-TEN-T lines.

Major problems in the Czech Republic's railway network include its poor technical level (the inadequate line speed and frequent speed reductions, low capacity, poor interoperability, and inadequate conditions for freight transport – especially the length of the tracks in stations and multimodal transport terminals), the poor condition and insufficient facilities at transport terminals, railway stations and stops, and the related mediocre passenger experience, resulting in low competitiveness compared with road transport in most important respects.

With this in mind, security facilities will be modernised, accompanied by the deployment of a remote-controlled safety system and automatic train control, together with other modern technology (including space technology) to enhance rail transport safety and the related development of databases.

In addition, the ETCS (European Train Control System) is being installed in the sections between Prague and Kolín. A system is also being installed on the first transit railway corridor.

Between 2011 and 2013, projects to upgrade and develop control systems to support the management of freight and passenger transport were implemented by the national rail carrier, Czech Railways (České dráhy), and the Railway Infrastructure Administration. These projects entailed the introduction of a module to support the control-centre management of freight transport, as well as passenger transport control and information systems.

Interoperability components are being installed on selected railway lines in the Czech Republic. In 2013, work took place to update the document 'Implementation Plan or ERTMS in the Czech Republic' Important projects include:

- **TSI-TAF implementation** (technical specifications for the interoperability of the subsystem for telematics applications in freight transport in the trans-European conventional railway system) in the information systems operated by the state organisation Railway Infrastructure Administration;
- **GSM-R** (Global System for Mobile Communications – Railway) **Děčín – Všetaty – Kolín** (completed in 2013);
- GSM-R in the sections from Ostrava to the state border with Slovakia and from Přerov to Česká Třebová (completed in 2013);
- **GSM-R in the section Kolín – Havlíčkův Brod – Křižanov – Brno** (tendering procedure remains pending);
- **GSM-R for the third corridor in the section Beroun – Plzeň – Cheb** (the project plan was approved by the Ministry of Transport Central Committee in November 2013 and is expected to be implemented between 2013 and 2016).

In addition, the ETCS (*European Train Control System*) is being installed in the following sections:

- Prague – Kolín

- On the first transit railway corridor

In the forthcoming period, ITS development priorities and requirements in rail transport will focus on interoperability between the high-speed and conventional trans-European railway network. The integration of European railways has increasingly necessitated international rail transport safety cooperation within the European Union. The installation of GSM-R radio stations in the railway vehicles of ČD, a.s. and ČD Cargo, a.s. will continue. In the coming period, vehicle movement monitoring GPS navigation systems will continue to be deployed on diesel locomotives to optimise the management and monitoring of ČD locomotives.

A significant forthcoming ČD project is the fitting-out of the Test Centre of the Velim Railway Research Institute (Výzkumný ústav železniční) for the testing of railway applications using global navigation satellite systems (GNSS), planned for implementation in 2015 and 2016.

ITS deployment on inland waterways

On inland waterways, the current status of operations and further deployment of river information services (RIS) in the Czech Republic is in line with Directive 2005/44/EC on harmonised river information services. The following services are currently in operation in the Czech Republic:
- the State Waterway Administration (Státní plavební správa) has electronic navigational charts available for download in 'Inland ECDIS' format; the charts are updated approximately every six months;
- 'Notices to Skippers' are provided. These are reports on current waterway conditions, restrictions, water levels, etc. Preparations are underway to expand the scheme to include weather-related reports;
- vessels are currently tracked and traced on the basis of data recordings on lock use. In this way, it is possible to identify between which locks a vessel is situated. In 2014, an 'Automatic Identification System' (AIS) will be deployed for pilot operation in accordance with the Commission Regulation on the RIS guideline 'Vessel tracking and tracing'. This will facilitate the tracking of a vessel's current position with great precision, thus significantly enhancing the safety and flow of waterway traffic;
- as part of the RIS guideline 'Electronic reporting', voyage data, within the meaning of Implementing Regulation 356/2009 on RIS, are reported either online or at the first lock used. During 2014, an instrument will be implemented that will draw on these data to process statistics automatically. In the medium-term, there are plans to interlink this application with systems abroad.

The Waterways Directorate of the Czech Republic, as an investor organisation for the development of waterway infrastructure, is in charge of implementing the RIS. A basic project for a telematics system has been implemented, which has given rise to the Elbe-Vltava Transport Information System ('LAVDIS'). This project was financed with resources from the State Transport Infrastructure Fund, with co-financing provided by EU funds (the ERDF) via the Operational Programme Infrastructure. This work has been followed by further investments in a DGPS reference station under the project 'DGPS correction signal transmitter in the RIS', co-financed by EU funds via the Operational Programme Transport.

The Waterways Directorate is also responsible for the implementation of other development sections of the RIS under new projects, e.g. the deployment of an Automatic Identification System (AIS), improvements in the quality of information on the state of waterways and the connection of the RIS with other logistical applications and systems.

The RIS also encompasses issues related to digital navigational charts under the Inland ECDIS standard, which is fully harmonised in the EU. The format is based on Directive No 2005/24/EC on harmonised river information services (RIS) on inland waterways in the Community. Navigational charts in the Czech Republic are managed by the State Waterway Administration, which also operates the waterway geographical information system. This system is used to generate navigational charts to the Inland ECDIS standard. Under the project IRIS Europe II, the Waterways Directorate (as an investor) has arranged for the deployment of technology to measure lock depth and to transfer the measured data to the GIS and Inland ECDIS navigational charts. Measurements are taken by the state undertaking Povodí Labe, s.p., and data processing [...]

A **River Information System (RIS)** has been established and expanded in the inland waterway transport sector in the reporting period. RIS deployment is handled in accordance with Directive 2005/44/EC of the European Parliament and of the Council on harmonised river information services.

As part of the IRIS II project, services and information focusing on the collection of static and dynamic waterway data, vessel and freight tracking, and wireless access to RAF services at key navigation points have been implemented. IRIS 3 project implementation includes activities centring on the pilot implementation of traffic and transport information services, as well as information services for logistics and the authorities.

ITS deployment in air transport

The second stage of the ACCEPTA project has been used to support the implementation of approach procedures applying the EGNOS system. The aim is to **implement approach procedures** for **Brno Tuřany Airport** (the approach to runways 28 and 10) and **Ostrava Mošnov Airport** (the approach to runways 22 and 04).

The **Aircraft/Control Centre DI Radiotelephone Communication** project was launched in 2012 in response to the expansion in services under Priority Area 1). Sports pilots from across the Czech Republic will be able to transmit real-time information about traffic problems, tailbacks, detours, fires and other emergencies on an allocated aviation frequency. It should take until 2022 to implement this project.

V. ITS financing in the Czech Republic

Multisource financing, combining funding from the central government budget, the budget of the State Transport Infrastructure Fund, the budgets of regions and chartered cities, resources from the relevant EU financial instruments, and private-sector funds, was used to implement ITS projects in the reporting period. Public funds allocated to research and development support were also channelled into ITS projects.

Between 2011 and 2013, ITS development and deployment in the TEN-T network was primarily financed via the **Operational Programme Transport**. Regions and chartered cities sourced financing from regional operational programmes such as the **ROP NUTS II**, the OP Prague – Adaptability and Competitiveness, and the Integrated Operational Programme.

Financial resources for ITS deployment in the road infrastructure were also drawn from the EU's Community schemes **EasyWay** and eCall/HeERO.

Approximately **CZK 105 billion** was invested in **transport infrastructure** in the Czech Republic between 2011 and 2013. More than **CZK 2.5 billion** from public resources – the central government budget, European funds (operational and regional programmes), and the budgets of regions and chartered cities – was spent nationally on ITS deployment and upgrading in the reporting period. In the Czech Republic, less than 3% of all investments in the areas of transport monitored went into ITS development. More than 50% of all resources spent on telematics were drawn from the EU's Structural Funds.

- Approximately 44%, i.e. CZK 514 million, was sourced from the Operational Programme Transport
- Approximately 31%, i.e. CZK 370 million, was sourced from the Operational Programme TEN-T
- Approximately 22%, i.e. CZK 254 million, was sourced from the Regional Operational Programme NUTS II
- Approximately 2%, i.e. CZK 27 million, was sourced from EasyWay
- Approximately 1%, i.e. CZK 12 million, was sourced from the CIP

More than **CZK 1.4 billion** was invested in actions under the **priority areas** of Directive 2010/14/EU. Approximately 80% of financial resources were expended on Priority Areas 1 (44%) and 3 (44%). The least amount of resources was invested in Area 4 (approximately 2%).

94% of transport telematics resources were spent on **investment projects**; just under 3% was channelled into **pilot projects, testing and trial operation**, and just over 3% went on studies.

Most projects were implemented **nationally**, accounting for more than CZK 1.5 billion. Projects worth nearly CZK 600 million were implemented in the **City of Prague**. Projects worth CZK 53 million were implemented in **Brno**, while in the **Vysočina Region**, for example, investments amounted to approximately CZK 2 million.

More than CZK 1.1 billion was invested in **rail transport** in the reporting period. Of that, most funding covered the investment projects 'GMS-R' and 'ETCS – Corridor I, Kolín – Břeclav (State border with Austria/Slovakia)'.

More than CZK 1.3 billion was invested in **road transport**. Of that, most funding covered the investment projects 'Increased road safety in the City of Prague' and 'Deployment of electronic ticketing systems'. In road transport, the ratio of transport telematics investments to investments in

other modes of transport was lowest, accounting for just under 1.5% of investments into road transport infrastructure.

The vast majority of financial resources in **water transport** were used to expand the river information system RIS III. The total investments in water transport ITS amounted to approximately CZK 70 million.

The proportion of public investment in the use of ITS in **aviation** was lowest. Here, financial resources amounted to approximately CZK 15 million, of which about half was invested in the acceleration of the application of EGNOS systems in air transport.

List of annexes:

Annex 1 – Significant ITS projects implemented in the Czech Republic in the reporting period
Annex 2 – Deployment map – ITS sensors and actuators in the Czech Republic