

On 15 October 2012, Act No 317/2012 on intelligent transport systems in road transport and amending certain other laws entered into effect, through which Slovakia transposed 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. This Act created the legal framework for Intelligent Transport System deployment in Slovakia and for implementation of the National Traffic Information System (NTIS) project and for establishment of the National Traffic Information Centre (NTIC).

The Act establishes the possibility of developing a complex system environment for the collection, processing, sharing, archiving, provisioning and publication of traffic information concerning the latest transport situations on the roads and concerning the environment for the administration and operation of applications and systems in respect of this traffic information. The traffic information in the NTIC must be localised via a common reference network (CRN) for roads. The Act lays down a method for the provisioning and publication of traffic information to the general public, and the provision of traffic information to traffic information providers and to natural and legal persons on a contractual basis.

In January 2015, the Ministry of Transport, Construction and Regional Development of the Slovak Republic concluded an agreement with a contractor for the development of the NTIS and NTIC. The project is funded from EU sources and is due for completion by the end of 2015. The NTIC will secure the provision of reliable and verified traffic information both for the general public and the professional public. The aim is to integrate the systems and databases of road owners and administrators and other entities that have relevant traffic information in their possession, and to develop a transport portal, a mobile application and an interface for the exchange and provision of traffic information. It shall make use of and cover the entire road network. In the deployment of the system, account shall also be taken of the future development of the network with regard to the scope and quality of the ITS facilities on all categories of roads. The inclusion of basic information on other modes of transport (rail, bus, cycle, aircraft, etc.) is also planned.

The NTIS is to be an open, modular, system environment for the creation, collection, processing, distribution, archiving and post-processing of traffic information on various modes of transport, including road, rail and air. The term 'system environment' indicates that this will not comprise a single, large, complex information system, but a number of interoperating systems, the compatibility of which will be guaranteed through the use of interfaces that comply with international standards.

The interconnection of the systems shall be secured by key basic systems, which are the NTIC Information System, RNM IS Positioning Services and Basic Infrastructure Services (central numerical register, central register of organisations and users, synchronous time etc.).

A system environment designed in this way also keeps options open for the future and offers the possibility, if needed, of integrating other systems that participate in traffic information data flow processes and are equipped with an interface for incorporation into the NTIS system environment. Implementation in the form of an open environment is essential if we want to ensure complex and complete fulfilment of the tasks of the NTIS and

at the same time to ensure its future flexibility, i.e. the options for expanding it to include functions fulfilling requirements that cannot be known at present.

The development of the NTIS will create an open system environment that will help to reduce the occurrence of congestion and heavy traffic on busy roads, an environment that can help to reduce traffic accidents and increase the efficiency of the authorities, organisations and institutions active in the area of road maintenance and administration. The NTIS will constitute a source of necessary transport-engineering information of importance to traffic management and the creation of traffic models.

Operation of the NTIS will deliver the following benefits in particular:

- reductions in traffic accidents and the consequences of accidents for life, health and property,
- an increase in overall road safety,
- reductions in journey times and improved traffic flows,
- direct positive impact on the behaviour of road users, encouraging personal responsibility and consideration for others,
- support for the effective deployment of information technologies, ITS and telematic systems in the area of transport,
- securing local, regional, national and European interoperability in the area of traffic information and transport data, and in the exchange of updates on the transport situation or information on roads,
- support for the intelligent management and control of road traffic by means of technical, technological and telecommunication systems for the effective management of transport,
- support for the provision of ITS services for passenger and freight transport in transport corridors and urban/interurban regions, support for the managing the operation and planning of roads and in particular for emergency planning.

The information system created in the project shall be administered and operated by the supplier of the project solution under the aegis of the Ministry of Transport, Construction and Regional Development of the Slovak Republic.

The measures contained in this report are measures that will be secured directly by the Ministry of Transport, Construction and Regional Development of the Slovak Republic or by organisations appointed by the Ministry. The activities described and listed in the text shall be structured in accordance with the individual priority areas listed in 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. Slovakia will carry out the following activities in the area of ITS implementation in accordance with the Directive.

Priority Area I: – Optimal use of road, traffic and travel data:

A. Road infrastructure data (Central technical register of roads)

A central technical register of roads (Central Register) shall be provided under Section 3(3)(f) of Act No 135/1961 on roads (the Roads Act) as amended, by the Ministry of Transport, Construction and Regional Development of the Slovak Republic and operated by the Slovak Road Administration through the Road Databank. The Central Register

represents a summary from the activities of obtaining the background details and information necessary for performing data collection on the ground, performing the data collection itself, processing the measured data, processing the data that is not measurable on the ground and carrying out activities connected with use of the data. The Central Register currently includes motorways, expressways and category I, II and III roads, in respect of which it records the following basic data groups, which in electronic form comprise the “Road Network Model” (RNM):

- **Data representing the road network** / reference network – points (branching points on the axes of the carriageways, start and end points of roads, boundaries of the administrative areas of the Slovak Republic / districts, ownership and administrative boundaries of roads), sections (carriageway axes), lines of roads (derived from sections), lines of routes (derived from sections). The reference network data comprise a spatial model, i.e. they comprise spatial elements measured using GPS technology (static and kinetic measurements, differential corrections in real time, 1s signal interval, i.e. the measuring position is recorded every second). The measured data is supplemented by descriptive data (attributes), e.g. the basic attributes of a section include the road number, the length of the section, the name of the section, orientation of the section compared to the orientation of the road, direction of transport, owner, administrator of the road, territorial jurisdiction – district, region.
- **Data on road components and facilities**, which are linearly referenced to sections (this means that their occurrence is measured as a chainage value – distance from the start of the section in metres); this data includes a full cross-sectional layout over the width of the road – lanes, carriageways, hard and soft shoulders, paved portions of road – their occurrence, width and restraint systems are recorded, along with the road equipment – bus stops, filling stations, car parks, rest areas, technical equipment etc., traffic signs and road structures with a detailed attribute description.
- **Data characterising the road surface**, which are measured using a diagnostic technique and are referenced to sections in an identical way to the data on road components and facilities. The data are: load-bearing capacity of the road, lateral and longitudinal flatness, longitudinal skid friction and state of the road surface.

The Slovak Road Administration is under an obligation to extend the Central Register to include local roads by 2017. The Ministry of Transport, Construction and Regional Development, in cooperation with the Slovak Road Administration, is currently preparing the actual project for extending the Central Register to include local and urban roads. Implementation is expected to be completed in accordance with the deadline by the start of 2017.

Data collection is carried out:

- For new sections of road: this information is sent to the Road Databank in the form of an approval decision or a decision on the conditional use of a structure, which are sent in by road administrators or investors, or, as the case may be, a decision on a change to the layout of the road network of the Ministry of Transport, Construction and Regional Development. This process is performed in accordance with TP 15/2013 Layout of the road network.

- For existing sections of road in the event of a change to any of the data monitored.
- Measurements of variable technical parameters – diagnostic road measurements are carried out at the road network level – they are performed regularly every year within a scope that depends on the availability of the specific diagnostic equipment; measurements at the project level depend on the requirements coming from the road management system.

The Central Register also includes further “supplementary” data or materials, e.g. situational sketches of crossroad situations during measurement (an important data source for editing the attribute data in the office), photographs of nodal points, scanned documents (documentation on bridges, decisions on changes to the layout of the road network, approval decisions etc.).

The Central Register also includes processed data resulting from the geoprocessing of basic data. These include tabular formats, statistical reports and map documents intended mainly for allowing a wide range of users to make use of the data.

The quality of the data can be observed at two levels:

- One level is the scope, representation and accuracy of the recorded data; it can be said here that these aspects are at a satisfactory level, the scope of the data fully meets the needs of the sector (if the need arises to record new data types, the RNM is flexible, the accuracy of the recorded data depends on the collection technology (use of GPS technology provides sub-metre positional accuracy, the height accuracy of the spatial data is about 2 m where there is sufficient GPS signal coverage, of course. The technique of linear referencing is performed using standard measuring devices for distance travelled, which are regularly calibrated and measure with a longitudinal accuracy of +/- 0.05 %).
- The other level is how up to date the data represented in the RNM is compared to the situation on the ground. This depends on the nature of the relevant data and on the responsibility of the road administrators. In this area, there has been a failure to secure satisfactorily up-to-date information on traffic signs. We propose addressing the process through the new Roads Act, where this obligation is directly assigned to the road administration authorities who approve traffic sign specifications.

Implementation of the Central Register is greatly supported by modern information technologies – in the Slovak Road Administration the Road Network Model Information System (RNM IS) is operated, providing comprehensive functionality not only for the Central Register but also for processes in the system for proposing and evaluating routes for the carriage of large and heavy loads, the systems for managing roads and bridges and the system for calculating road capacities. The RNM IS uses ESRI / ArcGIS technology in a desktop and server architecture customised with tools for managing and using the data in the Central Register. The architecture of the solution is client/server, using an MS SQL relational database system in ESRI with ArcSDE functionality, a personal geodatabase.

The data processed and distributed within the framework of the central dispatching and reporting activities provided by the NTIC division forms an integral component of the data

and information associated with the road network. Its agenda consists of receiving and processing traffic information relating to traffic flow and it is based on exploitation of the data and information, and thus cooperation, of the road administration organisations; information on closures obtained from the relevant road administration authorities has also been processed recently.

The Slovak Road Administration has also been delegated by the Ministry of Transport, Construction and Regional Development to secure the creation, updating, certification and distribution of the positioning codes for the TMC tables (positioning tables). These are intended for use in the transmission of traffic information via the RDS/TMC.

Use of road infrastructure data

The use of road infrastructure data is secured through an information service which ensures the use of all data and information created in the Central Register and application systems for transport routes; it is operated at a high level.

For the purposes of data provisioning and publication, a publication database has been developed and is operated by the RNM IS, and it brings together data from multiple sources, supplemented by derived data, and comprising a form that is suitable for the information service.

The RNM IS includes a wide range of tools providing standard processing of the recorded data and supporting the creation of an extensive agenda for the reporting of data in the form of tabular outputs, statistical reports and map documents. These are created periodically (usually once a year, with data updated for the relevant calendar year) and they are available to the general public through the internet services of the Road Databank portal (www.cdb.sk).

In addition to the static documents, the RNM IS web portal also provides access to online data (access to the latest state of the data stored in the database) through the Mapy CDB web browser (<https://ismcs.cdb.sk/portal/mapviewer>), which enables data searching, note creation and map printing. For road administrators, functionality is available which enables authorised effective commenting on the state of the data in the Central Register. A web application is operated through effective cooperation with the road administration authorities as a component of the RNM IS making use of data from the Central Register database for evaluating proposed routes up to 60 t, which falls within the competence of the relevant road administration authorities. The Reports web application enables users to create reports from data in the Central Register for any road, or part thereof and to download it to a local computer.

RNM IS technology using ESRI ArcGIS software enables the provisioning of data under OGC (Open Geospatial Consortium) standards such as WMS (Web Map Service) and WFS (Web Feature Service), for example.

The provisioning of data from the Central Register via WFS and WMS is secured through a license manager, i.e. software making it possible to use licences to manage and control user access to the above services based on licensing policy of the Slovak Road Administration.

Entities within the state and public administration, autonomous authorities and entities set up or established by such bodies which wish to use data from the Central Register in the performance of their work tasks shall be provided with data by the Slovak Road Administration free of charge on the basis of a licensing agreement which defines the specific ways of using the data and protects the authorship of the data.

The Central Register data are used by many users, whether in the road management sector or in other sectors of the state administration, entities representing self-governing authorities, municipalities, road owners and administrators, private companies (especially project companies), research institutes and entities for science, research and task solutions in the education sector and international projects and tasks.

The Databank Information Service Division provides all users with advice on how to use the data. Slovak Road Administration organises workshops every year for representatives of road administration organisations in order to ensure effective cooperation, the sharing of experience, mapping requirements and potential problems.

In order to provide access to Central Register data contents, a Metadata Portal is under successful development in the RNM IS containing a detailed description of all the data forming part of the Central Register.

In order to ensure the development and operation of services and the harmonisation and provisioning of spatial data on the road transport network in the countries of the European Union in accordance with Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (Inspire) as amended and Act No 3/2010 on the national infrastructure for spatial information, the Slovak Road Administration has harmonised the road transport network data and developed an appropriate service infrastructure for data provisioning and usage. This is available via the RNM IS/INSPIRE portal (<https://inspire.cdb.sk/geoportal>).

B. Collection technology for the collection of data for the Central Register of roads

The purchase of two vehicles is planned in the future, with built-in mobile mapping equipment (3D laser, referenced photographs), to provide more effective and in particular more secure data collection, while the assessment of data will be transferred to an office environment.

C. RNM IS – providing the CRN and positioning services

An essential precondition for the usefulness of traffic information is its exact positioning, i.e. identifying the part of the road network to which the given information applies. Without positioning, traffic information is worthless, and the essential precondition is for the positioning to be “understood” by all interested parties, i.e. for them to interpret the positioning in the same way.

To this end, a main positioning methodology was therefore incorporated into the RNM IS, making it possible to derive a CRN positioning database from the data in the central technical register of roads, to provide the Traffic Reporting Service information system with

data services for working with the positioning information and to provide users with a universal interactive component for creating and editing positioning information.

In addition to the primary static positioning methodology, a dynamic positioning methodology was also created in the positioning service, which is used when searching for structures in the CRN.

The basic static positioning method is linear positioning against the CRN and the basic dynamic method is TPEG ILOC.

Uninterrupted operation and availability of the CRN is secured for the positioning interface.

D. Traffic Reporting Service Information System (TRS IS).

In 2003, Slovakia developed a unified system for the creation, processing and distribution of information on the traffic flow situation – the TFS IS, which was upgraded in 2010-2013 to the Traffic Reporting Service Information System (TRS IS). Administration organisations for all roads in Slovakia (motorways, expressways and category I, II and III roads) are connected to it, as well as administrators of urban roads in Bratislava and Košice, who report, in accordance with the established rules, on weather conditions and traffic flows on the roads under their administration and on the occurrence of emergencies on these roads. The central office, the so-called dispatching centre, is operated by the Slovak Road Administration (SRA). The system operates around the clock during the winter period, i.e. usually from 1 November in a given calendar year to 31 March of the following calendar year; in the rest of the year it operates within the normal working hours of the individual organisations (the so-called summer regime).

In addition to traffic flow and weather monitoring, the TRS IS also secures the recording and processing of all forms of situational traffic information and data. Situational traffic information includes a register of situations that might have an impact on safety or traffic flows, providing the possibility for a detailed classification of the event or events that cause a given situation, the measures taken by the authorities and agencies, the consequences of the event and the measures, and also recommendations and instructions for drivers. Events include accidents, road works, damaged infrastructure, public occasions, CSS breakdowns, crossings and other technical equipment, large loads etc. Measures adopted may include closures, changes to road width, changes to traffic signs (including speed limit restrictions), diversions etc. Consequences may include various levels of abnormal traffic (queues, slow-moving traffic, heavy traffic), blocked lanes or carriageways, impassable sections and delays.

The TRS IS system is fitted with a data interface that conforms to the European standard CEN/TS 16157-1 to -3 (DATEX II), and through which traffic information can be received and distributed from/to other information systems. It is also fitted with a RDS-TMC subsystem enabling the distribution of traffic information to compatible TMC receivers of end users, i.e. in particular to navigation devices. RDS-TMC transmissions and the collection of information on short-term restrictions are carried out in cooperation with the broadcaster Slovenský rozhlas (project Green Wave).

The operation of the TRS IS includes use of the data and data services of the central technical register of roads as well as traffic data on the major urban roads in regional and

district towns (operated by the Slovak Road Administration, Road Databank division), and information on road closures, which are sent to the Slovak Road Administration by the road administration authorities. The traffic information obtained within the framework of project Green Wave (from trained traffic reporters and other road users) will gradually be brought into the system through a universal web application. The Slovak Road Administration plans to approach the road administration organisations with a cooperation proposal concerning the input of traffic information that relates to their activities. The cooperation with the Národná diaľničná spoločnosť (NDS) [National Motorway Company] concerns the receipt of traffic information from the NDS traffic service information system to the TRS IS of the Slovak Road Administration at the data interface level.

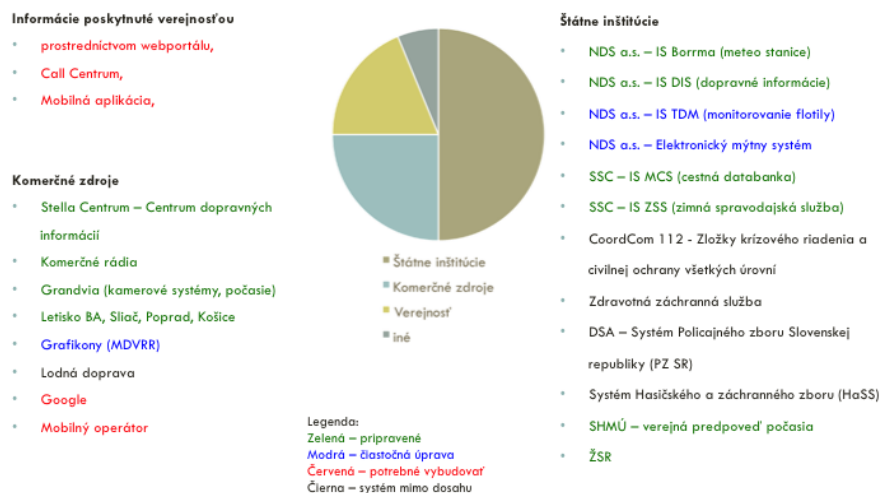
The traffic information is currently positioned against the TMC positioning tables (Alert-C methodology); work is under way at present to switch to positioning against the CRN (common reference network). Positioning according to the Alert-C method will then be derived automatically from the CRN through the CRN Positioning Services.

E. NTIS

Development of the NTIS in Slovakia is underpinned by continuous technical assessments of the existing road infrastructure in Slovakia, particularly the motorways, expressways and category I roads.

The solution should provide collection and publication of traffic information and traffic situations.

Traffic information collection refers to the area of logical modules that are directly connected to traffic information collection. The basis of traffic information collection will be the Call Centre modules, the mobile application and the portal. The modules are linked on ESB. Where appropriate, the NTIS will be capable of connection to an external system.



[Key:

Information provided by the public	[grey] State institutions	State institutions
• via the web portal	[pale blue] Commercial sources	• NDS a.s. – IS Borrma (weather station)
• Call Centre	[yellow] Public	• NDS a.s. – IS DIS (transport information)
• Mobile application	[Dark blue] Other	• NDS a.s. – IS TDM (fleet monitoring)

Commercial sources		<ul style="list-style-type: none"> NDS a.s. – Electronic tolling system
<ul style="list-style-type: none"> Stella Centre – Transport Information Centre 	Legend:	<ul style="list-style-type: none"> SRA – IS MCS (road databank)
<ul style="list-style-type: none"> Commercial radio stations 	Green – ready	<ul style="list-style-type: none"> SRA – IS WRS (winter reporting service)
<ul style="list-style-type: none"> Grandvia (camera systems, weather) 	Blue – partially in place	<ul style="list-style-type: none"> CoordCom 112 – All levels of crisis management and civil defence
<ul style="list-style-type: none"> Bratislava, Sliach, Poprad, Košice airports 	Red – requires development	<ul style="list-style-type: none"> Ambulance service
<ul style="list-style-type: none"> Graphs (Ministry of Transport, Construction and Regional Development) 	Black – out of reach	<ul style="list-style-type: none"> DSA – Slovak police force system
<ul style="list-style-type: none"> Ship operators 		<ul style="list-style-type: none"> Fire and rescue service system
<ul style="list-style-type: none"> Google 		<ul style="list-style-type: none"> Public weather forecasting
<ul style="list-style-type: none"> Mobile operators 		<ul style="list-style-type: none"> Slovak Railways

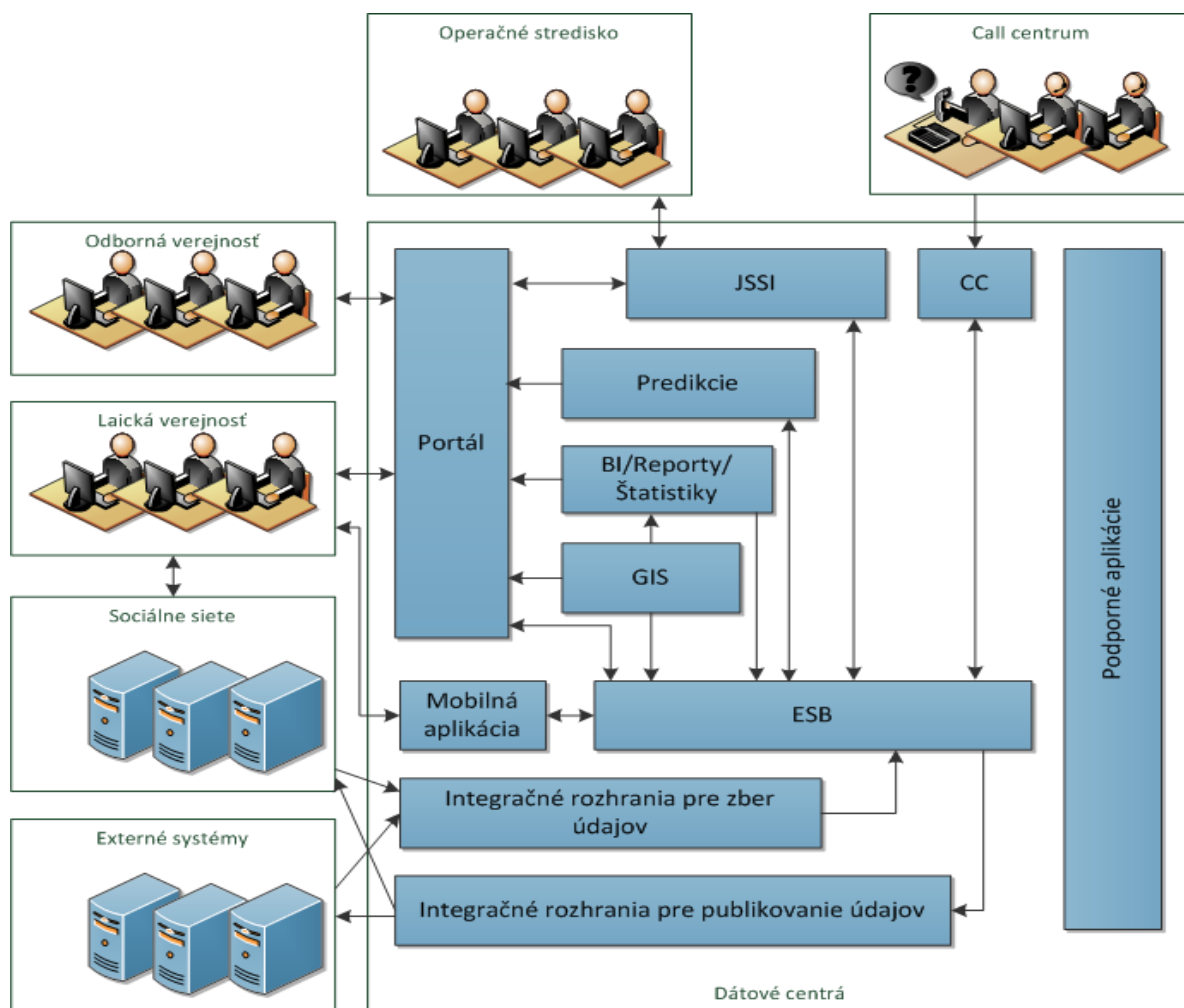
Fig.: Traffic information sources that are / can be incorporated into the NTIS solution.

When developing this phase of the NTIS, the Ministry of Transport, Construction and Regional Development tried to take account of emerging trends in the area of ITS and the securing of information on traffic situations. Data collection is planned to include the use of data from the tolling system and fleet vehicle data providers (GPS monitoring), as well as anonymised data from mobile operators and the mobile application itself. This method of implementation will make it possible in future also to include data obtained from the eCall system or other sources in organisations/companies working with the data in question (transport services, Green Wave etc.). This source is used primarily for obtaining data on traffic flows and providing information on the immediate situation and delays on routes. The historical data can then be used to plan transport upgrades and evaluate measures taken.

Traffic information publication refers to the area of logical modules that are directly connected to the publication of traffic information.

Information will be published to:

- system users and the public (portals, mobile application, call centre),
- external systems (systems supporting DATEX2, RDS-TMC, TPEG over IP) via an integrated interface for information publication.



	Operations centre	Call centre	
Professional public	Portal	JSSI CC	Support applications
General public		Forecasts	
		BI/reports/statistics	
		GIS	
Social networks	Mobile applications	ESB	
	Integrated interface for data collection		
External systems	Integrated interface for data publication		

Fig.: NTIS application architecture.

The NTIC will be the central technical, technological, operational and organisational worksite of the NTIS. It will be an operational centre that will look after the processing, evaluation, verification and authorisation of traffic information and data 24 hours a day, 7 days a week.

The National Traffic Information Centre:

- controls the quality and correctness of the traffic information and data provided, the transmission of information from authorities, organisations and institutions, and resolves problems in the event of non-compliance with obligations or procedures;

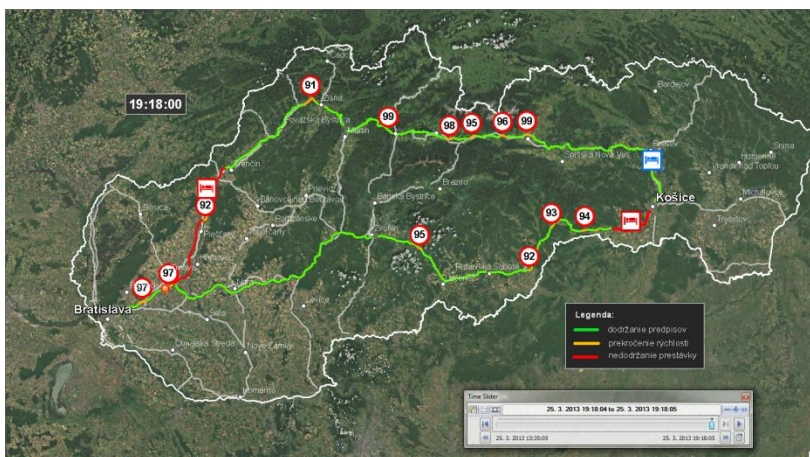
- is responsible for unifying information in cases where the same or similar traffic information comes into the system concerning one and the same event within the same time interval and from the same point on the road network;
- follows the lifecycle of events up to their end and the full resumption of traffic, supplements unauthorised or incomplete information with attributes from other sources and verifies these;
- provides traffic information and data to all customers, secures the operation of systems for the publication and distribution of traffic information and data, operates the other applications and systems of the NTIS, resolves any technical and technological problems;
- maintains and administers the archives of historical transport data and information.

Another component of the NTIS will be a portal solution for the collection and publication of traffic information. This will be a traditional web portal solution, using a thin client on the client side – a standard web browser, so there is no need to install additional software on the client’s machine. The solution supports multilingual content and switching between the individual language versions. The portal solution publishes information via a publication system, which is a component of the unified data processing system.

The portal solution is multi-channel – enabling the provision of traffic information in different categories and levels of detail for the different target groups. The distribution channels are as follows:

- portal for road administrators and solution providers
- portal the professional public
- portal for the general public.

The portal solution includes route planning functionality, which takes account of the latest traffic situation and restrictions, and any expected traffic situations or planned traffic restrictions.



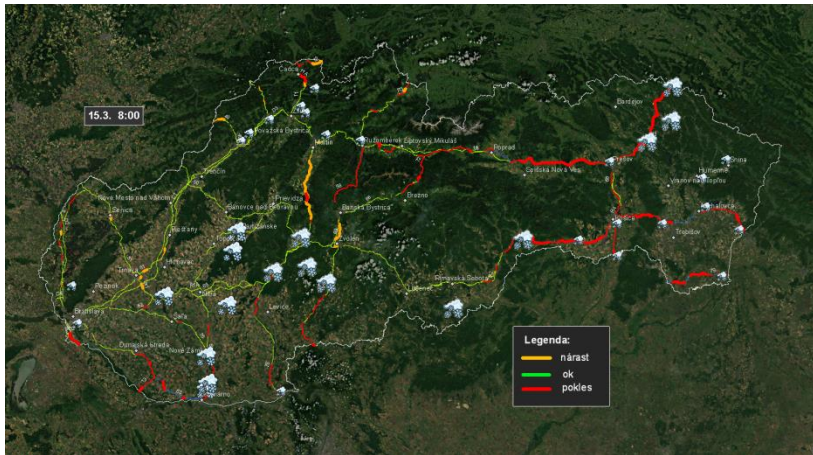


Fig.: Illustration of a possible display of the traffic and weather situation in Slovakia.

Priority Area II: Continuity of traffic and freight management ITS services

Telematic systems on motorways and expressways and ITS in regional and larger towns in Slovakia

For the mitigation of traffic problems in regional and larger towns affected by freight transit traffic, a partial transport solution must be implemented as follows:

- removal of road infrastructure collision points through the use of intelligent transport system elements;
- structural solutions giving preference to public transport vehicles (reserved lanes, preference at crossroads etc.);
- technical solutions in support of traffic flow and safety (monitoring systems, intelligent crossroads systems, variable traffic signs etc.).

In the process of preparing this programme, a fundamental analysis was performed in respect of traffic-transportation processes (accident rates, frequent disruptions to traffic flow, harm to the environment, traffic intensity) in individual regional and some larger towns. On the basis of the analysis the following towns were selected – Prešov, Košice, Poprad, Banská Bystrica (+ Zvolen), Žilina, Trenčín, Prievidza, Ružomberok, Martin, Nitra and Trnava, where increasing traffic problems will have to be resolved through implementation of the ITS. The actual solution will be based on the elaborated project and investment preparation of specific measures, particularly in the form of development of the technology and traffic management centres in the towns. The traffic information from these systems will be integrated into the National Traffic Information Centre. The originally planned list of towns will, however, have to be reviewed in view of road infrastructure works carried out or planned in the near future. This issue is, however, planned for the following period as a continuation after development of the initial phase of the NTIS.

Priority Area III: ITS road safety and security applications

Precise positioning of transport accidents, redesign of accident black spots

In order to eliminate traffic accidents and rebuild accident black spots, accident black spot sections must be evaluated on the basis of a long-term determination of the exact sites of accidents.

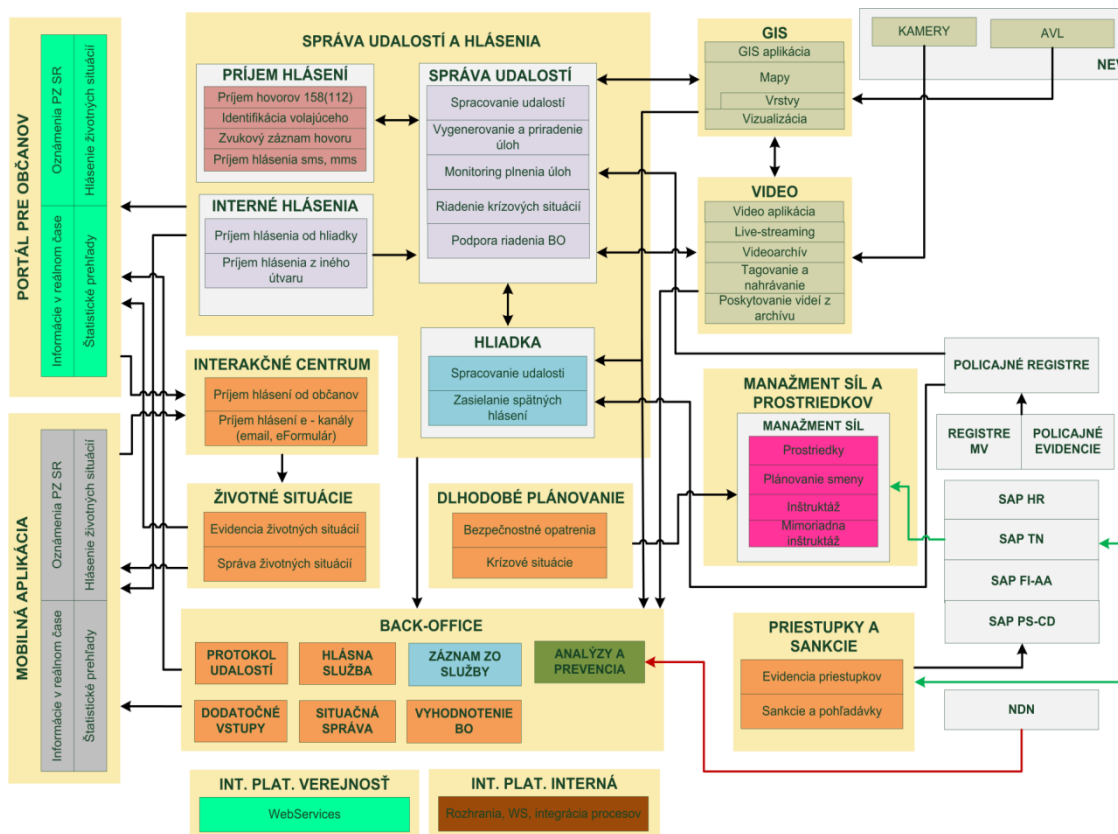
A special module of the NTIC will provide information on accidents, enabling the provision of transport-engineering data for accident positioning calculations, including a quantification of the social harm and damage to property caused by the traffic accidents, compilation of a collision diagram and subsequently also the option of evaluating the effectiveness of the measures implemented.

A definition of measures to increase the safety of road users is included in the National Plan for Increasing Road Safety in 2011-2020, approved by the government under Resolution No 798 of 14 December 2011. The National Plan for Increasing Road Safety in 2011-2020 includes framework objectives and measures associated with these relating to the specifications of Directive 2010/40/EU 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.

Following implementation of the initial NTIS project, it will be possible to provide information on traffic events to the police force and to link the recently implemented Mobile Policeman project, carried out by the Ministry of the Interior of the Slovak Republic, with NTIC systems. This will be possible to implement, however, only on the basis of outputs from both projects in the following period as development activities.

The main aim of the Mobile Policeman project is to

- optimise and reduce the administrative load on members of the police force, so that they can spend more time on the job;
- automate information processing processes in the police force;
- develop effective anti-corruption and control tools;
- provide electronic police services to citizens;
- support the operational management of the police force;
- support the analytical and statistical processes of the police force;
- optimise the work of members of the police force in obtaining and making use of data and information.



PORTAL FOR CITIZENS	Police reports	Administration and reporting of events	GIS	CAMERAS AVL			
		Reporting life situations		NEV			
		Receipt of report	Administration of events	GIS applications			
		Receipt of call 158 (112)	Creation and assignment of tasks	Maps			
		Identification of caller	Monitoring of task fulfilment	Levels			
	Information in real time	Statistical summaries	Recording of call	Managing crisis situations	Visualisations		
			Receipt of SMS, MMS	Support for back office management	VIDEO		
		INTERNAL REPORT		Video application			
		Receipt of report from patrol		Live streaming			
		Receipt of report from other unit		Video archives			
MOBILE APPLICATIONS	Information in real time	Police reports	Recording of life situation	Sending feedback reports	Resources	SAP HR	
			Administration of life situation	Crisis situations	Shift planning	SAP TN	
		Statistical summaries	Reporting life situations	LONG-TERM PLANNING	Training	SAP FI-AA	
			Receipt of report from citizens	Safety measures	Emergency training	SAP PS CD	
		BACK OFFICE				OFFENCES AND PENALTIES	NDN
		EVENT REPORT	REPORTING SERVICE	REPORT FROM SERVICE	ANALYSIS AND PREVENTION	Register of offences	

	ADDITIONAL INPUTS	SITUATION ADMIN	BO EVALUATION		Penalties and outstanding sums	
	INT. PLAT. PUBLIC		INT. PLAT. INTERNAL			
	Web services		Interface, WS, process integration			

Priority Area IV: Linking the vehicle with the transport infrastructure

A. Tolling system

The electronic collection of tolls was introduced in accordance with Directive 1999/62/EC of the European Parliament and of the Council on the charging of heavy goods vehicles for the use of certain infrastructures with the toll rate variation in the text of Directive 2006/38/EC of the European Parliament and of the Council.

A satellite system based on GNSS/CN (or GPS/GSM) technologies therefore operates in Slovakia.

There have been many changes to the electronic tolling system since the system was launched, but we can consider the most extensive of these to be the ones that entered into force from the start of 2014.

The Ministry of Transport, Construction and Regional Development of the Slovak Republic drew up Act No 474/2013 on the collection of tolls for the use of defined sections of roads and amending certain other laws (Act on Tolls), which replaced the former Act No 25/2007. At the same time as the Act on Tolls, Government Regulation No 497/2013 was adopted, which lays down a method for calculating tolls and toll rates and a system of reductions from toll rates for the use of defined sections of roads, Decree No 475/2013 defining sections of motorways, expressways and category I roads, category II roads and category III roads for the collection of tolls and Decree No 476/2013 implementing certain provisions of the act on the collection of tolls for the use of defined sections of roads and amending certain other laws.

The main aims of the Act on Tolls and the aforementioned implementing legislation was to ensure adoption of the measures planned in close cooperation with motorway company Národná diaľničná spoločnosť, a.s. (NDS) as the toll collection administrator and based on mutual dialogue and consensus with the higher territorial units as well as the carriers.

Another important objective was to set a framework for provision of the European Electronic Toll Service in Slovakia in accordance with Commission Decision 2009/750/EC on the definition of the European Electronic Toll Service and its technical elements, which lays down conditions for guaranteeing the interoperability of tolling systems (Commission Decision 2009/750/EC), which also led to the implementation of this decision. The Act also transposes Directive 2011/76/EU of the European Parliament and of the Council amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures with the toll rate variation in the text of Directive 2006/38/EC of the European Parliament and of the Council.

The Act introduced an objective responsibility in the sector of tolls which is intended to result in more effective, faster and more economical procedures on unlawful actions for specific violations of the Act on Toll Collection and, through individual and general

prevention, to clearly reduce the number of offenders and increase toll collections. At the same time, improved enforcement of duly imposed fines is anticipated.

As stated above, it is also planned to use the data from the toll system in the NTIS. This source will be used primarily to obtain data on traffic flows and to provide information on immediate situations and delays on routes. The historical data can then be used to plan transport upgrades and evaluate measures taken.

B. Other sources

In the same way as data from tolling, the NTIS also makes use of data from fleet vehicle data providers (GPS monitoring), as well as anonymised data from mobile operators and the mobile application itself. This method of implementation will make it possible in future also to include data obtained from the eCall system or other sources from organisations/companies working with the data in question (transport services, Green Wave etc.). This source is used primarily for obtaining data on traffic flows and providing information on the immediate situation and delays on routes. The historical data can then be used to plan transport upgrades and evaluate measures taken.