

Satellite Based Navigation to Optimize Traffic Flows

DETAILS

SECTOR | Transport

STAGE | Operations and Maintenance

TECHNOLOGIES | GLONASS, GPS, M2M, GSM/GPRS (2G, 3G, 4G), RFID

SUMMARY

Regional navigation and information system (hereinafter-RNIS) is a system designed for information and navigation support of the transport complex of a constituent entity of the Russian Federation through the use of GLONASS/GPS technology aimed at enhancing the safety and efficiency of passenger and cargo transportation at the regional level.

RNIS serves as a single access point to the monitoring and reference information about public transport operating in the region. RNIS allows government agencies, local governments and their subordinate organizations to conduct online centralized remote monitoring of the current location and condition of certain vehicles, control their movement, as well as quickly respond to cases of unforeseen circumstances or violations of the route schedule. Also, all the necessary services are available for transport companies and residents of the region who have round-the-clock access to essential information about transport carriers, passenger bus routes, road repairs and street cleaning, hosted on specialized web portals.

Goals of the RNIS:

- improvement of the efficiency of public traffic management through continuous monitoring of the region's transport, its location and condition;
 - better economic performance of transport organizations through downtime and unauthorized fuel drains prevention;
 - improvement of the safety of passenger transportation, carriage of special, dangerous, heavy and oversized cargo due to rapid response to emergencies and various violations of the rules of transportation of passengers;
 - control and monitoring of the constituent entity's transport system by executive authorities, automation of passenger transportation control and accounting for the carriers' performance under concluded government contracts;
 - modelling and forecasting: visualization of the current and archive transport situation, increasing the accuracy of forecasting while planning further execution of transportation contracts.
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- The RNIS represents a set of the following task-oriented subsystems depending on narrow-focused industry objectives:

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- unified regional navigation and information center for collection and visualization of monitoring summary of the constituent unit;
- integrated navigation platform aimed at obtaining, processing, storing and transferring of monitoring information to users through GLONASS or GLONASS/GPS technologies;
- transport industry monitoring subsystem including passenger transportation control within the territory of the Russian Federation constituent for regulation, dispatch control, security and keeping public informed about the passenger transport operation;
- school buses monitoring and control subsystem within the territory of the Russian Federation constituent for control automation;
- automated navigation and information subsystem of information exchange, call processing and management of ambulance vehicles;
- road haulage monitoring of special, dangerous, bulky and heavy cargo subsystem within the territory of the Russian Federation constituent for regulation and dispatch control in transit;
- monitoring of vehicles of public utilities and road facilities units of the Russian Federation constituent for regulation and control of public utility transport including sanitation trucks, harvesting and road equipment.

Before the establishment of the RNIS, there was no unified information and navigation core of the Russian Federation constituent to ensure consolidation of information flows and allow effecting centralized and transport control for socially significant transportation and special and dangerous freight traffic safety nationwide.

Accounting automation and establishment of complete analytics of the Russian Federation constituent entity's transport industry performance indicators (to achieve KPI, to follow traffic schedule, routes, timetable, speed limits, to fix schedule variance and to prevent unsanctioned transportation)

The desired outcome:

- Proper RNIS synchronization of the Russian Federation constituent with the systems of local transport companies
- Reduction of the time period for emergency response and taking appropriate measures
- Improving the quality of provided services by using feedback from citizens through online services

Further development and modernization of the RNIS provides for the enhanced functionality of existing subsystems, creation of new subsystems following forthcoming narrow-focus sectoral objectives of constituent entities of the Russian Federation, as well as the development of additional services that can be provided by using system capabilities.

VALUE CREATED

Improving efficiency and reducing costs:

- Cost reduction: for vehicle repairs by up to 10%; for fuel by 15 to 30 %
- Vehicle mileage reduction by 20 to 30 %
- 15 to 20% reduction in downtime of vehicles
- Labor productivity growth by 30%

Enhancing economic, social and environmental value:

Implementation of a high-quality and full-featured solution through creation (upgrading) of regional navigation and information systems contributes to:

- lower regional budget expenditures, better operational performance and more transparent management in housing and utilities, transport system by implementing end-to-end automatic reporting, eliminating the possibility of forgery and offline adjustments both on the side of contractors (budget recipients) and on the side of clients (public authorities);

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- reduced number and severity of road accidents through the provision of an effective tool for preventing traffic violations and the ability to influence the situation proactively;
- increase in tax and non-tax revenues of regions driven by increasing transparency and efficiency of management of all categories of enterprises connected to the RNIS;
- more comfortable ground passenger transport with the optimized route network and guaranteed travel time;
- the popularization of public transport as an alternative to driving private cars, which, as a result, contributes to better environmental conditions;
- optimization of traffic load and reduction of the road wear.

POLICY TOOLS AND LEVERS

Legislation and regulation; Funding and financing:

For almost 10 years the RNIS operation in Russia has been ensured by federal and regional regulation which provides for:

- laws and regulations that make it mandatory for certain categories of transport to be equipped with satellite navigation, obligate executive authorities to exercise navigation control over passenger, special and dangerous goods transportation. The technical requirements for the RNIS and its structure are clarified at the federal level;
- co-financing of the implementation of regional programs for information and navigation support of automobile routes in 2013-2014 by the federal government;
- independence of the constituent entities of the Russian Federation in choosing and implementing their strategy for creating a RNIS.

IMPLEMENTATION

Cost	The cost of each project across the country is individual: it depends on the software and technical solution used by a constituent entity of the Russian Federation. The cost of one of the successfully implemented RNIS with the participation of the private investor is presented in the Examples section.
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RISKS AND MITIGATIONS

Cybersecurity: cyberattack threats create risks for critical infrastructure and disorient the RNIS participants.

Sustainable investments: failure to present a coherent return on investment model for a potential investor who is interested in creating united GLONASS navigation space (for example, the prospects of recouping capital and operating expenses through charges for connecting regional carriers to the monitoring system).

Technical compatibility of the RNIS subsystems: the possibility of an unfavorable scenario such as the establishment of technologically incompatible subsystems in the region.

Creating services for decision-making within the framework of the RNIS: the complexity of processing a large amount of information about transport operations for executive authorities to make operational decisions in case of emergency.

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EXAMPLE

[«The RNIS of the Moscow Region»](#) project is implemented using the public-private partnership mechanism with the participation of Ministry of Transport and Road Infrastructure of the Moscow Region and AO “Group T – 1” providing navigation and information services in the Moscow Region using the system.

On May 15, 2017, the parties signed the [investment agreement](#) for 8 years. Within the terms of the contract, the investor modernized the RNIS by having invested 249,5 million rubles.

The launched RNIS allows real-time control of all bus services in the region. More than 105 thousand runs are under control daily in the passenger transport sector and the average monthly number exceeds 3 million.

Work within the RNIS system is mandatory for all carriers of the Moscow region. All public transport carriers in the Moscow region have already registered in the system - more than 11.5 thousand buses, as well as 5 thousand units of road and municipal vehicles. In case the necessary information is not provided to the system, penalties are applied to the carrier, up to the license revocation.

To improve the quality of provided services in the field of public transportation, as well as to respond promptly to emerging issues, certain RNIS capabilities allow consumers to use online tools of civic activity of the Moscow region, in particular the [«Dobrodel»](#) portal¹. Any RNIS user can file a complaint concerning the public transport operation (e.g. schedule delay, vehicle failure), roads condition, violation of the rules for disposal and transportation of solid waste. The RNIS portal also allows asking questions of interest concerning the ground public transport operation and receive real-time responses.

¹ The official portal of the Moscow Region Government which allows all the region residents to file their complaints and recommendations on various issues via the Internet.