

OPTIMIZING THE USE OF SATELLITE NAVIGATION IN TRANSPORT LOGISTICS

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The current stage of the development of the transport sector in our country creates the need to implement new approaches to the management of cargo flows, conduct an effective management policy at the macro and micro level, and implement its modern mechanisms in the transport and logistics sectors, as well as the use of Intelligent transport systems in the field.

Currently, satellite radionavigation systems have become an integral part of human society, covering all spheres of its activity. Satellite positioning technologies are widely used in various technical systems, various types of business processes, daily life, science, education, economy and other fields.

Among the many tasks solved on the basis of GLONASS, one of the most promising and important is the field of transport and transport logistics. According to the SmartMarketing analytical company, in the first half of 2009, 306,000 navigators of all types and categories were sold in Russia, 35.6% of which were car navigators. However, by 2016, the volume of sales increased more than 4 times and amounted to 1 million 450 thousand navigators for various purposes. At the same time, the share of car navigators has increased by more than 40%.

Transport connecting separate economic regions, companies and enterprises plays an important role in the field of logistics. Transport material resources, ready transfers products from the sphere of production to the sphere of consumption. Transport is a branch of material production, the main product of which is movement. This product is bought and sold, works as a commodity, i.e. has consumption value.

The consumption value of transport products is their ability to meet the needs of various cargo transportation. It can be expressed by delivering to the consumer on time, in a certain amount, improving the quality of logistics operations and at the lowest cost.

For many years, the most popular type of cargo and passenger transportation is road transport. This field is growing and developing rapidly. In the developed countries of the world, the results of space activities (hereinafter referred to as RCA) are widely used in various spheres of socio-economic activity. Thus, navigation technologies have become the norm of everyday life not only for the population, but also for government agencies. The market of navigation and geoinformation technologies is characterized by good financial and economic dynamics. According to estimates, by 2015 the size of the world market of navigation systems was about 300 billion US dollars.

The use of the GLONASS navigation system for tracking vehicles is becoming an integral part of the competent organization of the transport service of any enterprise. GLONASS/GPS systems are especially effective and cost-effective for business owners with several dozen or hundreds of cars, buses and other vehicles. The GLONASS system provides a high level of security in municipal transport monitoring, which is a prerequisite for carrying out passenger transport and any work for communal needs. A vehicle equipped with GLONAS or GPS signal receiver increases traffic safety several times due to continuous monitoring of the movement of the vehicle.

Currently, almost all companies engaged in the provision of global transport logistics services are fully equipped with GLONASS/GPS navigators. Thus, at present, GLONASS technologies are most in demand in the field of transport, they reduce fuel consumption (20% up to savings), optimization of cargo and passenger transportation routes, improvement of traffic safety, as well as quick and rapid provision of necessary medical and technical assistance in case of accidents, control of cargo safety, detection of unauthorized use of vehicles performs tasks such as.

Complicated problems in transporting goods not only to different places, but also appears when it is necessary to organize deliveries to facilities with security rings.

Implementation of the system on the basis of regular determination of the location, speed and direction of movement of transport units using GPS/GLONASS global satellite navigation signals or GLONASS / GPS (satellite navigation method) and the received data need to be transmitted through different communication networks. The effectiveness of the satellite monitoring system increases significantly when using equipment that combines GLONASS and GPS monitoring, devices that determine the state of technological processes and objects, as well as mobile video surveillance and signaling capabilities built into the monitoring system.

Freight companies in the field of transport logistics are interested in improving the quality of transport services, increasing the volume of transported goods, as well as reducing operating costs. Practice shows that the introduction of a satellite monitoring system at the enterprise can increase the efficiency of using cars by up to 40 percent. This result includes reducing improper use of the vehicle fleet, preventing cases of unauthorized refueling and theft of goods, increasing the service life of the vehicle, creating a reasonable schedule and optimal routes of vehicles, long-term storage of cargo can be achieved through planning and transportation.

For emergency response services in the field of passenger transportation, the ability to use a mobile video surveillance subsystem is of particular importance, which allows monitoring and control of the situation on the road and inside the cabin from video cameras installed outside and inside the vehicle. The introduction of systems can significantly improve the important parameters of the operation of emergency services and passenger transport, such as timeliness of arrival, accuracy of the route and safety

of the route. The capabilities of some monitoring systems allow you to know not only which vehicles are inside the security ring, but also for what purpose, as well as what kind of cargo should arrive in the near future. The system ensures transparency of the movement of motor vehicles, informs users about the presence of unregistered vehicles that have no mission in the area. Entry and exit of vehicles (including at the request of the security service or directly by the organizers of the event), compliance with the traffic schedule (delay, early arrival at the checkpoint) are registered.

Each navigation terminal has its own internal software, which is responsible for the interaction of the elements of the device itself - GLONASS / GPS / GSM module, microprocessor, various controllers, memory modules, etc. This program is responsible for traffic monitoring: collecting, processing and transmitting data about traffic, as well as about the performance parameters of various sensors. After that, this data is sent to the server to receive and process the data.

Additional sensors connected to the terminals can be installed in the car for additional information, for example:

- fuel consumption sensor;
- vehicle axle load sensor;
- fuel level sensor in the tank;
- temperature sensor in the refrigerator;

sensors that record the fact of the operation or idleness of special mechanisms (rotation of the crane boom, operation of the concrete mixer), the fact of opening the door or the hood, the fact of the presence of a passenger (taxi).

The received data is collected on the local device and later

- after returning to the park, it can be transferred to a centralized database or transmitted to a central server through various communication channels in real time. Ideally, the sensors and trackers should be hidden in the vehicle.

- The data reception and processing server acts as a link between the equipment and the user interface. It is responsible for receiving, storing and processing incoming data, as well as providing data at the request of users. Integrated navigation and information system includes several categories of users.

- at the level of the general contractor, the system allows effective management of logistics processes;

- timely receipt of important monitoring data on the operation of transport at the level of carriers and placing an order for delivery, indicating the transport, driver, cargo and delivery period;

- for the security services guarding the territory of the event venues - it allows to control both the transport entering the territory for unloading and the conformity of the cargo declared in the system.

In order to create convenience for users, web applications that can be used both on

computers and mobile devices have been introduced as part of modern navigation-information systems. A flexible interface allows you to - set user roles, set working hours of event venues. Thus, navigation and information systems based on GLONASS can automatically create lists for the organization of several events at the same time or for several different delivery objects for an unlimited number of suppliers and carriers, including movement to specially protected areas. can be used to create

Requirements for the use of navigation systems in transport logistics.

The implementation of the functions of tracking and recording the movement of the vehicle along the route should be carried out in the system based on the regular determination of the location of the transport units using GLONASS or GLONASS/GPS (satellite navigation method) global satellite navigation signals. The main parameters controlled by SYN are:

- coordinates of the object's current location;
- object (vehicle) speed;
- optimality of the route;
- consumption of fuel and lubricants;
- following route plans;
- forecast of problems while moving along the route;
- object safety;

The procedure for ensuring the safety and security of cargo is currently implemented on the basis of a simple scheme. There are different options for load protection devices equipped with an alarm button. When it is clicked, a beep message is sent to a predefined set of addresses (physical, phone, electronic) showing the object's GLONASS coordinates and the exact time. This simple scheme of ensuring cargo safety at work is significantly complicated, first of all, based on the system of preventive monitoring of all entities and objects in the cargo control zone.

Visual control of the location and movement of transport units should be provided based on the use of an electronic map. The electronic map (when used in rapid command and control tasks) should provide an effective visual representation of the situation for the entire route and for each mobile unit in the process of decision-making and the implementation of control actions by the dispatcher.

Electronic of the actual movement of the car for any working day should be shown on the map.

Effective implementation of the GLONASS system is impossible without including it in various hardware and software systems and information systems designed to solve various practical problems. The introduction of information systems based on SYN allows to obtain a new quality effect in a number of areas;

- economic efficiency by reducing current costs for operating the transport complex;

- social efficiency by improving the quality of service to customers and residents (in passenger transportation);
- increasing the level of security through the centralized system of providing information to transport management as a result of the use of the GLONASS system, as well as the rapid connection of various specialized groups and organizations in the event of accidents and emergency situations;
 - commercial efficiency by obtaining additional income from providing new services and opportunities to clients;
 - organizational effectiveness due to the creation of a comprehensive transport management system.
 - Analysis of safety issues in the transportation of goods

The following threats to the economic and physical safety of the enterprise arise during the transportation of goods:

- increase the costs of vehicle repair and depreciation.
- consumption of fuel and fuel-lubricants (stealing) increase
- can lead to at least an administrative offense and maximum non-observance of the traffic rules of the carrier.
- to a traffic accident in which people were killed.
- decrease in the level of driver discipline.

The technical support of the automated dispatcher navigation system of vehicle traffic control includes the following.

- technical components and complexes of control automation tools, including navigation and communication equipment of vehicles, computer equipment installed in CDS, in transport enterprises;

- cellular communication channels and means (GSM, GPRS) and technical means of communication with them to ensure the rapid dispatching communication network of the system;

- wired corporate data of the operating enterprise communication channels of the transmission network and technical means of interaction with them;

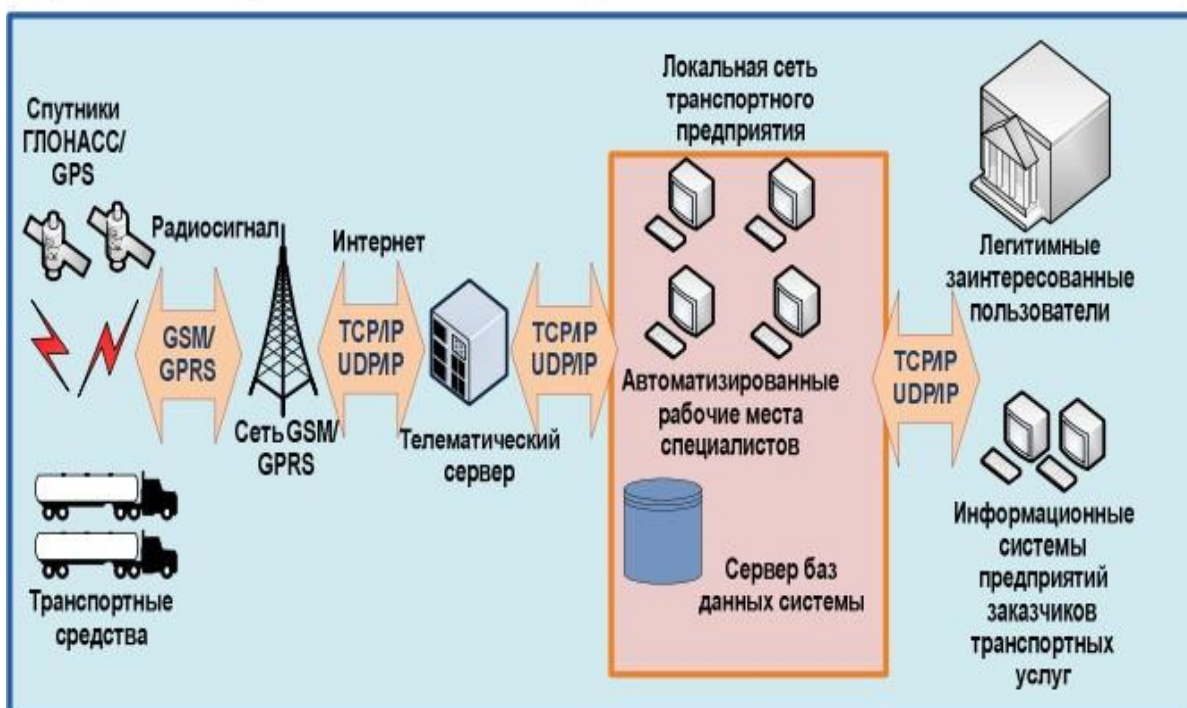
- communication channels and tools of the cellular data transfer network (GPRS).

It is implemented through a hardware-software complex built on "client-server" technology using WEB technologies

The complex includes:

- telematics server; database server, data;
- special software;
- electronic vector maps;

- subscriber terminals (AT);



General scheme of operation of the GLONASS/GPS satellite positioning system

The development and implementation of these technologies allows to increase the efficiency of transport logistics management - to increase the stability of work, to reduce operational costs and to increase the quality of service.

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