ITS Control of Highways Capacity

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Abstract

The article describes the potential for capacity increase of a highway section with use of intelligent transport systems. The implementation results in significant reduction of congestion and accident rate decrease on a highway. It is referring to the first linear control project in the Czech Republic implemented on the automobile ring road around Prague.

1. Introduction

The problems associated with the annual growth of automobile transport start spreading from large metropolitan cities to small towns. The level of motorization in the Eastern European countries is about 400 vehicles per 1000 persons of the population. Thereby, the population size as well as the number of automobiles is uneven in different countries.

Considering the fact that during the period until 2020 the share of cargo transportation is expected to increase by 50% and the share of passenger transportation by 35%, the issues demand to be expediently solved. However, the implementation of intelligent transport systems (ITS) is rather slow and in general goes without any coordination between transport agencies of different countries and sometimes even regions of one state. It results in fractionary structure of decisions on intrastate, regional, and local levels and non-availability of regulatory standards, which
threatens the integrity of the transport services market.

2. Main text

In Europe and lately in Russia as well as in the Eurasian Economic Union countries the focus is put on the elaboration and implementation of telematics applications as a low-cost and efficient mean for improving the existing transport situation. The European Union adopted the document (95/C 264/01) “On deployment of telematics in the road transport sector” [Commission of the European Communities (2008)]. Besides, the European Commission prepared the documents for expediting and coordination of ITS on vehicles. The action plan determines the priority fields of activities:

1. Optimal use of automobile road, transport, and route data.
2. Ensuring traffic safety.
3. Incorporation of vehicles into the traffic infrastructure.

According to the European Parliament and the Council of Europe Directive establishing the framework for ITS introduction in the field of automobile transportation, EU Member States will take measures required for coordinated introduction and use of ITS applications and services within the EU the way accounting for [European Parliament, Council of European Union (2010)]:

- ensuring access to respective reliable and regularly updated traffic information for ITS users and representatives;
- ensuring exchange of road and route data as well as other information between the respective transport information centers and the traffic control in different regions or different EU Member States;
- taking measures required for integration of ITS systems associated with safety into vehicles and traffic infrastructure as well as ensuring the elaboration of interaction as to safety in person-machine terms;
- taking measures required for integration of various ITS applications containing the data exchange and the communication between vehicles and traffic infrastructure on a single platform.

A rather extensive document issued by the European Commission states that Europe suffers a lot due to the fact the standardization of important technologies and processes occurred within the innovations lags behind significantly. The Commission named 14 areas which have to be significantly strengthened and, which is the main point, to speed up the standardization process [European commission (2010)].

The fundamental Russian document determining the priorities for the transport complex development, its main goals and tasks together with respective solutions is the Russian Federation Transport Strategy for the Period till 2030 [Government of the Russian Federation (2008)]. The Transport Strategy in its latest revision mainly focuses on implementation of modern control systems, technologies, and methods. Predominantly it means application of modern navigation and information and communication technologies to the Russian Federation transport complex. The majority of the development goals stated by the Transport Strategy presupposes application of global satellite systems and, in particular, the national system GLONASS.

One of the strategy goals is formation of Russian integrated transport space based on the balanced rapid development of the efficient transport infrastructure which envisages development of ITS in urban agglomerations including those with use of highly efficient information and telecommunication technologies and the global navigation system GLONASS.

Implementation of these measures, according to the Transport Strategy, is provided among other things due to realization of the following events:

- development of the automated control system, implementation of navigation systems based on GLONASS technologies and electronic document turnover, development of the national platform for intelligent transport systems providing the information integration of various application (industrial) ITS and ITS elements to each other and to external information systems;
- development of information environment for building ITS on federal highways and in big transport hubs.

In terms of goal indices, the Transport Strategy envisages the implementation of intelligent transport systems in all the RF cities having the population exceeding 1 mn. persons up to 2024. As it is known, modern ITS are inconceivable without wide application of navigation and information and communication technologies.

The Transport Strategy specifies that to solve the issue of the development of ITS for enhancing the quality of passenger carriage with use of modern information and telecommunication technologies and global navigation
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