Radek DYL¹

THE USING OF THE TELEMATIC IN THE TRANSPORT

Summary. The article deals with the transport telematic using, respectively intelligent transport systems as the possible instrument for the transport quality solution on the transport nets. In the text the main aims of the transport telematic and services are said which can be provided to the transport users. Further it aims on the architecture creation importance as the intelligent transport systems basement. In the conclusion some already functioning telematic systems are mentioned.

WYKORZYSTANIE TELEMATYKI TRANSPORTOWEJ

Streszczenie. Artykuł zawiera możliwości wykorzystania telematyki transportowej lub inteligentnych systemów transportowych decydujących o jakości ruchu drogowego. W tekście omówiono główne cele telematyki transportowej włącznie z usługami dla transportu użytkowego. W artykule przedstawiono tworzenie architektury jako podstawy inteligentnych systemów transportowych. Zakończenie artykułu przedstawia niektóre z już wykorzystywanych systemów telematycznych.

THE USING OF THE TELEMATIC IN THE TRANSPORT

In the last century it came the big growth in traffic that carried the corresponding progress of the infrastructure. This trend also continues in the present day but it has fast and unbalanced character that it leads especially to the creation of the traffic jam, to the bigger number of the accidents, to the decrease of the infrastructure and the environment.

One of the opportunity, how to react on this situation, is the corresponding progress of the transport infrastructure which is able to solve either by the modernization of the existing infrastructure or by the building of the fully new buildings (road, railway, inland water routes, seaport and inland harbors, airports, transfer areas etc.). The expansion of the transport infrastructure isn't always possible or desirable and from the aspect of the expended costs there are also another alternatives that can be more economical, e.g. the effective control of the transport traffic.

Another opportunities, which are possible for the solution of the transport growth, involved step by step with the fast expansion of the information and telecommunication technologies. By the using of these technologies in the transport section together with the other technologies like e.g. control technologies is known under technical term "Transport Telematic, appropriable intelligent transport systems".

The term of the transport telematic is used largely in Europe and is equivalent to the ITS (Intelligent Transport Systems) term, which is used in Japan, USA and Canada. From the definition of the "Transport Telematic" term flows out that it integrates the information and the telecommunication technologies with the transport engineering. It occurs with the support of the other corresponding sciences (economics, transport theory, system engineering etc.) to the securing of the transport and shipment process system control for the corresponding infrastructure.

The main aims of the telematic:

- The rising of the road safety,
- The rising of mobility and the improvement of the services in transport,
- The rising of the economic efficiency of transport processes,
- The rising of the profits in the area of productivity and the operational efficiency,
- The improvement of the environmental protection by decreasing of the negative transport impact.

In these days the "Transport Telematic" term is often connected only with road transport (e.g. with the choice of the road pricing and with the GPS-supported navigation) but the implementation is situated in all areas and transport types, transport means, infrastructure, organization, transport control and interface between all these elements. Transport telematic is produced by the whole set of the different instruments and technologies which are determined for information acquisition, processing and transfer to the individual parts of the transport system (Fig. 1), including the communication, control, geographical information and the other technologies. Some of these instruments are effective themselves but the ambition is their integration with the other telematic instruments. This isn't only on the national level but also on the European level.



Fig. 1. The Transport System Elements Rys. 1. Elementy systemu transportowego The European Union supports the research, development and implementation of the individual telematic systems in the individual European states because already in the present we can't miss that every transport means (trains, boats, buses, cars and trucks) don't know the borders inside Europe. By this ITS development in the individual states we can't advance in the non-system way and without respect on the surrounding countries. So it's necessary to advance by the specific rules and norms because we want to have compatible transport infrastructure. So it means to have such non-limiting parameters for the using of the telematic services wherever in Europe.

If we require that the transport would guarantee its customers complex and highquality services, so transport employees, managers of the transport companies and freight forwarders have to have enough information that makes possible early and correct decision to them. From these reasons we must understand transport telematic as the instrument of the information and telecommunication support of transport-transit process that must offer the intelligent telematic services to transport customers and which are:

- Services for passengers and drivers

Which offer to the users the information about traffic roads, telecommunications and price relations of transporters by means of information systems, mobile operators, radio, television, Internet etc.

- Services for the infrastructure administrators

Which offer to the administrators of the transport roads and terminals the information about the transport roads quality, about transport traffic security control, about infrastructure maintenance control etc.

- Services for transport operators

Which offer to the transporters the information about suitable choice of transport roads and the most useful routes, about car fleet circulation control, about maintenance and distant vehicle diagnostics

- Services for state and public administration

Which offer the tracking and evaluation of the person and cargo transit, the financial solution of the transport infrastructure (towns, regions, countries), the transport telematic system connection on public information system etc.

Services for security and rescue system

Which serve to the connection of the integrated security and rescue state systems, to the prevention rising of abnormal events with ecological consequences and for better organization by their elimination etc.

- Services for financial and control institutions.

Which serve to the leasing and insurance companies owners for the stolen cars tracking and searching, for cars and trucks electronic identification, for ITS-provided electronic payments

How we've already explained it's necessary by the ITS development and implementation in the individual countries to advance systematically. It means the transport telematic systems creation has to be established by predetermined and adjusted architecture by all countries. The architecture already defines basic placement of explored systems and at once it serves to the telematic systems design.

For each transport telematic system is characteristic that is created by information technologies based on the information acquisition, processing and exchange between individual users and elements of the transport chain. Simultaneously it also creates the telematic applications for control of the whole system and for its optimalization. The basic distribution of the transport telematic system means is on Fig. 2.



Fig. 2. The Basic Distribution of the Transport Telematic System Means Rys. 2. Podstawowy podział środków transportowego systemu telematycznego

s. 2. Toesawowy podziel stoekow transportowego systema telematycznego

The transport telematic system can be also divided onto four basic items:

- Telematic instruments

Are technical devices that serve for static and dynamic data acquisition about transport process (devices which are situated on the traffic roads, on the transport object or in the traffic means) or they serve for direct interaction of the transport process (signalized intersections, variable signs, traffic roads diagnostics sensors, fail-safe technique etc.)

- Telematic control of the transport processes

Serve for the traffic process control, tracking and interaction. Transport process control further covers processes like is monitoring, on-line process control, on-line management, off-line management and off-line planning

Telematic passport systems

Serve for digital evidence of all possession that is connected with transport process by modern telematic methods. The passports register all possession and they are valuable source about all transport system parts.

- Telematic economic systems

Serve for the transport and transit process economic description (economics of the transport roads, terminals, transport means etc.) and also for the evaluation of the transport process economic parameters. They acquire information from already described components.

By the architecture creation we don't have to aim only on the one transport type but we have to also define the couplings between generic information systems that are already used by individual transport systems.

In the transport telematic systems we can distinguish these architectures:

- Reference defines basic transport actors and transport system processes, important subsystems, specifies basic requirements on this system.
- Functional defines individual applications, modules and subsystems of telematic system, including couplings between them,

- Informational defines the telematic system structure and hierarchy, including the allocation, coding and information acquisition requisitions.
- **Physical** defines physical devices which perform individual processes to the functional insurance of applications, modules and subsystems defined in the functional architecture.
- **Communication** defines a transfer environment which is dedicated for the information transfer between physical devices in system.
- **Organizational** defines principles for structure creation and for the functional adjoining of the individual management levels.

The basement of the transport telematic system creation is then the architecture by which we can create reciprocal connection of the particular telematic applications. Further it has to be acceptable by the individual European states and it will be necessary to compare and share the creation results of the individual architectures. Further it will be necessary to periodically actualize the architectures in dependence on an order of their improvement.

The telematic system architecture is the priority interest also in the Czech Republic and for its creation the Ministry of Transport already has written a lot of projects. These projects are the basic for intelligent transport system creation.



Fig. 3. System of driver's navigation

Rys. 3. System nawigacji kierowców

The transport telematic, respectively its telematic systems already operate, e.g. in road transport. These systems serve for driver's navigation (Fig. 3). Especially it's the question of the shortest track searching, detour of the sections with road accidents, traffic restraints or jams. Another opportunity is the using of these systems for town transport (crossroad system control, car park occupancy detection etc.) also on the highways (using of the variable road signaling, electronic road fee withdrawal etc.). In the railway freight traffic these systems serve for the goods transportation tracking, the car fleet control tracking and for cargo identification. In the railway passenger traffic it deals with the optimal interconnection searching, with the schedule information, with the actual train position etc. In the shipping these systems are used for the boat navigation, for the detection of the actual boat position, for the harbor operations control etc. The telematic also finds place in logistics, e.g. the pick-up and delivery tracking, including the package state evidence.

From the mentioned examples of the telematic systems using it's clear that the transport telematic is the possible instrument how to solve the service quality of the transport nets. The profit will be not only for all traffic customers, but also for transport nets owners, for the transporters and for the state, regional and local administrations.

References

- 1. Svítek M. a kolektiv: Závěrečná zpráva projektu "ITS v podmínkách dopravnětelekomunikačního prostředí ČR" za rok 2001, Technická zpráva, Praha 2001.
- Svítek M. a kolektiv: Závěrečná zpráva projektu "ITS v podmínkách dopravnětelekomunikačního prostředí ČR" za rok 2002, Technická zpráva, Praha 2002.
- Pichl M., Svítek M.: Telematika v železniční dopravě s ohledem na harmonizovaný a synchronizovaný rozvoj ITS v Evropě, Vědeckotechnický sborník Českých drah č. 16, 2003, s. 21-26, ISSN 1211-2321.

Recenzent: Prof. dr hab.inż. Andrzej Wilk