TRANSPORT TELEMATICS AND AIR TRANSPORT

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The intention of this thesis is to clarify and specify the term telematics, importance and methods of its implementation in the management of transportation systems. Characterize various tools such as contributes to the improvement of traffic conditions on road trips. Possibility of its use in the present circumstances but also its direction in the coming years and the ways in which it is expected to be used in the future to manage different types of transport and of course each in combination with air traffic.

K e y w o r d s : Telematics, intelligent transport systems, transport, airport

1 INTRODUCTION

Intelligent transport systems and telematics are one of the factors, which we meet every day, because it is a natural part of our lives. In order for us to spend only the time we need to safely manage the roads are nowadays necessary intelligent traffic management systems. The thesis telematics is defined in general as a tool of intelligent traffic management. There are described functional transportation systems in the world and their deployment in the Slovak conditions, as well as the possibility of using intelligent transport systems to improve air traffic.

2 TRANSPORT TELEMATICS

Telematics is the convergence of a subsequent gradual unification of telecommunications technology and computer support for the management of the economy, and mathematical methods of a comprehensive management system. Effects of telematics are based on collaboration across disciplines and show the user a wide range of areas. From multi-media communications of individuals to use and manage of global utilities.[1]

2.1 Telematic management of transport systems

The first statement of traffic management automation is indeed light-controlled intersections, refer to the period characterized by time-dependent phase control in traffic-dependent control using the principle of adaptive management. Control light intersection is only one part of telematics. Futuristic scenarios telematics applications suggest its use to address global problems, such as limiting traffic congestion, improve safety, the protection of the environment and improve the efficiency in transport of goods.[2]

Improving Security

Variable traffic signs will be limited in speed depending on weather conditions (frost, fog) in traffic or in dangerous locations to communicate (a dangerous turn, a sharp downward) depending on the current speed of the vehicle.[2]

Advances in automotive technology will mean that all vehicles will be equipped with anti-collision radar, which automatically adjust speed so as to keep safe distance from the vehicle ahead. To the contrary, if it would approach a vehicle from behind, there will be automatically activated back brake lights that will quickly force to activate incoming vehicle brakes.[2]

Traffic sensors will record the abnormal deceleration of the flow, which can identify accident (Accident Detection), so it is immediately notified thereof transportation center, but can react faster and Rescue Service. If an accident occurs in the case of activation of the airbags connected communication path to the parent headquarters and the emergency broadcast signal "May-Day". Ambulance finds the exact location of the accident using GPS. Some projects have even assumed that vehicles may not exceed the speed if it does not allow communication status and weather conditions.[2]

Environmental benefits

In addition to the positive effect of reducing the vehicle columns or slow-moving vehicles it will be of great help to create attractive alternatives to private transport. Public transportation will have priority at controlled intersections, each agent will be continuously monitored for example using GPS.[2]

Response times to passengers at stops seem longer than they are, will be displayed, with a range of additional information on large displays. It will extend the payment of fees by different types of multi-purpose, eg. Smart cards, which allows only a single means of payment in public transport, but also in the vehicle on a highway built by the transponder.[2]

2.2 Architecture of transport telematics

The basic concept of the system architecture has been formulated in a research project led by the Dutch Ministry of Transport, which is known as the "*key architecture required for KAREN European networks."* This provides a basis for standardization, preparation of development plans and medium-term investment projects IDS. System architecture KAREN focuses on road transport telematics, but can serve as a useful model for other modes of transport.[3]

Transport telematics system architecture defines the basic layout. By transport telematics system is made up of information technology (IT), which contain information on the sub-elements of the transport chain (roads, vehicles, transportation of people and goods, etc.) and users of transport (freight forwarders, carriers, government, customs, etc. .). Transport telematics system provides collection, transfer, processing and exchange of information between different users and features of the transport chain creates a so-called telematics applications for the management and optimization.[2]

2.3 Technical subsystems

Traffic lights

Traffic lights are the actuators which drivers typically encounter. Signals are used to regulate the flow of traffic by stopping on red Stop sign.[2]

Variable traffic signs

Variable traffic signs affect the dynamic behavior of the traffic flow. They are divided into light reflective (passive) and light emitting (active) variables brands. The passive tags are pivoting triangular prisms. Furthermore, using a toggle or slide marks in various technical designs. Light emitting labels are made using LED or fiber optic.[2]

Information boards

Information boards are tasked alphanumerically or by simple pictograms to inform the driver. Their task is to simulate the traffic signs.[2]

Video detection systems

Video detection systems are now essential for successful monitoring traffic, because machine image recognition technology allows you to situate the camera field of view, not only the presence of detectors (intensity), but also speed detectors, direction, and so on. Video detection can also be an essential tool for detection of violation of traffic rules, such as turning on a red light.[2]

Environmentally monitoring

Monitoring not only the concentration of pollutants and weather conditions on exposed areas, but the environmental monitoring also include the weighing of vehicles. The telematics systems are often linked to these measurements navigation systems. Custom sensors are supplied in a robust design with microprocessor control and self-calibration pursuing any anomalies.[2]

3 TELEMATICS IN AIRCRAFT

Europe and the whole world is approaching a major threshold of a new era, so-called The new age of aviation. European aviation is determined to grasp the possibility of building a New Age, build a top aviation system is gradually becoming a world leader in aviation. Sharp increase in the volume of aviation and passenger transport and cargo, the changing market needs, the need for environmentally cleaner air transport, the requirement for higher reliability and safety, affordability as well as new achievements require major changes to the overall aviation system.[4]

3.1 The safety and reliability of aircraft and system

Despite the fact that air travel is statistically the safest transportation system already, the goal is to reduce the number of statistically most frequently repeated accidents (ending death and loss of aircraft) aircraft for another 80 percent. The most common accidents happen approach and landing, due to terrain collision, and loss of control of the aircraft (technical problem) The focus will mainly be on resolving the elimination of human error and eliminate their effects, which are the most common causes of accidents. This is intended in particular advanced IT.[4]

The entire aviation system of the future must strictly eliminate the possibility of misuse by terrorists. Especially the new ATM system, which considers the SWIM model and thus centralized information system (in terms of data collection and subsequent use). This is a model in which information from all sides ATS will be directed to a central system, where they migrate towards a particular recipient. Responsibility for download them to receive at least partly to the address), will require extremely strong security against getting cracked, attack, name of data by hackers, terrorists, etc.[4]

In terms of safety, the ATC also addresses issues such as: protection from abuse, protection from electromagnetic interference, automatic detection of diversion of the flight path, (partial) control of flight from the ground (it could come off moral issues going on today, or shoot down hijacked aircraft or not . Suffice it to him to depart from the ground if necessary). These tasks are of course already in progress, their implementation is projected around 2015.[4]

3.2 European air traffic management system

The aim of aviation system and the objective of the management is that the European aviation system was able to make in the European airspace per year to about 16 million flights and to 24-hour daily operation and in 99% of flights by the time the flight plan schedule. ATM is a priority for the Single European Sky, which deals with the SESAR (Single European Sky ATM Research).[4]

The requirement for future ATM concept involves the need to operate flights in all weather conditions, the concept of small safe separation of aircraft, the best flight corridors, as well as optimize airports, airfields, scrolling, and management take off slots.[4]

The European Union in 2008 launched a new development program of the European air traffic management SESAR, which should address the increasing number of flights over Europe. Informing the organization of air traffic Eurocontrol airspace over Europe has already reached its limit of 28,000 flights a day, yet it is expected that by 2020, the number had doubled. The European Union is therefore working on the development of SESAR worth 2.1 billion euros (63.26 billion Sk) to the safety of air traffic will use satellite navigation. Satellite data will be transmitted directly to the screen, on-board systems in the aircraft, which will replace the current system that uses a radar and radio communications, which has been in force since the end of the second World War. The new system should be operational by 2020, and Brussels from it not only increases the safety of air transport and promises better fuel economy and less CO2 emissions, reduce the cost of flight operations and aircraft delay constraint. The current system is forcing the aircraft to use longer routes, the airlines costing extra € 4 billion as a result of excessive consumption fuel.[4]

3.3 Intelligent management of flights

Forecasts of air traffic in Europe suggest that the next 20 years have double the intensity of air traffic in some regions, especially in Central Europe.[5]

The Single European Sky is a transnational nature. It involves in particular the creation of cross-border functional airspace blocks. With these blocks, routes and airspace structures are no longer defined by national boundaries, but in reality the flow of traffic. New air traffic control equipment designed especially for functional airspace blocks can not be limited to the national dimension. New technologies implemented will require extra equipment for aircraft, there is little point in being limited to purely national technological choice. Ultimately, the differences in equipment and performance of air traffic control systems of the Member States such that the effort to homogenize the European level is needed: the overall performance of European control infrastructure, particularly in terms of safety performance depends primarily on the "weakest".[5]

3.4 Air traffic control: an essential element of air operations

Air traffic control is a new generation of the SESAR project. Growth in air traffic is Europe need to modernize air traffic control infrastructure. Radically improving air traffic management to overcome the limitations of SESAR airspace and the increasing lack of airport capacity through optimal use of existing infrastructure.[5]

This is a real technological leap, as the communication link between the aircraft and the ground, satellite navigation, automatic control in real time a route of aircraft.[5]

Impact of SESAR environment will also be considerable, particularly through the use of the amazing advances of Galileo, which will determine its direct and environmentally better air lines. It is estimated that this area could be to reduce emissions of greenhouse gases by 4 to 6% per flight. In addition, greater accuracy and flexibility offered by satellite navigation and landing and taking off in a new generation of order to set the optimal routes around airports with regard to the need to take account of people living near airports. These benefits, however, associated with each flight made a significant increase in the number of flights will have an overall negative impact on the environment, which SESAR can not fully face. It is therefore necessary to provide for additional measures to reduce the impact of aviation on the environment.[5]

3.5 Stages of the project SESAR

Definition phase is followed by an implementation phase, which consists of two consecutive stages:

- Development (2008-2013)

This phase will see the development of other technologies that will be the foundation of a new generation of systems. Allows implementation of major technological advances, particularly in the area of development assistance in the control of a certain division of tasks between the ground and the aircraft to the controller from tasks that may, in certain phases of flight pilot to perform (for example, during the approach phases).[5]

- Implementation (2014-2020)

It is a phase of large-scale introduction of new systems and the introduction of comprehensive features that are associated with them. Air traffic control system established in this final stage is the new generation of control. This new system will triple its capacity over the current situation, the security level is increased by at least 10 points. Unit cost of operation will be much lower than the current cost.[5]

Benefits SESAR will affect all components of the ATM system:

- Airlines save time and money by providing smoother and more accurate approach to the airport. Better profiles flights - fuel economy.
- Navigation service providers (ANSP-Air Navigation Service Providers) provide higher quality services at lower costs for airspace users.
- Airports become more integrated into the European performance of the network. Proposing to operate in worse weather conditions, optimize operations and overall performance, increase capacity.
- ATC or air traffic controllers to improve the working environment. New technologies ensure the availability of relevant information to be provided at the right time, a simple and intuitive way. Developed procedures for ATC sector will enable better management deal with complex air situation.
- Passengers will benefit from the harmonization of departures and arrivals. At the same time there will be better services at a lower cost while increasing data security.
- The environment will not be burdened by so many issues, exhaust emissions and noise.

3.6 GALILEO

The European Commission and the European Space Agency is currently developing navigation system Galileo. It is a system that will be available to European navigators. Will guarantee trouble-free operation in all conditions and will be under civilian administration.[6]

GALILEO will include aerospace, ground and user segment. Space segment will consist of 30 satellites, of which 27 will be active and 3 spare. These satellites will be placed in secondary orbit of 23,616 km above the earth's surface. Monitoring and control of space segment will provide a network of ground stations forming segment. It is assumed that the considered frequency plan of the GALILEO receiver can receive the GPS signals. This expands the number of satellites comprising the Space segment from 27 to 51 (24 + 27 GPS GALILEO), thereby increasing the probability of observing the number of satellites required to determine the current position to the 95% position anywhere on Earth.[6]

3.7 Using system GALILEO in the air

Air traffic management increases the maximum speed of transport and security solutions. Upgrading forcing Europe introduce new monitoring applications. GALILEO is a progressive tool in the management of aviation. For flight safety is one source of information is insufficient, therefore multiplying and Galileo systems will most functional complement existing systems. It can be used in different phases of flight - accompanying the route, approach, landing, move along the ground, in particular where there are more radars to move through the area. Infrastructure airports can accommodate increasing traffic while guaranteeing better management and security. Galileo will support the creation of a European sky.[7]

5 CONCLUSION

Slovakia has become currently the focus of a variety of investors, who in addition to economic and political status of the state are interested in the transport infrastructure of this country. The existing variants of development of the transport network should cover the whole territory of the Slovak Republic and also about the fact that we are in most transit country. These variants are still at risk from different perspectives, with significant negative consequences, a strong reduction of funds for construction of new transport infrastructure in favor of removal of past mistakes.

Intelligent transport systems are a major challenge to the EU transport policies. It is about the development of a compatible, countrywide transport network in all Member States between modes of this community.

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