location, satellite navigation,
positioning systems

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VEHICLES AND LOADS MOBILITY POSITIONING SYSTEMS

Public information and mobile transport systems analysis necessity is based on globalisation and integration processes; interconnection of various types of transport means and their management in order to obtain more effective, save and mobile loads motoring and the creation of the intelligent transport sector. It is necessary to improve present European transport services and promote new services upbringing, to fulfil the shortcomings, to eliminate the jam-ups (for the present the traffic jams in EU cost around 2% of GDP and the accidents 1,5 to 2,5%, besides there are around 40000 people dying every year).

SYSTEMY POZYCJONOWANIA RUCHU POJAZDÓW I ŁADUNKÓW

Potrzeba analizy informacji publicznej i ruchomych systemów transportowych opiera się na procesie globalizacji i integracji, połączeniu różnych typów środków transportu i ich zarządzaniu w celu uzyskania bardziej efektywnego, bezpiecznego przewożenia ładunków, jak również tworzeniu inteligentnego sektora transportowego. Konieczne jest poprawienie obecnych europejskich usług serwisowych i promowanie nowych zachowań serwisowych, aby wypełnić luki, wyeliminować korki, (obecnie korki w EU kosztują około 2% PKB, a wypadki 1,5% do 2,5%, poza tym co roku ginie w nich 40.000 ludzi).

1. INTRODUCTION

Satellite positioning systems are widely used in the world, which enables to indicate the presence of the object, having the positioning equipment, by the wanted precision. To estimate the geographical position fast and precisely is very important if we want to track the object which changes its position (for example a car, a ship or a plane) in the digital map. Especially transporting dangerous loads by any mean of the transport. One of the ways to indicate the geographical position of the object is by using Global Positioning Systems (GPS).

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2. WORLD SATELLITE NAVIGATION AND POSITIONING SYSTEMS

GPS – radio navigation system that with the help from satellites allows to indicate the geographical location. For the location indication a GPS recipient is used which receives and processes radio signals constantly sent by the satellites. With the help of satellite navigation it is possible to measure speed, travelling time, distance, height (above sea level) although the visibility is not always working when there is interference, as 3 satellites are needed.

In order to obtain accuracy of GPS, WAAS, EGNOS, MSAS, DGPS, RTK are used with are operates corrected signals from SNAS. GNSS, GLONASS, GPS have to meet always the growing worldwide requirements.

The main factors limitation GIS spread is it's dependences on maximal computer recourses and that the system is not freely distributed if to compare it to other programs it is an expensive product.

The project of GALILEO system is very expensive. To Lithuania it would cost lots of money.

Informational technologies DHLNET are mostly used for distribution and tracking of air transport loads which is hardly adapted for land transport.

For transfer of the coordinated of the geographical objects global navigation and positioning systems are being used (see the Table 1):

Table 1

World Satellite navigation and positioning systems

No	Acronym of System	The full name of System	Regions of use
1	GALILEO	European Satellite Navigation System	In Europe since 2008
2	SBAS	Satellite-Based Augmentation Systems	North America, Europe, Asia
3	WAAS	Wide Area Augmentation System	North America
4	EGNOS	European Geostationary Navigation Overlay Service	Europe
5	MSAS	MTSAT Satellite based Augmentation System	Japan
6	DGPS	Differential Global Positioning System	In the world
7	THALES NAVIGATION	Thales Navigation & Thales Group	In the world

These systems are the instrumentality to managing land transport in Europe, whether they are by road, rail or inland waterways. They increase both the capacity and the safety of land transport. Not only airlines but also companies, which operate transport services, need to know where their vehicles are at all times.

As well as improving safety, world satellite navigation and positioning systems are an invaluable aid to managing transport operations. Managers will be able to know exactly when a consignment has been held up and its exact location This will also improve customer services as clients can be notified of delays and the reason for them and when necessary breakdown crews can be sent out immediately.

3. LOADS AND VEHICLE TRACKING AND CONTROL SYSTEMS

For transfer of the coordinated of the geographical objects, for tracking of loads and vehicle control and tracking systems are being used (see the Table 2):

Table 2

Loads and vehicle tracking and control systems

No	System acronym	Full name of the system and connection type	Representative in Lithuania or the closest representative
1	„MOBISAFE"	Load vehicle control and supervision system. GSM is used	Republic of Lithuania Ministry of Internal Affairs, Lithuanian police defence organisation office
2	„EUTELTRACS"	Integrated satellite system which allows to control transport and load locomotion. Only satellite link EUTELSAT is used.	VARICOM In Lithuania and Latvia
3	„SEKLYS"	Mobile objects control and supervision service. GSM is used.	OMNITEL
4	„NAVISAT"	Transport control system. GSM is used.	ALTAS
5	„AUTOGUARD"	Vehicle control and security system. GSM is used.	In Poland
6	„SAT TRAC"	Satellite vehicle tracking system.	UAB „Admita",

Most usually „MobiSafe" system is used for vehicle security although it may be used and for other matters where security is needed, for example, transporting valuable loads.

When there is a danger or the crime was committed or the accident happened, „MobiSafe" receiver is sending alerts immediately containing the exact coordinates to the stand. In order to measure the exact coordinates of the vehicle satellite GPS system is being used. Vehicle coordinates are being sent to the stand. In the control centre computer geographical systems are being used which helps to take care of the tracking of the vehicle and it can be seen in the digital maps of the place or town. Processed information, which is get from the satellite, allows to indicate the position of vehicle with 10-30 meters bias. That's how it is possible to track the position of the vehicle after the accident and to send help. Or, in case of theft, it is possible to get back vehicle and the load with the help from police.

EutelTRACS is a complex satellite system that allows controlling transport and loading mobility. It is a mutual alerts connection, navigation, emergency and danger alerts transfer, load and transport parameter observation.

VARICOM EUTELTRACS satellite centre is a cheap way of transferring data between transport companies dispatcher and Earth station organisator. Subscribing dispatchers computers are connecting to the central data system with modems after the numbers and passwords are checked, which no holding on, transfers the alerts to the earth station. Reverse connection runs similarly.

Programs in the dispatcher's computer maintain a constant connection with companies' vehicles. QTRACS – PC or GeoTrek automatically sends data to the Earth station by modem as well as takes information that has been submitted. Afterwards QTRACS – PC or GeoTrek processes it and presents to the dispatcher and further it is being used or saved.

GeoTrek program is designed for an effective control of vehicle and operative connection between companies' dispatcher and vehicle drivers' support.

GeoTrek program have these functions:
- Mutual connection between companies base and vehicle is sending text messages (concrete and periodical time);
- Provides the possibility to maintain the connection between different vehicles;
- Helps to choose and plan the most optimal routes;
- In Europe, Northern Africa, Middle Asia situated vehicle can be tracked in digital map with 80-200 meters bias. Geo Trek has 250 or 450 maps that are complemented as needed.

System of control and supervision of mobile objects „Seklys" ("Detective") in the digital maps which can be seen on the computer screen. Mobile objects can be controlled and observed in several ways: through their mobile phone or through OMNITEL „Seklys" gates.

With help from receivers system allows GPS to transfer coordinates by special SMS messages through GSM service „Seklys" Internet gateway. The obtained information is connected with digital maps. Through the internet subscriber can see the interface on the map.

„NaviSat" system is designed for transport companies, courier, taxi, security and passenger service companies. The efficiency of the system was proved both in big and small parks.

When car thefts prevention was being held, active collaboration with „Regitra", Police department, Countries boarder security office and private security companies are being maintained.

Satellite car tracking system „Sat Trac" is an instant car tracking, instant viewing. It is a not complicated system which is most usually installed to vehicles which price is less or equal to 150 000, - Lt.

Security systems are being provided with term less attendance. Technical support network is composed through all Lithuania. All services are being provided with pure-purchase.

Satellite car tracking system „Sat Trac" is used to track and observe cars in Lithuania.

Vehicle can be tracked only in the countries that support mobile networks.

Vehicle tracking and control systems disadvantages:

- Necessary connection to the police or respective services;
- Expensive set;
- Not effective transition witch can be blocked for many reasons:
    - because of the changes in the receiver,
    - satellite interference, etc.
- Alerts, received from the satellite may not reach the stands

„MOBISAFE" is mostly used for vehicle security; every can should have a „MOBISAFE" receiver getting alerts from the satellite.

„EUTELTRACS" – every subscriber has a „mail box" where all the messages and navigational data is being held.

Notices connection takes respectively long time and for the moment it is possible to picture only up to 100 points change.

„SEKLYS" is best for passenger service companies and factories which distribute their production.

„NAVISAT" is used when car theft prevention actions are being held.

The disadvantages of car control and security system „AUTOGUARD":

- Unproductive work – long search for 1 car;
- Possible interference of GPS connection;
- Expensive equipment;
- There is no constant Internet connection with the client.

„SAT TRAC" is an instantaneous car supervision system that is installed to expensive cars.

4. CONCLUSIONS

1. It is importantly to use decisions of public information and transport mobility in the transportation of road transport.

2. As well as improving safety, world satellite navigation and positioning systems are an invaluable aid to managing transport operations.

3. It is necessary to use vehicle and loads tracking on their trips in the forwarder of road transport.

4. It is important to create codification system according EU standards of various kind loads.

5. Tracking and location systems play an important role in transportation of dangerous loads because dangerous loads bring big danger for the environment and the society.

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