

UDK:351.814.31:654.9:368:656.05

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## **TELEMATICS – FUTURE OF TRAFFIC**

The author outlines modern tendencies of using telecommunication and information achievements in the field of traffic. Modern technics improves many aspects of conveying people and goods by various means of transportation. Safety, savings, comfort and efficiency in using automobiles and trains are significantly improved by telematic equipment; this is most clearly expressed in the USA and Western Europe, while Japan is, for now, lagging.

**Key words:** *telematics, traffic systems, ITS, wireless networks, GPS, Wi-Fi*

Telematics is a science of sending, receiving and archiving information by the help of telecommunication equipment. The word *telematics* is a combination of two words: *telecommunications* and *informatics*; this science combines the two modern technologies. Traffic telematic systems provide information on the operation of automobiles and trains, with the view of improving it. On the basis of data gathered in this way, conclusions can be made as to how an automobile or a train is operated, and drivers identified who are in a need of the additional training.

Telematics comprises:

1. **service telematics** (e-banking, e-business, e-government)
2. **traffic telematics** (ITS – intelligent transportation systems)
3. **building automation** (facility management)
4. **health telematics** (e-health)
5. **educational telematics** (e-learning)
6. **safety telematics.**

In the text below, we will focus on the traffic telematics. In this field, we meet the **intelligent transportation system – ITS**. This is an automated system of traffic information and management, which comprises hardwares and softwares. By the help of the system of cameras and sensors, the ITS registers the situation on roads, analyzes gathered data and responds by sending adequate information, above all to the drivers.

The USA are the leader in telematic technical equipment. The Western Europe is just behind; on the other hand, in the developed countries, such as Japan, vehicles are least equipped with telematics (although this is the leading market in mobile communications and entertainment electronics).

Telematic systems can be divided into:

1. on - line systems (constantly available)
2. off - line systems (only available at particular moments – for example, after returning to the base).

By dependence, the systems are divided into:

1. **independent** (autonomous) and
2. **dependent**, such as:
  - global positioning system (GPS)
  - mobile phone networks
  - navigation software
  - digital maps
  - routing software (route optimization).

The vehicles are installed the following equipment:

- on-board computer
- GPS receiver
- communication module
- driver's terminal (display and keyboard)
- navigation device
- equipment for monitoring the adjacent vehicles

- barcode readers
- terminals used for electronic recording of customer signatures (evidence on the performed goods delivery).

In telematics, data are transferred through:

1. GSM (Global System for Mobile) network (SMS – Short Message Service)
2. Satellite system
3. Cable or wireless system, after the vehicles have returned to the base

**Wireless networks** represent linked computers, digital communication devices, network equipment, where the connection is made through radio waves. The advantage over gridding is in the client mobility and cheap installation of a temporary network. Wireless networks may be installed at locations during particular sport and scientific events and/or in emergencies, natural disasters or armed conflicts.

**Wi-Fi (Wireless-Fidelity)** is a wireless network where data between two or more computers are transferred by the help of radio frequencies (RF) and adequate antennas. This network was invented in 1991 by the NCR Corporation/AT&T in Holland. The first network operated at the speed of 1 to 2 Mbit/s. The cheapest option of the Wi-Fi network is the 802.11b standard. In such networks, the speed of data flow is up to 11 megabits per second.

Some scientists think that future automobiles will soon switch to the Wi-Fi technology, which will make them cheaper and more efficient. The scientists of *Warwick* University are developing the optical wireless systems, where data travel through rays of light. These systems are using the LED or infrared lamps, they are of low weight, cheap and easy to maintain. At this moment, the optical wireless system is relatively unknown. However, a day is not far away when the travellers will be able to watch TV which is signal-fed through a beam of overhead systems, or when engine parts will be able to interactively communicate without wires.

Optical wireless system will attract the vehicle manufacturers, since such technology reduces the vehicle weight and, consequently, the fuel consumption. The General Motors Company is developing wireless technology that would warn drivers about the pedestrians and cyclists passing-by. The new wireless equipment would efficiently warn drivers about the proximity of other vehicles from all sides.

**GPS receiver** computes a vehicle location on the basis of data received from the GPS satellite. There are 24 active satellites in the land orbit; twenty

one of them are navigational, and three spare. A satellite moves at the speed of 11,000 km per hour, meaning that each of them travels around the Earth in 12 hours. The flight of the satellite is performed in the so-called high orbit. The operation at such high allows the signals to cover larger area. Each satellite first transmits signals received by the GPS receiver; then, it decodes and processes them, after which such data are forwarded to the location station. The visibility from three satellites of the GPS system is sufficient for determining the geographical coordinates; however, for determining the height above sea-level, it is necessary to have visibility from at least four satellites. The bigger the visibility from a satellite at a particular moment, the more precise location. The GPS receiver calculates the range of other parameters as well, such as the speed, direction, length of the target route and distance to the target location.

Although there is a wide range of different telematic systems, each of them represents various combinations of three basic components:

1. **hardware** (physically installed device onto a vehicle, serving to gather data); the most frequently installed devices are OBU, GPS receiver, navigation device, communication module;
2. **data transfer** (manner in which all gathered data are transferred from the vehicle to the data gathering services);
3. **steering software** (gathers data and transforms them into a range of user information necessary for successful business operation).

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