

## STANDARDIZATION OF TRANSPORT TELEMATICS

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### **Abstract**

*The paper refers to telematics theoretical basis, especially transport telematics. European and international institutions responsible for standardization in the aforementioned areas have been characterized. Furthermore, author has presented standardization publications on telematics and transport telematics. The European Commission and many state administrations in the world attach a great importance to the use of telematics systems in transport. This requires designing and manufacturing devices using the advanced telecommunication and IT technologies. Some states have already implemented the telematics systems in transport, which control now such functions as: vehicles fleet management, urban traffic management and road toll collection. Implementation of the autonomic systems in the European states and lack of possibilities to cooperate with other systems caused the European Commission to conduct, since 2000, a wide spread activities on interoperability of the telematics systems and introduction of legal regulations (decrees, directives). Interoperability and building telematics systems architecture brings about the necessity to develop standards concerning, among the others, technical, safety solutions as well as data transmission protocols between the system elements and its environment solutions. At present in Poland, telematics applications are not used to a sufficient degree, to effectively manage the vehicles' fleet, or at least for urban traffic management, and when they are used, and then they are developed without taking into consideration appropriate interoperability. These applications in the future may provide quick and precise information and allow to safely managing the urban traffic. In the forthcoming years they will be further improved by using Galileo system, whose localizing precision will be better than that of GPS. To meet these challenges, the international and European institutions have been characterized in this paper, which conduct standardizing activities in telematics and transport telematics. Also the fundamental, already developed standards for the aforementioned areas, have been presented.*

**Keywords:** transport, telematics, telecommunications, informatics, transport telematics

### **1. Introduction**

The term telematics comes from the French - *télématique* and first appeared in the literature at the end of the seventies. In 1978 two French experts: S. Nora and A. Minc, introduced this term-*télématique*, which was created by linking telecommunication (*télécommunications*) and informatics (*informatique*), and using the following segments of those words: *télé* and *matique*. In 1980 this term began to function also in the English terminology [6].

The term telematics describes the combination of the transmission of information over a telecommunication network and the computerized processing of this information [3].

In Europe, this term began to be used, on the wider scale, at the beginning of the nineties, when the EU started to include telematics in the framework programs.

Development of the systems and telematic applications was envisaged in the III Framework Program (1990-1994) and IV EU Framework Program (1994-1998).

At present, the term telematics is defined as telecommunication, information and informatics technology solutions, as well as automatic control solutions, adapted to the needs of the physical systems catered for - and their tasks, infrastructure, organization maintenance processes, management and integrated with these systems. [5, 7-9].

Telematics systems use various software, devices and applications:

- for electronic communication, linking individual elements of the telematics system (wide

spread network WAN, local network LAN, mobile telecommunication network, satellite systems),

- for information collection (measurements sensors, video camera, radars),
- of information presentation for the telematics system administrators (GIS systems, access control systems),
- of information presentation for the system users (light signaling, radio broadcasting, internet technologies - WWW, SMS).

This term has begun to be introduced into various branches of the economy, hence the appearance of such terms as: financial, construction, medical, environmental protection, operational, postal, library telematics.

A particular example illustrating the application of the telematics, is modern transport. Transport telematics encompasses systems, which allow - thanks to a data transmission and its analysis - to influence the road traffic participants' behavior or operation of the vehicles' technical elements, or indeed on the road, during the actual haulage [4].

The conclusion of many years of research conducted in the USA and Canada is that, the use of telematic systems, results in the reduction of the funds allocated for the transport infrastructure even by 30 - 35%, with the same functionality of the system [2].

In 1994, during the first world congress in Paris, the term - Intelligent Transport Systems (ITS) was accepted. ITS is a system, in which people, roads and vehicles are linked through the network utilizing advanced information technology [1].

New stage in the development of the Intelligent Transport Systems is opened by the program of an EU common transport policy for the years 2001–2010. Additionally, the European Commission has begun the negotiations, in order to achieve consensus on the introduction in 2010 of an E-call emergency system in all new cars.

The matter of transport telematics appeared in Polish publications in the middle of the nineties. In 1997 the attempt was made to define conceptual scope and the area of transport telematics applications [8], which were finally described as a branch of knowledge and technical activities integrating information technology with telecommunication in the applications for the needs of the transport systems.

On the 19 of March 2007 in the district court of Katowice, the registration took place of the Polish Transport Telematics Association, which has its own subject web page - [telematyka.pl](http://telematyka.pl).

On the 26 of April 2007 the founder's meeting took place of an Intelligent Transport Systems Association - ITS Poland. The association's objective is to form a partnership of knowledge for the promotion of the ITS solutions, as a means to improving transport efficiency and safety, with the natural environment protection in mind. ITS Poland cooperates with similar organizations in Europe and world wide.

## 2. Standardization in telematics

Standardization in telematics in Europe is dealt with by the following institutions [8, 9]:

- CENELEC (Committee European de Normalization Electro technique) - for electro-technology,
- CEN (Committee European de Normalization) - for informative and information technology,
- ETSI (European Telecommunications Standards Institute) - for telecommunication,
- CENELEC - European Committee for Electro technical Standardization - was formed in 1973.

Hitherto, there were two organizations responsible for the electro technical standardization: CENELCOM and CENEL. At present CENELEC is a private technical association of a „non-profit” type, operating within a Belgian legislation, with a seat in Brussels. The members are national institutions for the electro technical standardization from majority of the European states. Although CENELEC cooperates closely with the European Union, it is not an EU institution.

The mission of the Committee is to create voluntary standards for electro-technology and electronics in order to support the development of the European Economic Area in the goods sector and electro technical & electronic services w sector. Members are the State Committees for Electro technology of the EU and EFTA (the European Free Trade Association) countries. In Poland the role of the State Committee is performed by Polish Standardization Committee - PKN (it is a CENELEC member since 1 of January 2004). At present the CENELEC members are all European Union states and Norway, Switzerland and Island. The associate members are: Albania, Bosnia and Herzegovina, Croatia, Republic of Macedonia, Serbia, Montenegro, Tunisia, Turkey and Ukraine, with a perspective to become full members.

CEN - European Standardization Committee - is a private technical association of a „non-profit” type, operating within a Belgian legislation, with a seat in Brussels. Officially it was formed in 1974, but the beginnings of its activities date back to - Paris, 1961.

The primary task of CEN is drafting, acceptance and dissemination of the European standards and other standardizing documents in all the spheres of the economy, except electro-technology, electronics and telecommunication. Standardizing System CEN is a multinational, multisector and decentralized organization. It consists of the state standardizing bodies and the CEN Management Centre, which plays a special and active role in the managing this system with an authorization of the member state of CEN, associate members, affiliated members and partner standardizing units.

The members of CEN are state standardizing bodies of the European Union states and the European Free Trade Association (EFTA). Currently CEN has 30 state members.

Polish Standardization Committee (PKN) gained the status of a full CEN member on the 1 January 2004. CEN members have a duty to introduce EN standards into the domestic standards systems and remove current standards contradictory to the ones being introduced. Thanks to that, the common European solutions' systems are being created. European standards are one of the mainstays of European Economic Area (EEA) and the essential tool to remove the trade barriers.

The main clients of the CEN Standardizing System are industrial, trade institutions, private and public scientific centers, state units and other public authorities, including UE and EFTA, trade unions, consumers and environmental protection, conformity assessment, research and certification groups.

EN is a main project source of the European standards and technical specifications. It is the only recognized European organization dealing with planning, drafting and acceptance of the standards in all lines of trade, except electro technical and telecommunication.

ETSI - European Institute for the Telecommunication Standards - was formed on the 29 of March 1988, and is the European equivalent of IEEE. The prime objective of ETSI is drafting standards necessary for creation of the European telecommunication market. In 1995 the work of the organization was made international by admitting also the institutions from outside Europe, to participate in it.

According to the status, the Institute is a private association of a „non-profit” type, operating according to a French legislation, because its seat is in Sophia-Antipolis in France. It unites institutions, dealing with drafting European telecommunication standards, and those from the countries taking part in the work of the European Confederation of Postal Administration and Telecommunication. ETSI as a first standardizing body ensures free access to the standardizing documents through an Internet. Currently ETSI through the international cooperation, fulfils the task which is working out the standardizing documents used globally, meeting the needs of the telecommunication society and the electronic communication.

Institute participated in defining such standards as DECT<sup>1</sup>, GSM, TETRA, MHP, and CSA. Because GSM has become a popular standard around the world, there was a standardizing 3GPP

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<sup>1</sup> DECT (formerly Digital European Cordless Telephone) is an ETSI standard for digital porTab. phone. DECT can also be used for wireless broadband data transfers. DECT is recognized by the ITU as fulfilling the IMT-2000 requirements and thus qualifies as a 3G system. In its basic version it uses 10 radio channels of the frequency range - 1880 to 1900 MHz (each DECT device should be adapted to using theses channels).

consortium formed, for its development, and ETSI became one of its sections.

CENELEC, together with CEN and ETSI form European technical standardizing system, whilst international standards come under the jurisdiction of the International Organization for Standardization (ISO) and International Electro technical Commission (IEC).

ISO - International Organization for Standardization - deals with the development and promotion of standards in the international exchange. ISO began its activities officially on the 23 of February 1947. Amongst the founder-members was Polish Standardization Committee. Its predecessor was International Federation of the National Standardizing Associations - ISA, operating during the years 1926-1942, as a convention of the world most important standardizing organizations: American ANSI, German DIN, French AFNOR, and British BSI.

ISO is a non-governmental organization, and its members are not delegated by the governments, despite the fact that some member organizations are within the government structures. This places the organization on special position between state and private sector, particularly with respect to industrial associations. As a rule, each state is represented by only one organization.

The work of the organization is coordinated by the General Secretariat with a seat in Geneva. The strategic decisions are undertaken by General Assembly on the annual sessions. ISO Council gathers three times a year. ISO structure is modeled on those of ANSI and DIN. It consists of several hundreds of technical committees and working groups, conducting technical discussions and the Main Committee, where each member states have one vote.

International Standardizing Organization has compiled standards on the telecommunications and informatics security.

IEC - International Electro technical Commission - global standardizing organization, formed in 1906, with a seat in Geneva, in 1947 affiliated with International Organization for Standardization, deals with preparation and publication of international standards, concerning electricity, electronics and related subjects. IEC documents are a basis for domestic standards being introduced as well as represent a reference for presenting offers and signing international contracts.

IEC accepted ETHERNET Powerlink (EPL), as a Publicly Available Specification - PAS. Specifications ETHERNET Powerlink was reported by IAONA organization - Industrial Automation Open Network Association to IEC SC65C, as a real time communication profile based on the industrial Ethernet. Vast majority, that is even 96% of all IEC National Committees voted for ETHERNET Powerlink. All except one country out of 25 states voting on the proposal immediately accepted the project. At the same time, the sub-commission approved specification as a new working subject.

The above acceptance represents an essential step for the ETHERNET Powerlink to become a part of standard- IEC - IEC 61784-2 "Digital data exchange for measurements and control - Part 2: Additional profiles for the communication networks based on ISO/IEC 8802-3 in the real time applications ", being worked on at present. ETHERNET Powerlink Standardization Group - EPSG and its strategic partners will also work on adjusting ETHERNET Powerlink (EPL) specification to the next IEC-61158 version, the essential - field bus standard. ETHERNET Powerlink is the only real time solution based on the industrial Ethernet with a microsecond speed and precision, which does not require dedicated equipment and ASIC systems.

IT technologies are in both of these organizations' (ISO and IEC) area of interest. In order to make the work on this subject more efficient, ISO and IEC formed a First Joint Technical Committee JTC1, usually known in short as ISO/IEC JTC1. Currently the Commission is divided into 18 separate sub-commissions. JTC1 Commission began Fast Track procedure with respect to Office Open XML File Formats specification, which was reported by ECMA (European Computer Manufacturers Association). The Fast Track procedure specification, described in the ISO/IEC JTC1 Directive, relies on the fact that the project concerning the standard, does not undergo

normal procedures of the international standard creation, but only enters directly a final voting phase of the JTC1 Member States.

EIA - Electronic Industries Association - was established in 1924, and deals with standards for telecommunication and computer communication. Standards: RS-232-C, RS-449, RS-422, RS-423 (encompass inline interface of the modem-computer), EIA-232 - cover inline interface of DTE (Data Terminal Equipment) and DCE (Data Communication Equipment) devices.

The sector of the International Telecommunication Union, ITU is responsible for the telecommunication standards. ITU-T organization replaces committee - Comité Consultatif Internationale de Télégraphie et Téléphonie (CCITT). Its duties are amongst the others: working out standards projects and modem functionality projects as well as network and faxes transmission protocols. ITU is an international organization, in which states' governments and private sector coordinate global networks and telecommunication services.

CCITT was replaced on the 1 of March 1993 by ITU-T (International Telecommunication Union - Telecommunication Standardization Sector) - ITU Telecommunication Standardization Sector, dealing with creating high quality standards, covering all telecommunication areas. The standards accepted are denoted by the name ITU-T. Standards: V.22, V.28, V.34, V.35, X.200<sup>2</sup> (ISO 7498, reference model OSI), X.400 (ISO 10021, e-mail servicing), X.25 (ISO 7776, packet network interface). ITU - International Telecommunications Union" - established in 1932 replaced International Telegraph Union and International Radiotelegraphy Union. In 1947 it converted itself into a specialized UN agenda. It deals with popularizing and development of telecommunication and states coordination in this matter.

ITU approved ADSL2 (Asymmetric Digital Subscriber Line) standard and it has been designated as G.992.3 (ADSL2) and G.992.4 (ADSL2 Lite). Apart from the improvement in the data flow ability and efficiency, ADSL2 technology features possibilities such as connection operation diagnosing, dynamic control of connection flow ability or energy saving operating mode - standby. ADSL2+ (recommendation ITU-T G.992.5) is an improved version of ADSL2, thus technology enabling asymmetric access to the Internet and being a version of DSL. It enables to obtain higher speed than ADSL2 with the same line length, but despite that, still the important role is played by a distance from the DSLAM (Digital Subscriber Line Access Multiplexer) devices.

IEEE - Institute of Electrical and Electronic Engineers - is an organization dealing with creating data transmission standards. IEEE 802 committees prepare drafts for the LAN network, which are then approved by ANSI. Drafts are also sent to ISO, which disseminates them as ISO 8802. IEEE 802 defines standards for such products as: network cards, routers, bridges and other LAN network subgroups built of concentric cable. Standards: 802.1 - networks cooperation, 802.2 - logic connection control, 802.3 - method available for CSMA/CD medium, 802.4 - Token Bus networks, 802.5 - Token Ring networks, 802.6 - MAN networks, 802.7 - wideband transmission, 802.8 - fiber optics, 802.9 - integrated computer and telephone networks, 802.10 - networks security, 802.11 - cable free networks 802.12 LAN network with demand priority.

ANSI - American National Standards Institute - deals with defining encoding and signaling standards obligatory in the USA, and also represents ISO and CCITT organizations. Standards:

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<sup>2</sup> V.22 - provides 1200 bits per second at 600 baud (state changes per second). V.22 bis- the first true world standard, it allows 2400 bits per second at 600 baud. V.28 - that defines the functions of all circuits for the RS-232 interface. V.34 - provides 28,800 bits per second or fallback to 24,000 and 19,200 bits per second and backwards compatibility with V.32 and V.32bis. V.34bis - provides up to 33,600 bits per second or fallback to 31,200 or V.34 transfer rates. V.35 - the trunk interface between a network access device and a packet network at data rates greater than 19.2 Kbps. V.35 - may use the bandwidths of several telephone circuits as a group. X.25 -standard network layer protocol for packet switched wide area network (WAN) communication. An X.25 WAN consists of packet-switching exchange (PSE) nodes as the networking hardware, and leased lines, the phone or ISDN connections as physical links. X.200 (the OSI model) defines the mating layers necessary to pass information between computers (adaptive or linear). OSI layer protocols may be defined by similarity standards, but each protocol likely has options. X.400 defines standards for Data Communication Networks for Message Handling Systems (MHS) - more commonly known as E-mail.

ANSI 802.1-1985 (IEEE 802.5, access protocols, cables and interfaces for Token Ring network), ANSI/IEEE 802.3 (Ethernet network using concentric cable and access methods), ANSI X3.135 (SQL language), ANSI X3.92 (encoding algorithm), ANSI X3T9.5 (data transmission methods in the fiber optics networks of a 100Mb/s FDDI speed).

In some cases, e.g. for the telecommunications and informatics security, standards cover several criteria and standards:

- Trusted Computer System Evaluation Criteria - TCSEC,
- Information Technology Security Evaluation Criteria - ITSEC,
- Tele IT security evaluation criteria - BS 7799 (standard of the British Standardization Institute),
- IT security evaluation criteria- Common Criteria,
- ISO/ IEC 15408 standard,
- ISO/IEC 2700 standard.

TCSEC standard (Trusted Computer Security Evaluation Criteria) was published in 1983 in the Orange Book in the USA by the Defense Department. Standard defines safety classes of the computer systems. There have been 6 classes defined of the systems:

- B1 - Labeled Security Protection,
- B2 - Structured Protection,
- B3 - Security Domains,
- C1 - Discretionary Security Protection,
- C2 - Controlled Access Protection.
- A1 - Verified Design (class A refers to systems are most secure).

In May 1990, France, Germany, the Netherlands and the United Kingdom published the Information Technology Security Evaluation Criteria (ITSEC) based on existing work in their respective countries. Following extensive international review, Version 1.2 was subsequently published in June 1991 by the Commission of the European Communities for operational use within evaluation and certification schemes.

According to this standard, the certainty degree evaluation, that the system has properties declared, is done based upon two criteria:

- effectiveness - whether the system is resistant to attacks or failures and whether it is probable, that it will be configured in such way that it will infringe the safety rules,
- correctness - whether the technical solutions ensuring safety, have been implemented,
- Based on these criteria the system is allocated to one of the classes marked from E1 to E6. Relationship between the classification results compliant with ITSEC and classes defined by TCSEC standard are presented in the Tab. 1.

ITSEC standard is accompanied by an ITSEM document (IT Security Evaluation Manual), describing detailed principles of using the first one.

*Tab. 1. Methods of quality assurance and assessment. Source: ITSEC. Provisional Harmonized Criteria. Luxembourg: Office for Official Publications of the European Communities, 1991*

ITSEC classification	TCSEC classification
E1, F-C1	C1
E2, F-C2	C2
E3, F-B1	B1
E4, F-B2	B2
E5, F-B3	B3
E6, F-B3	A1

Tests for information safety ITSEC in the EU can be conducted by:

- Federal Bureau for the IT Systems Safety (BSI - Bundesamt für Sicherheit in der Informationstechnik), in Germany,
- Central Directorate of the Information Systems and Networks Safety (DCSSI - Direction Centrale de la Sécurité des Systemes d'Information), in France,
- CESG - Computer Electronics Security Group in Great Britain,
- CERT-RO - Computer Emergency Response Team - Rijksoverheid in Holland.

In 1993, in Canada CTCPEC standard (Canadian Trusted Computer Product Evaluation Criteria) was formulated, linking features of ITSEC and TCSEC.

In 1993 the organizations that formed CTCPEC, TCSEC and ITSEC, began joint work within a CC project (Common Criteria), whose aim was merging two standards mentioned.

In 1998 the agreement was signed about mutual recognition of the safety certificates, issued based on CC. The results of CC project formed the basis for creating ISO/IEC 15408 standard. The criteria defined in this norm can be used as a basis for evaluating properties of the protective measures for the products IT systems. Common criteria (CC) allow comparing the results, irrespectively of the protective measures evaluation conducted. This standard was formed in 1999 and consists of three parts. In 2005, the new version of this standard was published - Tab. 2.

Tab. 2. Information technology - Security techniques - Evaluation criteria for IT security

ISO/IEC 15408-1	Part 1: Introduction and general model. It defines two forms for expressing IT security functional and assurance requirements. The protection profile (PP) construct allows creation of generalized reusable sets of these security requirements.
ISO/IEC 15408-2	Part 2: Security functional requirements. It defines the required structure and content of security functional components for the purpose of security evaluation. It includes a catalogue of functional components that will meet the common security functionality requirements of many IT products and systems.
ISO/IEC 15408-3	Part 3: Security assurance requirements. It defines the assurance requirements of ISO/IEC 15408. It includes the evaluation assurance levels (EALs) that define a scale for measuring assurance, the individual assurance components from which the assurance levels are composed, and the criteria for evaluation of protection profiles and security targets.

Next compilation was group of standards ISO/IEC 27000:2005, concerning standards for the Information Security Management System - Tab. 3.

### 3. Transport telematics standardization

In the European Union, the standards concerning telematics transport systems (ITS) are formulated mainly by CEN and ETSI.

To this end, in 1991, the Technical Committee for Transport Telematics and Road Traffic - CEN/TC 278 (Road Transport and Traffic Telematics) was established.

Also, a world organization - Telecommunication Industry Association has been established, within which, the Technical Committee ISO/TC 204 is responsible for standardization in Transport Telematics (Intelligent Transport Systems).

The activities of TC 204 refer to system, infrastructural, coordination and planning aspects of standardization work, including the activities of other international standardization structures. It conducts standardization work on the information, communication solutions and control of the ground transport systems as well as means of cooperation between them. This refers particularly to managing traffic, public and freight transport, providing the information to the travelers, emergency services, transport entrepreneurs and drivers. Committee 204 gathers 19 member states - and 27 states-observers.

Tab. 3. Information technology - Security techniques - Information security management systems - Overview and

*vocabulary*

ISO/IEC/27001	The standard was published in October 2005, essentially replacing the old BS7799-2 standard. It is the specification for ISMS, an Information Security Management System.
ISO/IEC 27002	The standard is the rename of the ISO 17799 standard, and is a code of practice for information security. It basically outlines hundreds of potential controls and control mechanisms, which may be implemented, in theory, subject to the guidance provided within ISO 27001.
ISO/IEC 27003	The purpose of this proposed development is to provide help and guidance in implementing ISMS (Information Security Management System). This will include focus upon the PDCA method, with respect to establishing, implementing reviewing and improving the ISMS itself - planed to impose in October 2008
ISO/IEC 27004	It is the official number of the emerging standard covering information security management measurement and metrics. Again, however, it is not expected to be published in the immediate term. However, its development is well underway, being at stage 3, working draft level.
ISO/IEC 27005	The standard is heavily be based upon ISO 13335 (MICTS Part 2), which provide guidelines for the management of information and communications technology security. There is also a loose similarity with BS7799-3, which was published in March 2006 - planed to impose in 2009.
ISO/IEC 27006	Requirements for bodies providing audit and certification of information security management systems (during creating).
ISO/IEC/2007	Guidelines for Information security management systems auditing, planed 2009.

In the Committee TC 278, as well as in TC 204, there are working groups, which are responsible for various areas of activities - Tab. 4.

*Tab. 4. Areas of activities for TC 278 and TC 204 working groups*

The activity area	TC 278	TC 204
EFC - Electronic fee collection and access control	WG 1	WG 5
FFMS - Freight and Fleet Management systems	WG 2	WG 7
PT - Public Transport	WG 3	WG 8
TTI - Traffic & Traveler Information	WG 4	WG 10
TC - Traffic Control	WG 5	WG 9
GRD - Geographic road data	WG 7	
RTD - Road Traffic Data	WG 8	
DSRC - Dedicated Short Range Communication	WG 9	WG 15
HMI - Human-machine Interfaces	WG 10	
AVI/AEI - Automatic Vehicle Identification and Automatic Equipment Identification	WG 12	WG 4
Architecture and terminology	WG 13	WG 1
After theft systems for the recovery of stolen vehicles	WG 14	
Safety	WG 15	
Data base technology		WG3
Navigation systems		WG 11
Vehicle/road way warning and control systems		WG 14
Wide area communications/protocol sand interfaces		WG 16
Intermodal aspects using mobile and nomadic devices for ITS		WG 17

Technical TC 278 Committee formulated following standards for the transport telematics: EN



12253, EN 12795, and EN 12834 (ISO 15628) and EN 13372 - Tab. 5.

Tab. 5. Standards for the transport telematics formulated by TC 278

EN 12253 (2003)	RTTT. Road transport and traffic telematics. Dedicated short-range communication. Physical layer using microwave at 5.8 GHz. Road transport, Teleprocessing, Traffic, Traffic control, Physical layer (OSI), Open systems interconnection, Microwave links, Radio links, Information exchange, Data transmission, Communication networks, Mobile communication systems, Telecommunication systems, Data processing.
EN 12795 (2003)	RTTT. Road transport and traffic telematics. Dedicated short range communication (DSRC). DSRC data link layer. Medium access and logical link control.
EN 12834 (2003)	RTTT. Road transport and traffic telematics. Dedicated Short Range Communication (DSRC). DSRC application layer.
EN 13372 (2003)	RTTT. Road transport and traffic telematics (RTTT). Dedicated short-range communication. Profiles for RTTT applications.

RTTT - Road Transport and Traffic Telematics - covers devices used in the control systems of the road transport telematics. It refers mainly to the systems, ensuring radio communication between vehicles as well as between the vehicles and the roadside infrastructure.

ETSI - European Institute for the Telecommunication standards developed standards EN 300674 and EN 301091, concerning transport telematics.

Tab. 6. Standards for the transport telematics developed by ETSI

ETSI EN 300 674-1 V1.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 Kbit/s / 250 Kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 1: General characteristics and test methods for Road Side Units (RSU) and On-Board Units (OBU).
ETSI EN 300 674-2-1 V1.1.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 Kbit/s / 250 Kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive; Sub-part 1: Requirements for the Road Side Unit (RSU).
ETSI EN 300 674-2-2 V1.1.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 Kbit/s / 250 Kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive; Sub-part 2: Requirements for the On-Board Unit (OBU).
ETSI EN 301 091-1	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Short Range Devices; Road Transport and Traffic Telematics (RTTT); Radar Equipment Operating in the 76 GHz to 77 GHz and 24 GHz Range; Part 1: Technical Requirements and Methods of Measurements

Technical ISO/TC 204 Committee developed among the others, a standard -ISO/TS 14907, 17261, 14815 in 2005 and standard ISO 14814 in 2006 - Tab. 7.

Tab. 7. Standards for the transport telematics developed by TC 204

ISO/TS 14907-1	Road transport and traffic telematics - Electronic fee collection - Test procedures for user and fixed equipment - Part 1: Description of test procedures.
ISO/TS 14907-2	RTTT Road transport and traffic telematics - Electronic fee collection - Test procedures for user and fixed equipment - Part 2: Conformance test for the onboard unit application interface.
ISO/TS 17261	Intelligent transport systems - Automatic vehicle and equipment identification - Intermodal goods transport architecture and terminology.
ISO 14815 (2000)	RTTT. Road transport and traffic telematics - Automatic vehicle and equipment identification - System specifications.
ISO 14814 (2006)	RTTT. Road transport and traffic telematics - Automatic vehicle and equipment identification - Reference architecture and terminology. Standard establishes a common framework to achieve unambiguous identification in ITS/RTTT (Intelligent Transport Systems/Road Transport and Traffic Telematics) AVI/AEI (Automatic Vehicle Identification/Automatic Equipment Identification) applications.

#### 4. Conclusions

The European Commission and many state administrations in the world attach a great importance to the use of telematics systems in transport. This requires designing and manufacturing devices using the advanced telecommunication and IT technologies. Some states have already implemented the telematics systems in transport, which control now such functions as: vehicles fleet management, urban traffic management and road toll collection.

Implementation of the autonomic systems in the European states and lack of possibilities to cooperate with other systems caused the European Commission to conduct, since 2000, a wide spread activities on interoperability of the telematics systems and introduction of legal regulations (decrees, directives).

Interoperability and building telematics systems architecture brings about the necessity to develop standards concerning, among the others, technical, safety solutions as well as data transmission protocols between the system elements and it environment solutions.

At present in Poland, telematics applications are not used to a sufficient degree, to effectively manage the vehicles' fleet, or at least for urban traffic management, and when they are used, and then they are developed without taking into consideration appropriate interoperability. These applications in the future may provide quick and precise information and allow to safely managing the urban traffic. In the forthcoming years they will be further improved by using Galileo system, whose localizing precision will be better than that of GPS.

To meet these challenges, the international and European institutions have been characterized in this paper, which conduct standardizing activities in telematics and transport telematics. Also the fundamental, already developed standards for the aforementioned areas, have been presented.

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