TECHNICAL REPORT

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Intelligent transport systems — Joint APEC-ISO study of progress to develop and deploy ITS standards

Systèmes intelligents de transport — Étude de progrès conjointe APEC-ISO pour élaborer et déployer les normes ITS

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 28682 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems,* in collaboration with *APEC (Asia-Pacific Economic Cooperation)*.

Introduction

This Technical Report is intended to facilitate cooperation in ITS standardization activities by sharing recent information and experience on the application and deployment of ITS standards among APEC economies and ISO/TC 204 member countries.

The developers of this Technical Report:

(1) surveyed the current status of and plans for ITS standards and their deployment to increase understanding and boost technology transfer among APEC and ISO/TC 204 members,

(2) identified common problems that members are facing related to international standardization activities in the technical committee on intelligent transport systems (ISO/TC 204) of the "International Organization for Standardization" (ISO)

(3) Presented an ITS standards policy and collective opinions to improve ITS standardization activities and implementations.

The key questions addressed in this Technical Report are:

- How similar or different are each country's approaches to the development and deployment of ITS standards?
- Who develops ITS standards nationally, regionally and internationally?
- How many ITS standards have been developed worldwide?
- How many international ITS standards have been adopted or applied worldwide?
- What lessons have learned from the development and deployment of ITS standards?
- How to improve the practice of ITS standards development and application?
- What should be done to facilitate universal use of ITS standards?

This Technical Report contains:

- 662 ITS related standards worldwide (developed or under development) (Annex A)
- 89 Fact sheets of ITS related standards (including scope and conformance features) (Annex D)
- 100 ITS standards deployed world wide (Annex B)
- 20 Lessons learned from development or deployment experience of ITS standards (Annex C)
- Observations and Recommendations developing and deploying ITS standards (Section 4, 5, 6, 7, 8)

Intelligent transport systems — Joint APEC-ISO study of progress to develop and deploy ITS standards

1 Scope

This Technical Report

a) provides a survey of the current status and plan of ITS standards and their deployment,

b) identifies common problems which members are facing related to international standardization activities, and

c) provides collective opinions to improve ITS standardization activities and their implementations.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
eSafety
safety systems using electronics and or wireless communications

3 Abbreviated terms

AEI	automatic equipment identification
AFNOR	Association Française de NORmalisation
ANSI	American National Standards Institute
APEC	Asia-Pacific Economic Cooperation
APSC	advisory panel for standards cooperation (ITU)
ASN.1	abstract syntax notation.1
ASTM	American Society for Testing and Materials
AVI	automatic vehicle identification
CD	committee draft (ISO)
CD-ROM	compact disc, read-only memory
CEN	Comite Europeen de Normalisation
CENELEC	Comite Europeen de Normalisation Electrotechnique

CTI	committee on trade and investment
DATEX	DATa EXchange
DATEX ASN	DATEX using ASN.1
DIS	draft International Standard (ISO)
DOT	department of transport, department of transportation
ERM	electrotechnical and radio matters
EU	European Union
FDIS	final draft International Standard (ISO)
GIS	geographic information system
HoD	head of delegation
ICT	information and communication technologies
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IS	International Standard (ISO)
ISO	International Organization for Standardization
ITS	intelligent transport systems
ITSEG	ITS expert group
ITU	International Telecommunication Union
JPG	joint project group
JTF	joint task force
KATS	Korean Agency for Technology and Standards
LCR	road command language (France)
MEDIA	Management of Electronic Fee Collection DSRC Interoperability in Alpine Region
MOCT	Ministry of Construction and Transportation (Korea)
MRA	mutual recognition agreement
NAFTA	North America Free Trade Agreement
NP	new work item proposal (ISO)
NPA	National Police Agency (Korea, Japan)
NSB	national standards body
O member	observer member (ISO)

ORANGES	Orlando Regional Alliance for Next Generation Electronic payment Systems
OGC	Open Geospatial Consortium
P member	participating member (ISO)
PAS	Publicly Available Specification (ISO)
PC	planning committee (OGC)
PCS	personal communications services
PWI	preliminary work item (ISO)
RFID	radio frequency identification
RTLS	real time locating systems
RTSA	Road Traffic Safety Authority
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (USA)
SC	sub committee (ISO)
SCSC	sub-committee on standards and conformance (APEC)
SDO	standards development organization
SMR	specialized mobile radio
TC	Technical Committee (ISO)
TEL WG	telecommunications and information working group (APEC)
TELEMOV	telecommunications related to motor vehicles (ITU APSC)
TPT WG	transportation working group (APEC)
TR	Technical Report (ISO, country)
TS	Technical Specification (ISO, country)
TTA	Telecommunication Technology Association (Korea)
uGIS	ubiquitous GIS
UNECE	United Nations Economic Commission for Europe
VOIP	voice over internet protocol
VTS	Vehicular Technology Society (IEEE)
WG	Working Group (ISO)

4 An overview of ITS standards and related key players

4.1 Appreciations

NOTE Sincere appreciation is expressed to all the respondents, who voluntarily contributed to the report surveys. They are:

- Twenty-three members of ISO/TC 204 and APEC: Australia, Austria, Brunei Darussalam, Canada, China, Czech Republic, France, Germany, Hong Kong China, Hungary, Japan, Korea, Mexico, Norway, Peru, Singapore, Slovakia, South Africa, Sweden, Switzerland, Chinese Taipei, UK, USA, and;
- Six organizational representatives: APEC, CEN/TC 278, ETSI/ERM/TG37, IEEE, ISO/TC 211, ITU
- Dozens of contributors from APEC and ISO/TC 204: Chair and delegations of APEC, and Chair, Secretariat, HoDs, WG Convenors, rapporteurs and project editors of ISO/TC 204.

4.2 Structure of this technical report

Section 4 of this Technical Report provides the background of this project and introduces APEC, ISO/TC 204 and other important standards developing organizations for ITS.

Section 5 describes the methodology taken to conduct this project report and the questions and objectives of the two survey stages of this Technical Report.

Section 6 analyses the responses to two survey stages described in section 5. It shows the different approaches to developing standards and discusses implications of the survey results

Section 7 provides observations and conclusions aimed to support ITS standards developers. They are related not only to international standards development organizations, but also individual to members of ISO/TC 204 and APEC such as the government ministries and regulators, national standards bodies, domestic standards organizations, and trade associations, etc.

4.3 Benefits expected from ITS standardization

4.3.1 What are "Intelligent Transport Systems" (ITS) ?

Like many other parts of business and government around the world, the construction and operation of transportation systems is being transformed by computers, sensors, and communications technology – collectively called information technology (IT).

The application of IT to surface transportation is called “Intelligent Transport Systems” (ITS). ITS provides the ability to gather, organize, analyze, use, and share information about transportation systems. In the modern world, this ability is crucial to the effective and economical construction and operation of transportation systems and to their efficient use.

IT can be very helpful in conceiving, planning, and building new parts of the transport system. This use of IT is not specifically ITS, but it is very helpful in laying the groundwork for introducing ITS. ITS is being incorporated by manufacturers in “intelligent equipment ” that can be installed as part of the transportation infrastructure to gather and disseminate traveller information, control traffic signals and variable message signs, electronically collect tolls, and help manage the system

ITS provides vital support in operating transportation systems, including traffic management, pavement monitoring, oversight of system maintenance, and more effectively and reliably managing public transport •

ITS can store and evaluate archived data about the transportation system that is useful to planners who are evaluating transportation system improvements or to others evaluating safety aspects of the roadway

ITS also provides a wide array of in-vehicle technology to improve the safety, productivity, and comfort of road travel. In addition, a new direction for ITS in developed countries is worth waTC hing. This is a new focus on using wireless communications to help vehicles and the infrastructure cooperate with each other to enhance safety and the ability to manage the infrastructure well.

ITS encompass a broad range of wireless and wire communications-based information, control and electronics technologies. When integrated into the transportation system infrastructure, and in vehicles themselves, these technologies help monitor and manage traffic flow, reduce congestion, provide alternate routes to travellers, enhance productivity, and save lives, time and money.

ITS provide the tools for skilled transportation professionals to collect, analyse, and archive data about the performance of the system during the hours of peak use. Having this data enhances traffic operators' ability to respond to incidents, adverse weather or other capacity constricting events.

Traffic accidents and congestion take a heavy toll in lives, lost productivity, and wasted energy. ITS enables people and goods to move more safely and efficiently through a state-of-the-art, intermodal transportation system.

Source Information: 1)"ISO/TC 204 Business Plan" (www.iso.org – business plans for public review);
2) "ITS Technical Notes" (World Bank www.worldbank.org - Report no. 35680)

4.3.2 What are International Standards, standards and the role of ISO ?

ISO/IEC Guide 2 defines *standard* as "*document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context".* standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits

Standardization is "activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context". In particular, this activity consists of the processes of formulating, issuing and implementing standards. Important benefits of standardization are improvement of the suitability of products, processes and services for their intended purposes, prevention of barriers to trade and facilitation of technological co-operation.

The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three international bodies are most widely recognized for the planning, development and adoption of International Standards: ISO (International Organization for Standardization) is responsible for all sectors excluding electro-technical, which is the responsibility of IEC (International Electrotechnical Commission), and most of the Telecommunications Technologies, which are largely the responsibility of ITU (International Telecommunication Union).

Table 1 International SDOs: ISO, IEC and ITU

	ISO	IEC	ITU
Standardization area	All sectors (excluding IEC,ITU)	Electro-technical	Telecommunication
Members	156 (100: regular)	63 (51: regular)	189+
Technical Groups	733 TC /SCs 2,226 WG /ad hocs	179 TC /SCs 700 teams	ITU-T: 14 SGs+ ITU-R: 7 SGs+ ITU-D : 2 SGs+
Published standards type document	15,649 (IS, TS, TR, PAS, etc)	5,296 (IS, TS, TR, PAS, etc)	ITU-T : 2,900+ ITU-R : 4,500+ (Recommendations)

Active Projects	4,009	1,541	N/A
Website	www.iso.org	www.iec.ch	www.itu.int
Relevant European Organization	CEN	CENELEC	ETSI

ISO is a legal association, the members of which are the "National Standards Bodies" (NSBs) of some 140 countries (organizations representing social and economic interests at the international level), supported by a central secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the "International Standard" (IS). An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO technical committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO technical enquiry). ISO and its technical committees are also able to offer the "ISO Technical Specification" (ISO/TS), the "ISO Public Available Specification" (ISO/PAS) and the "ISO Technical Report" (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the "International Workshop Agreement" (IWA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

Source: ISO website (www.iso.org)

4.3.3 Benefits expected from ITS standardization

Standards are a primary enabler of the widespread dissemination of ITS technologies and their safe and consistent use worldwide. Some of the benefits of ITS, built on International Standards, are listed below:

- The primary social, political, and economic benefit offered by ITS is increased safety: fewer and less severe crashes.
- Another primary social and economic benefit is the saving of travel time and cost and the potential for making travel time more productive for business travellers, more agreeable for all travellers. ITS can facilitate use of alternate or multiple travel modes, improving travel times and helping to load-level the transportation system.
- An additional primary benefit is the potential for an improved environment, including air quality and noise abatement. Secondary benefits from a social perspective, but very important from a commercial perspective are increased traveller comfort, convenience, and entertainment.
- Protocols for interconnecting traffic management, emergency response, and other centres across jurisdictions will increase the appeal and effectiveness of such centres.
- Protocols and message sets for delivering traffic and traveller information to vehicles will allow vehicles to receive service seamlessly wherever they are and will broaden the usable collection of data transmission technologies that can be applied to information delivery.
- Universal physical storage formats for map databases will promote interchangeability of storage media (e.g., CD-ROMs) and open markets for custom tailored data content.
- A reference architecture for vehicle and equipment identification along with protocols for electronic toll collection / road use charge devices and for commercial vehicle credentials checking will promote competition in the marketplace and encourage wider and more interoperable deployment of such systems.

- An ITS reference architecture promotes the process of defining simple, self-contained, readily interconnected components into more complex intelligent transport systems, opening the market to new applications and simplifying the deployment process.

- A glossary of ITS terms and an ITS data registry will help to reduce confusion in the marketplace and to simplify procurement and deployment activities.

- Performance and test measures/certification for safety-oriented and driver assistance systems (e.g., adaptive cruise control, collision warnings) will help build marketplace confidence in the value, consistency, and reliability of such systems and, when conscientiously implemented, provide a layer of protection against product liability exposure.

In general, global ITS standards will decrease costs and open markets for vehicle and equipment manufacturers, infrastructure operators, etc.

4.4 APEC places high value on ITS standards

4.4.1 APEC

The Asia-Pacific Economic Cooperation, or APEC, is the premier forum for facilitating economic growth, cooperation, trade and investment in the Asia-Pacific region. APEC was established in 1989 to further enhance economic growth and prosperity for the region and to strengthen the Asia-Pacific community.

Since its inception, APEC has worked to reduce tariffs and other trade barriers across the Asia-Pacific region, creating efficient domestic economies and dramatically increasing exports. Key to achieving APEC's vision are what are referred to as the 'Bogor Goals' *of free and open trade and investment in the Asia-Pacific by 2010 for industrialised economies and 2020 for developing economies*. These goals were adopted by leaders at their 1994 meeting in Bogor, Indonesia.

APEC has 21 members - referred to as "Member Economies" - which account for approximately 40% of the world's population, approximately 56% of world GDP and about 48% of world trade. It also proudly represents the most economically dynamic region in the world having generated nearly 70% of global economic growth in its first 10 years.

APEC's 21 member economies are Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; The Republic of the Philippines; The Russian Federation; Singapore; Chinese Taipei; Thailand; United States of America; Viet Nam.

Source: APEC website (www.apec.org)

4.4.2 APEC TPT-WG promotes the use of ITS standards

4.4.2.1 APEC TPT-WG strives for the highest standards

Among APEC’s eleven sectoral working groups, the APEC "Transportation Working Group" (TPT-WG) fosters economic development in the Asia-Pacific region through recommendations to increase the efficiency of the regional transportation system.

The work of the TPT-WG is set out in the action program which is derived from the APEC transportation ministers' statements of 1995 and 1997. At the beginning of 1998, three steering committees were established in line with the priority areas of the working group: More competitive transportation industry (including infrastructure); safe and environmentally friendly transporation systems (including new technologies); and human resources development (including training, research and education).

APEC transportation ministers have been striving for the highest possible standards of efficiency, safety, security and environmental sustainability for their transportation systems. This joint policy was expressed in the 2004 TPT ministerial statement.

Source: APEC-TPT website (http://www.apec-tptWG.org.cn/)

4.4.2.2 APEC TPT intermodal/ITS "Experts Group" works towards ITS standards requirements

The "APEC Transportation Working Group" recognizes that "Intelligent Transport Systems" (ITS) can contribute much to the region's most significant transportation needs relating to saving lives, time, money, energy and the environment through more effective use of the existing transportation systems and related infrastructure. At the transportation ministers request, the "ITS Experts Group" is working towards ITS standards development arrangements that will allow these benefits to be fully realized.

The goal of the "ITS Experts Group" is to save lives, time, money and the environment through the realization of ITS.

The objectives are to identify ITS standards requirements which are APEC priorities; to facilitate the establishment of ITS standards by ISO which are APEC priorities; to promote the universal use amongst all APEC Economies of ITS standards established by ISO; to share information among APEC economies regarding ITS developments.

The "APEC TPT ITS Experts Group" was merged with its "Intermodal Expert Group" in May 2006 and renamed the "APEC TPT Expert Groups on Intermodal and ITS Experts Group" (IEG).

4.4.2.3 APEC TPT ITS "Experts Group" and ISO/TC 204 collaboration: "Category A Liaison"

APEC TPT-WG , via its ITS experts group, has been cooperating with ISO/TC 204 in ITS standardization activities, and established ISO Category-A liaison relationship.

The summary of joint activities between APEC TPT-WG and ISO/TC 204 is as follows:

First joint workshop of ISO/TC 204 – APEC/ITSEG

Date and venue: 12 Oct 2002 in Chicago, USA

Topics: Common understanding of each group and future action items

The workshop identified a list of possible joint work or action items for considerations

Second joint workshop of ISO/TC 204 – APEC/ITSEG

Date and venue: 17 May 2004 in Vancouver, Canada

Topics: Discussion on public transport and fleet management standards

The workshop identified common interest areas for transit and fleet management standards. The collective needs of APEC economies were raised and discussed.

First joint project – "World Report for ITS standards"

1st Joint project mainly for the year from the year of 2005 and 2006

Project objective

To survey ITS standards developments and implementations

To share case studies and lessons learned among APEC and ISO/TC 204 members

To review ITS standardization activities, mainly ISO/TC 204, for future oriented planning

The final ouTC ome is this Technical Report.

4.4.3 APEC TEL-WG works on telematics

The "APEC Telecommunications and Information Working Group" (TEL) aims to improve telecommunications and information infrastructure in the Asia-Pacific region by developing and implementing appropriate telecommunications and information policies, including relevant human resource and development cooperation strategies. This is reflected in the TEL's expanded vision of promoting the transition from an Asia Pacific information infrastructure into the "Asia Pacific Information Society".

"APEC TEL - Telematics Strategy": APEC TEL Ministers, to broaden and deepen business facilitation, called upon the TEL to strengthen work on the development of an APEC information strategy and an APEC telematics strategy in the 2005 APEC TEL ministerial statement.

APEC TEL has also conducted work on other applications areas including telematics and has developed an APEC telematics strategy. APEC TEL has also considered that a project designed to uncover the potential issues involved in this developing market is a vital first step in understanding the impact this new technology will have on the populations in APEC region. Agreements on standards used between economies will be vital in enabling the spread of the usage of telematics. APEC TEL discussed that the trend towards the installation of telematics devices in cars is a growing and potentially profitable market.

Source: APEC-TEL website (www.**apectel**WG.org)

4.4.4 APEC SCSC encourages participation in international standardization process

APEC established the SCSC to achieve the Bogor Goals in the field of standardization. SCSC, under the "Committee on Trade and Investment" (CTI), has been working since 1994 on helping APEC economies to address those key issues and others related issues through several initiatives with the aim to facilitate trade, such as:

- Alignment of national standards with international standards in priority areas
- Improving participation on international standardization process through capacity building activities and through the regional input developed by technical groups
- Encouraging implementation of good regulatory practices in the process of preparation, adoption or review of regulations
- Developing means for conformity assessment recognition in the regulated sector such as "Mutual Recognition Agreements" (MRAs)
- Encouraging the recognition of conformity assessment in the voluntary sector, including the cooperation with the "Specialist Regional Bodies" (SRBs)
- Cooperation on technical infrastructure development
- Enhancing the information exchange and knowledge on matters related to standards and conformance
- Further increasing the transparency and access to information across the APEC region
- Encouraging business awareness and involvement in the whole process.

These activities increase the propensity for a free and open trade and investment, helping economies to grow, create jobs and provide greater opportunities for international trade and investment. In contrast, protectionism usually fosters inefficiencies and gives fewer and costly choices to consumers. Free and open trade helps to lower the costs of production and thus reduces the prices of goods and services - a direct benefit to all.

Source: APEC website (http://www.apec.org/apec/apec_groups/committees/committee_on_trade/sub-committee_on_standards.html)

