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Information Society Technologies

In this issue:

SIXTH FRAMEWORK PROGRAMME

COMeSafety <newsletter>

Newsletter for European ITS Related Research Projects

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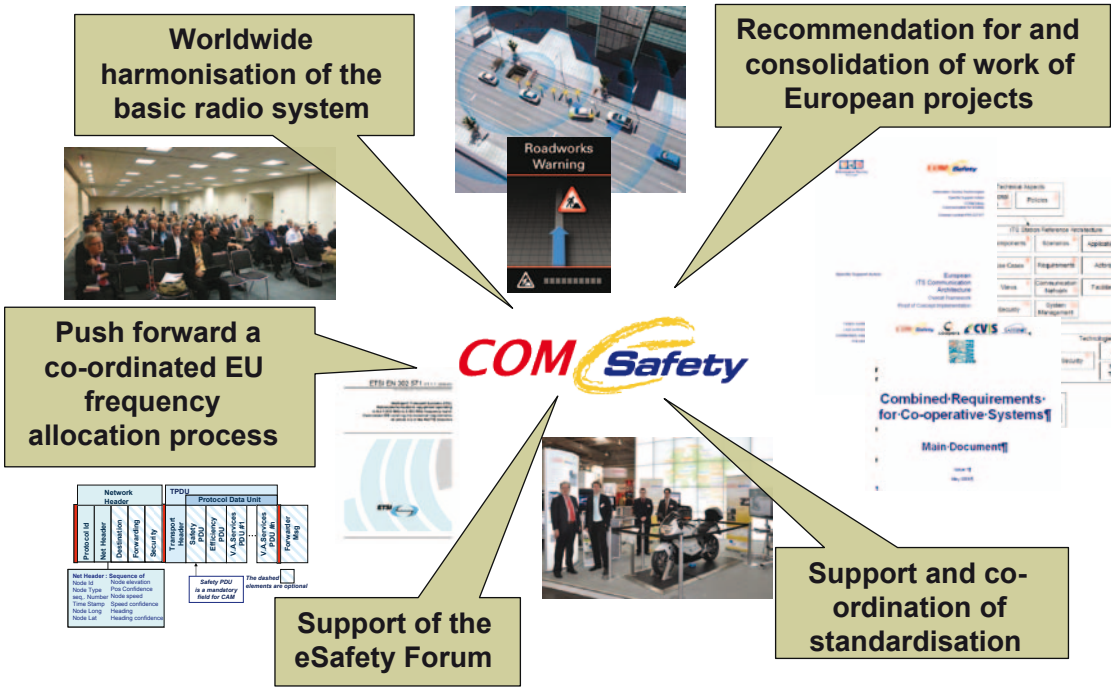
Audi BMW Group Forschung und Technik DAIMLER FIAT GROUP ITS Niedersachsen RENAULT

COMeSafety Finalisation / further steps

(by Timo Kosch, BMW Group)

This is the last issue of the COMeSafety Newsletter with the project having ended in December 2009. A small, but targeted project with clearly defined objectives and measures of success, COMeSafety was able to achieve its ambitious goals. However, this was not an achievement of the project alone, but rather an accomplishment of the whole European community: a cooperative work of the European Commission, the eSafety Forum, the research projects, industry consortia like the CAR 2 CAR Communication Consortium (C2C-CC), standardisation, interest groups, network organisations and other stakeholders together. COMeSafety served as a facilitator and promoter in this process.

To judge the progress made since COMeSafety started, let's take a look at the main goals of the project: consolidation of research results, support of the eSafety Forum, support of the European frequency allocation process, worldwide harmonisation of the basic radio system and dissemination towards all stakeholders.



With respect to the consolidation of research results, the most notable outcome is the publication of the European ITS communication architecture document and the consolidated communication system requirements of the projects following the guidelines of and in consistency with the European ITS framework architecture (FRAME). Published as version 2.0 in October 2008 as a joint effort of the Integrated Projects COOPERS, CVIS and Safespot together with STREPs like SeVeCom and specially supported by the FRAME and E-FRAME initiatives, work on the common architecture has progressed with further input from PRE-DRIVE C2X and additional advances of the IPs. These results have been integrated in an ongoing process moderated by COMeSafety and have lead to an update of the architecture which will be published as version 3.0 in February 2010. In addition to the specifications, it is important to note that interoperability of the prototypes of the projects and many of the stakeholders could already be achieved. COMeSafety supported the IPs in the early stages of the planning of their demonstrations with respect to the use cases and system components. The degree of interoperability reached by the Integrated Projects will be evident at the Cooperative Mobility Showcase in March 2010 in Amsterdam. Already in fall 2008, a set of vehicle-to-vehicle safety use cases could be experienced at the annual Forum of the C2C-CC which was already almost fully compatible with parts of the COMeSafety specifications.

COMeSafety has supported the work of the eSafety Forum, predominantly in the working group Communications, but also in others, both directly and indirectly. The most important result is the final report of the WG Communications with their recommendations. The first recommendation of this document, published in September 2007, was on the allocation of a protected spectrum. The COMeSafety goal for spectrum allocation was achieved with the EC Decision of 2008 that forces EU member states to designate the sub-band 5.875 GHz - 5.905 GHz for ITS road safety applications and to make that frequency band available on a non-exclusive basis "as soon as reasonably practicable". This EC decision was preceded by a CEPT Electronic Communication Committee (ECC) decision on the use of this spectrum with an additional 20MHz above for future extensions and an ECC recommendation on the use of 20MHz below for non-safety ITS applications.

While the spectrum allocation in Europe is an important prerequisite for the use of the same radio technology as in the United States, full international harmonisation with respect to the usage of the same hardware has not yet been achieved. Current draft standards at IEEE

Announcements:

3rd IEEE International Symposium on Wireless Vehicular Communications - IEEE WiVEC 2010
16–17 May 2010, Taipei, Taiwan

The IEEE International Symposium on Wireless Vehicular Communications (WiVeC) will cover all vehicular wireless communications aspects of Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I) and Vehicle-to-Person (V2P) communications, including implications on transport efficiency and safety, implications on automotive electronics, liability issues, standardisations efforts and spectrum assignment. The IEEE WiVeC symposium is sponsored by the IEEE Vehicular Technology Society (VTS).
After the successful first and second WiVeC editions in 2007 and 2008, the third IEEE WiVeC symposium will be co-located with the 71th IEEE Vehicular Technology Conference 2010 Spring conference and will take place at the Grand Hotel in Taipei on the 16th and 17th of May 2010. All accepted papers will be included in the VTC 2010-Spring conference proceedings and will be published on the IEEE Xplore database. Combined registrations packages will be offered for WiVeC and VTC events.

More detailed information:
www.ieeevtc.org/wivec2010/
Venue Information:
www.grand-hotel.org/newsite/html/e/ca01.htm

Transport Research Arena, Europe 2010
Greener, Safer and Smarter Road Transport for Europe
Brussels, Belgium, 07-10 June 2010

The main theme of TRA 2010:
Sustaining Road Transport Mobility through innovation in Europe
Conference OBJECTIVES:
TRA 2010 is an event for the alignment of the stakeholders of transport research and development. It follows previous successful editions of the conference in 2006 in Gothenburg and in 2008 in Ljubljana. The TRA contributes to innovation for sustainable mobility in Europe, leading to a greener, safer and smarter transport system, which will be more sustainable, competitive and efficient. By enhancing the networking and clustering of Europe's research and development capacity – based on a shared Strategic Research Agenda (SRA) and Research Framework – the TRA helps to align European, national, regional and private research and development actions on transport.
The European Commission (EC) sees an opportunity for all parties involved to meet and to present, exchange and disseminate the results obtained in research and development.
As such, the European Commission welcomes this TRA and strongly supports it.

For further information please visit:
www.traconference.eu/Downloads/tabid/264/Default.aspx

COMeSafety Finalisation / further steps

(by Timo Kosch, BMW Group)

(802.11p), ISO (DIS 21215/CALM M5) and ETSI (ES 202 663 European profile) are hinting at interoperability at the air interface, but are not finally defined yet. For example, it is not clear what the consequences of the mitigation techniques to avoid interference between European CEN Dedicated Short Range Communication (RTTT DSRC) equipment and Intelligent Transport Systems (ITS) operating at 5.9GHz (ETSI TS 102 792) will be or how a dual receiver solution will look like in the different standards and different parts of the world. Thus, while international harmonisation is under way and the standardisation organisations are cooperating closely, specifications that would ensure the possibility to use one piece of radio hardware in the different regions of the world have not been finalised yet. Nevertheless, standardisation has made considerable progress and with the advent of ETSI TC ITS, a standardisation organisation directly dealing with ITS safety communication systems in Europe has been established. COMeSafety has assisted this process and supported ETSI work e.g. with the system architecture specifications and its annexes, in particular including message formats.
To disseminate the research results and organise platforms to foster both the cooperation and the competition among the stakeholders, COMeSafety established various channels. This Newsletter certainly has played a major role as well as the annual vehicle safety communications workshop that COMeSafety has organised in a joint fashion with the EU, US and Japanese administrations. COMeSafety has also supported other major networking and dissemination activities - the annual eSafety Forum's Plenary, the ITS World Congress and recently the ETSI TC ITS Workshop certainly being among the most important. The COMeSafety Website has been extended and improved over time with its relaunch in 2009, including an updated usage scheme and new look and feel. It will continue to be online for at least another year. Since it is supposed to be of help for your work, you are invited to provide further feedback to us. COMeSafety also used other means to address a wider audience, including an exhibition at the CeBIT 2009 and publications in the scientific community as in the IEEE Communications Magazine.
While there is still a way to go, we are coming closer to see cooperative safety and traffic efficiency systems on European roads. Field operational tests will set the ground for the most effective applications and will help to get all the little nuts and bolts right which are very tricky in this complex system environment. While standardisation has already reached an advanced stage, standards will evolve and mature in parallel to the field operational testing activities. This all will need the ongoing joint cooperation of the stakeholders, and possibly further facilitation to be effective. In particular, cooperation now needs to be organised cross-region, since system introduction needs to be done in a coordinated fashion so that especially cross-border companies like the automotive industry can offer the same or at least very similar systems in the different parts of the world. This is necessary to ensure that the most effective systems can be realised in a cost-efficient manner. With the recently established official EU-US cooperation, more than just the basis is set. It is upon all of us to take it from here. Thus, there is still some news down the road. Whatever the channel will be, stay tuned.

International Workshop on Vehicle Communications

(by Gunnar Heyms, ITS Niedersachsen)

Summary Report
The fifth international workshop on Vehicle Communications (VSC) took place on 20th September 2009 in Stockholm. More than 65 participants from Europe, USA and Japan came together and used the day prior to the ITS World Congress to discuss about Vehicle Communication and the worldwide use of it. The event was opened by Timo Kosch, coordinator of the COMeSafety. As professional and external moderator Kelly Odell lead through the event and the discussions of the four sessions. Juhani Jääskeläinen, Directorate General for Information Society and Media welcomed the participants and reported about cooperative vehicle communication, current research activities and the European ambitious goal of accident and carbon free traffic. Short introductions of the sessions were complemented by vivid discussions between the delegates from Europe, USA and Japan and the professional audience.
Introductory speeches about vehicle communication pointing out the scope of road operators and about the potential of mobile phone cellular networks for vehicle communication complemented the scope of the sessions. During the last session on a joint cooperative research agenda the chairs displayed roadmaps and possible developments within the different regions. Ericsson, as sponsor, hosted the workshop and arranged the catering. The event was organised by the COMeSafety project and co-financed by the European Commission and the CAR 2 CAR Communication Consortium. Also it was supported by the US Department of Transportation and the Japanese Ministry for Land, Infrastructure and Transport (MLIT). Last

but not least Timo Kosch thanked all participants and project partners for the good and successful collaboration as regards the COMeSafety project, which ends 2009.
Please find the detailed review of the event on the COMeSafety website:
www.comesafety.org/index.php?id=6

COMeSafety: A successful initiative coming to an end

(by Juhani Jääskeläinen and Emilio Dávila, European Commission)

Four years have gone since the kick-off meeting of the COMeSafety project, which started on 1st January 2006. It had clear objectives:

1. Coordination and consolidation of the results of the European and national projects and other of initiatives in the field of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication;
2. Support of eSafety Forum's activities in this area;
3. Cooperation with activities and initiatives in other parts of the world;
4. Support of the allocation of a dedicated frequency band with effective protection for safety related V2V & V2I communications and
5. Dissemination of the above-mentioned results to all stakeholders, including the general public, to prepare system introduction.

At the beginning of 2006, some European RTD projects started to obtain the first results regarding V2V and V2I communications; the Car-to-Car consortium had been established; in Europe, there was no band allocated for safety related communications, and the standardisation was mainly focused around the CALM (Continuous Air Interface for Long and Medium range) standard, being developed within ISO TC 204 WG16, and in IEEE on the 802.11p, and related standards. Although there were European contributors to these standards, the activities were more centred in other regions, with contribution from European Standardisation Organisations (ESOs) scattered in different working groups and with some relevant stakeholders not present in the work. The first Vehicle Safety Communications Workshop took place in Japan and lacked European participation.

The situation now is completely different: Europe has taken leadership in inter-vehicular communication activities. There is a series of European RTD projects, funded by the EU and Member States, with an effective cooperation that has produced important results, first and foremost a proposal for a Common European ITS Communication Architecture. New Groups focusing specifically on ITS standardisation have been created in the ESOs, namely the ETSI TC ITS and the CEN TC 278 WG16. The International Workshop on Vehicle Communications is now an established event attracting speakers and participants from all parts of the world and it is well recognised globally. The Commission has signed a cooperation agreement on cooperative ITS with the US DoT that also strives to foster global standard harmonisation in this field. The results of the European Research Projects, mainly CVIS, but also SAFESPOT, COOPERS and others are considered as reference internationally. The European Commission has reserved a frequency band of 30 MHz for safety communications in the 5.9 GHz, common with a part of the US allocation, and compatible with the Japanese band use. In addition, the Commission has adopted an Action Plan for the implementation of ITS, including V2V and V2I communications, proposed a Directive on the deployment of ITS systems and issued a mandate to the ESOs for the further development of related standards.

In most of the activities mentioned above, COMeSafety has played a relevant role, being a common repository of the research projects, chairing the Task Force on the Common Architecture, organising the International Workshop, supporting the cooperation EU-US, providing evidence for the spectrum reservation, and many other coordination activities.

We would therefore like to congratulate the COMeSafety team for the hard work and valuable results they have achieved. We hope that the new projects will build on the results of COMeSafety and continue to make headway to accomplish successfully the large scale deployment of interoperable cooperative ITS applications in Europe.

Security in Embedded IP-based Systems (SEIS) – The SEIS Project at a Glance

(by A. Jentzsch, Christian Wewetzer, VW)

A considerable fraction of innovations in the automotive industry comes in form of software and embedded systems. This has led to the in-vehicle controller network becoming increasingly complex. Consistently using IP as communication protocol has the potential of simplifying the current architecture. Exploring this potential, the SEIS project has the goal of investigating a holistic security solution for both intra- and inter-vehicular IP-based communication.

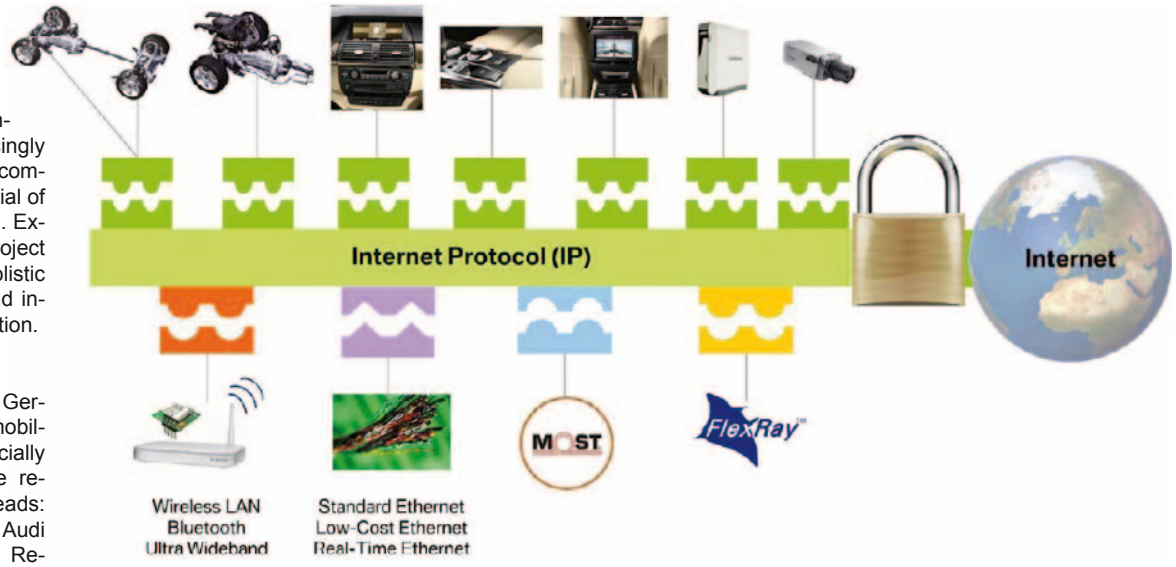


Figure 1 - SEIS investigates security solutions for IP-based intra- and inter-vehicle communication

Project Partners and Timeline

The SEIS project – initiated by the German „Innovationsallianz Automobilelektronik" – has been officially launched on July 1st, 2009. The respectable list of project partners reads: Alcatel-Lucent Germany, Audi, Audi Electronics Venture, BMW, BMW Research and Technology, Continental Automotive, Daimler, EADS Germany, Elektrobit Automotive, Infineon Technologies, Bosch, Volkswagen Group, Universities of Erlangen-Nuremberg and Karlsruhe, Technical Universities Chemnitz and Munich, Fraunhofer Institute for Communication Systems (ESK), Fraunhofer Institute for Secure Information Technology (SIT). The project is scheduled for a duration of three years. Funding is provided by the German „Bundesministerium für Bildung und Forschung" (BMBF) in the context of the research support programme IKT2020.

Methodology

In the initial phase, project partners will collect the relevant use cases and their communication requirements. Thereafter, the current state of the art – in terms of technical solutions satisfying the aforementioned requirements – will be elaborated and extended towards a fully IP-based system, with a special focus on the required security mechanisms. It is planned to use simulation to evaluate the developed solutions against the requirements, and to further optimise the network topology.

Expected Results

SEIS partners aim to provide a secure holistic IP-based communication solution. In the context of the SEIS project, „security" is regarded as means to ensure the two following system properties: first, the protection from willingful attacks (these attacks may stem from devices integrated into the intra-vehicle network – e.g. smartphones – or from external devices in the Internet), and second, the robustness to system faults. The aimed-for security solution is holistic, in the sense that it covers not only the classic IP use cases such as media data transfer, but also communication under real-time constraints, e.g. exchange of sensor data. A specific challenge considered in the project is how to maintain a high security level throughout the complete lifecylcle of a vehicle, facing novel attacks being developed over time. To achieve this, an update concept will be proposed. Lastly, project partners will develop migration strategies how to move from todays mixture of technologies towards an IP-based system.

Joint Workshop Security

(by Benjamin Weyl, BMW Group)

Summary Report

Within the C2C-CC Security Working Group Liaison Workshop supported by the COMeSafety project beginning of November at the MobileLifeCampus in Wolfsburg, experts from different projects have met in order to exchange information on current security issues and discuss respective solutions. The outcome of the work across the projects serves as input to standardisation bodies, such the ETSI Working Group 5 (www.etsi.org), where a standard for the secure and privacy preserving ITS communication is being prepared. Besides the technical view, a current status from the eSafety eSecurity Working Group (www.esafetysupport.org/en/esafety_activities/esafety_working_groups/esecurity.htm) has been presented where legal and political aspects on security and privacy are covered. Specifically, the eSecurity WG discusses data protection and privacy issues in close collaboration with the Article 29 Working Group. The experts from the workshop agree, that privacy-preserving mechanisms are a pre-requisite for the deployment of Car2X applications. The European funded project PRECIOSA (www.preciosa-project.org) focuses on the development of such privacy-preserving mechanisms and shows, how ITS systems can incorporate these mechanisms and how privacy can be reliably enforced. In addition to privacy, mechanisms in order to enable the secure communication of application data are required for the successful deployment of ITS applications. The SeVeCom project (www.sevecom.org) has developed a security architecture, which supports the secure exchange of ITS related data while applying privacy-preserving mechanisms based on pseudonyms. While the SeVeCom project mainly covers security for the external ITS communication, the EVITA project (www.evita-project.org) focuses on aspects for the security of vehicular on-board architecture by applying hardware security measures and dedicated security protocols. Projects like PRE-DRIVE C2X (www.pre-drive-c2x.eu) and SIM-TD (www.simtd.de) further develop and integrate these concepts in an overall ITS architecture where tests can be carried out within field-operational test environments.

The security experts work closely together across the projects in order to jointly discuss and harmonise various approaches and prepare input for standardisation bodies like the ETSI WG 5.

In addition to the exchange of information across European activities, close cooperation with other security experts, e.g. from US projects, lays the foundation for the international harmonised view on security and privacy solutions for ITS systems, which will a specific topic of the next Security Liaison Workshop.

The presentations from the C2C-CC Security WG Liaison Workshop can be found on the homepage of the CAR 2 CAR Communication Consortium (www.car-to-car.org).

Status of spectrum allocation for safety related ITS in the 5.9 GHz band in Europe

(by Dieter Seeberger, Daimler)

On 5th of August 2008 the European Commission adopted the Commission Decision (2008/671/EC) on the harmonised use of radio spectrum in the 5 875-5 905 MHz frequency band for safety-related applications of ITS. In the meantime 16 of the 27 member countries of the European Union have reported the implementation of this decision. In addition some countries which are not in the European Union, have reported the implementation of the ECC Decision (ECC/DEC/(08)01) within the CEPT, which is conform to the EC Decision. Altogether 20 European countries have allocated the spectrum and many others are going to follow soon.

The figure 1 shows the status of the 5.9 GHz ITS spectrum allocation for Europe.

MS	Status	MS	Status
BE	Under way	LT	Implemented
BG	Under way	LU	Implemented
HR	Under study	HU	Under way
CZ	Implemented	MT	Implemented
DK	Implemented	NL	Under way
DE	Implemented	NO	Implemented
EE	Implemented	AT	Under way
IE	Implemented	PL	Under way
GR	Under way	PT	Implemented
ES	Under way	RO	Under way
FI	Implemented	CH	Implemented
FR	implemented	SI	Implemented
IT	Implemented	SK	Implemented
CY	Implemented	FI	Implemented
LI	Implemented	SE	Under way
LV	Under way	UK	Implemented

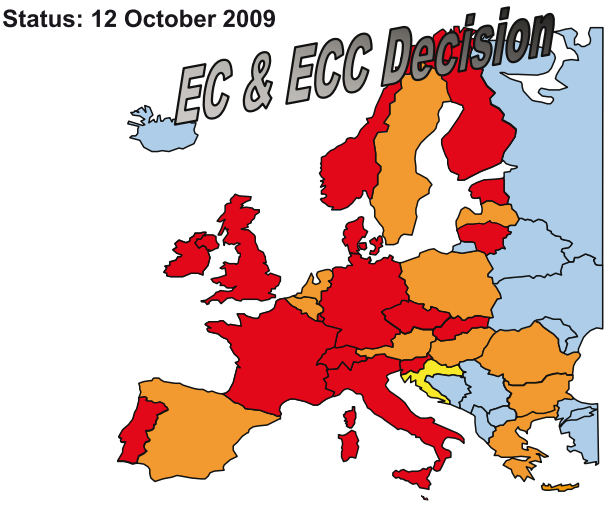


Figure 1: Status of the 5.9 GHz ITS spectrum allocation for Europe

SCORE-F: A French FOT for Road Co-operating Systems

(by Gérard Segarra, Renault SAS)

SCORE-F (Système COopératif Routier Expérimental Français, un système de communications pour des routes et des infrastructures intelligentes – France or French road co-operative system experiment) has been labeled by the two Competitive poles MOV'EO and System@tic of the Ile of France region (Paris area + 8 surrounding departments). It is now being assessed by the French Ministries in the scope of the FUI 9 call for proposal. If finally accepted, this project could start the first or second quarter of 2010 for a 30 months duration.

The consortium is a well balanced group of road co-operating systems stakeholders as it can be seen on the following figure 1.

This project led by Hitachi is mainly focusing on Road Safety and Traffic Efficiency Management taking into account the use cases which have been proposed by ETSI in its BSA (Basic Set of Applications). However, this project will also develop and demonstrate some Comfort use cases such as the

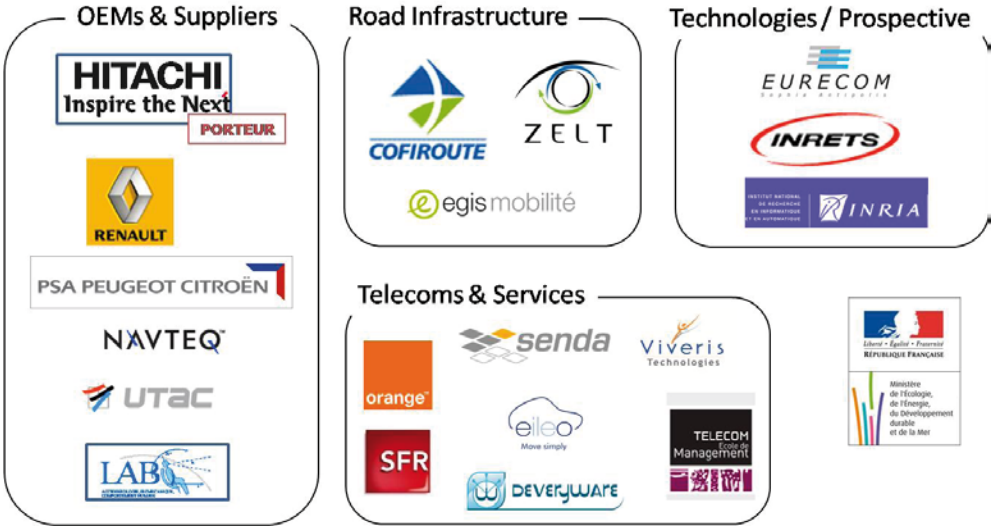


Figure 1: road co-operating systems stakeholders

SCORE-F: A French FOT for Road Co-operating Systems

(by Gérard Segarra, Renault SAS)

co-operative navigation and the Internet access. The technologies being used will be mainly the 5.9 GHz with for some use cases (to be defined) the use of 3G to compensate for the lack of a sufficient road infrastructure coverage.

This project has a proposed budget of 7 Million € with an expected support of 2.5 M€ from our French Ministries. In a first time the focus will be achieved on motorway (between Ile of France, the Normandy / Britany) with the co-operation of COFIROUTE. However, it is expected that the Ile of France Region and some of its departments be involved in the near future to develop Urban, Peri-Urban and Rural tests. So, initially about 50 vehicles and 20 RSUs are planed but this number can be greatly increased if the region and some departments become involved. Such involvement will also lead to some complementary financial supports.

ETSI / CEN emerging concepts and standards will be assessed in this French FOT. Their conformance testing and the certification process will be evaluated by UTAC.
Both, the Geonetworking and the IPv6 network protocols are part of the protocols stack which will be used.
System availability, security and dependability are also key elements which will be assessed and certainly will lead to some contributions.

Non technical elements such as the economical viability of some deployment scenarios, Partnership between Public and Private Partners, Organisation to put in place for the operational support of the system, legal aspect are also essential parts of the project.

As a conclusion, even if SCORE-F is certainly, currently, less ambitious than SIM-TD, it has now some good chance to be started and can be the basis of the French contribution in the achievement of the targeted DRIVE C2X European Field Operational Test on Road Co-operative Systems.

European ITS Communication Architecture Document – Current Status

(by Ilse Kulp, BMW Group)

When COMeSafety started in 2006, many European projects and activities were planned or already on their way dealing with different aspects of vehicle communications and cooperative road traffic systems. They have achieved a number of great results on various complementary issues. A European wide process was needed to consolidate these results and to support the projects to introduce these results into the European and world wide standardisation process.
In October last year, COMeSafety published the consolidated European ITS Communication Architecture Document (version 2.0), which was the result of the COMeSafety architecture task force group. Members of this task force mainly come from CVIS, COOPERS and SAFESPOT.

In 2009, PRE-DRIVE C2X joined the COMeSafety architecture task force and extended the document by the backend service integration view. In two workshops and many phone conferences, the COMeSafety architecture task force restructured the document and updated and improved the content. The next version of the consolidated European ITS Communication Architecture Document (version 3.0) is expected by the end of the year 2009 and will be published on the COMeSafety website (www.comesafety.org).

The European ITS Communication Architecture Document (version 2.5) refines and extends the system architecture by integrating the updated contents of the European ITS Communication Architecture Document (version 2.0), the PRE-DRIVE C2X deliverable D1.4 and content from the COMeSafety Architecture Task Force and describes the baseline for a European ITS communications architecture for cooperative systems. It has been developed within the scope of the EC funded specific support action COMeSafety.
Basis for the refinements was the European ITS Communication Architecture Document (version 2.0), which was evolved towards standardisation conformance by incorporating relevant standardisation efforts and guidelines for architecture descriptions. It has been developed as a joint effort together with the EC funded projects COOPERS, CVIS, PRE-DRIVE C2X and SAFESPOT and in cooperation with the CAR 2 CAR Communication Consortium, ETSI, IETF and ISO and with input from IEEE and SAE.
The European ITS Communication Architecture Document describes several architectural views, namely the ITS communication system component (see figure 1), the protocol stack view for ITS stations (see figure 2), the Vehicle-2-Business Communication integration view and the security view (see below).
The European ITS Communication Architecture Document (version 2.5) provides several important contributions to the system architecture, namely:

- IEEE 1471-2000 and ISO/IEC 42010 Compliance: In order to fulfil the guidelines of architectural system description, the document evolves and extends the COMeSafety system architecture towards compatibility with existing guidelines for system architecture description.
- Introduction of a Profile Concept: In order to support a flexible deployment of the ITS communications architecture, the document introduces a profile concept. Profiles enable a scalable and future-proof deployment of the system architecture, since they enable a gradual introduction of a system by implementing a sub-set of the overall functionality.
- Vehicle-2-Business Communication Integration View: the document comprises a Vehicle-2-Business Communication integration view, which integrates and customises the Vehicle-2-Business Communication infrastructure into the system architecture.
- Use Case Validation: Utilising the recent results of the use case selection process, the relevant use cases are examined with respect to their requirements. Based on these requirements, the system architecture is validated in order to ensure that the use cases are in conformance with the system architecture specification.

On the other side the Common Architecture Document (version 2.5) is also concerned with the security view on the overall ITS architecture, namely the mitigation of risks of malicious attacks that deteriorate the ITS functionality or threaten potential ITS business models realised. The document specifies a security architecture which is consistent with existing projects and standardisation efforts targeting secure ITS G5A communication. The most important provided contributions to the system security are:

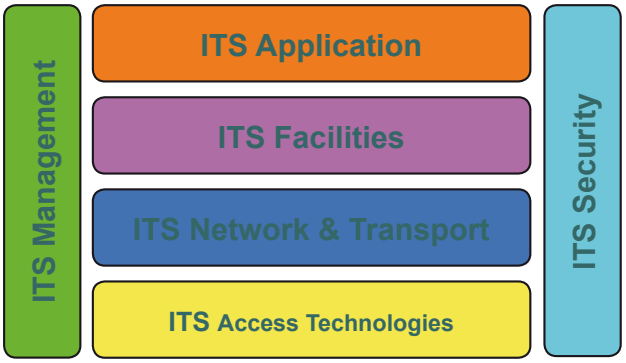


Figure 2: Reference Protocol Stack of an ITS Station

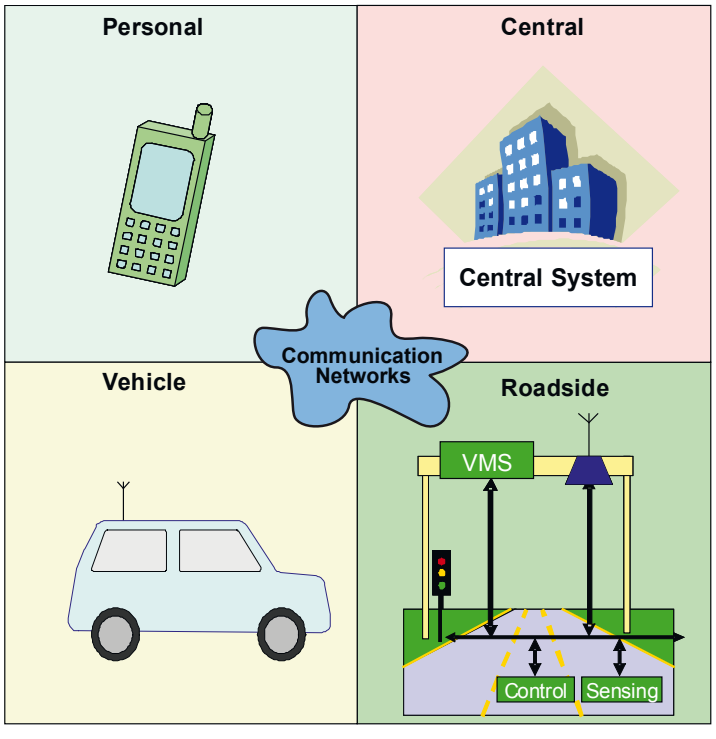


Figure 1: ITS communication system components

European ITS Communication Architecture Document – Current Status

(by Ilse Kulp, BMW Group)

- Secure communication deals with security related to the actual communication process. Security services can be used on any layer of the communication stack and will be provided through a layer-independent interface that creates generic secure messages. They can be configured to be insecure, signed or encrypted, and to also include mobility data that need particular protection for ITS G5A safety use cases.
- Identity management describes how identities and keys for their use in secure communications are managed. This includes a description and management of identities for vehicular communications.
- In-vehicle security stresses the necessary components within the vehicle, such as intrusion detection systems or firewalls, to create a trustworthy sender and protect in-vehicle systems.
- Privacy defines the components necessary for protecting the privacy of the users of the communication system.
- The administrative processes look at vehicular communications to ensure vehicle homologation, insurance updates, and in-field operation.

The development of a European ITS communications architecture for cooperative systems is of course an ongoing process. Thus the document is continuously adapted and updated. As COMeSafety is in its final year, there are discussions with the European Commission on the future responsibility of the maintenance of the European ITS Communication Architecture Document, which are not finished yet. COMeSafety will publish the result of the discussion on its website, which will be alive until mid 2011.

USDOT's IntelliDrive℠ Strategic Plan Aims for Deployment Readiness by 2013

(by Mike Schagrin, USDOT)

IntelliDrive℠ is a multimodal initiative of the U.S. Department of Transportation (USDOT) and its public and private sector partners. IntelliDriveSM applications are intended to provide networked wireless connectivity among vehicles; between vehicles and infrastructure; and among vehicles, infrastructure, and passengers' wireless devices. USDOT's theme for the future of ITS is wireless connectivity, and that is where USDOT will focus resources moving forward. Connectivity among vehicles enables crash prevention. Connectivity between vehicles and the infrastructure enables safety, mobility, and environmental benefits. Connectivity among vehicles, infrastructure, and wireless devices (for use by vehicle passengers or pedestrians) provides continuous real-time information to all system users.

USDOT has released an ITS Strategic Research Plan 2010-2014, which includes definition of the future research necessary to accelerate IntelliDriveSM development and implementation. The ITS Strategic Research Plan is the result of nearly a year's work by USDOT, and input from multiple stakeholder meetings. The key strategic challenges at this stage of IntelliDriveSM development include: (1) Resolving remaining technical challenges and testing and determining the actual benefits of applications; (2) Determining whether overall benefits are great enough to warrant deployment, and,

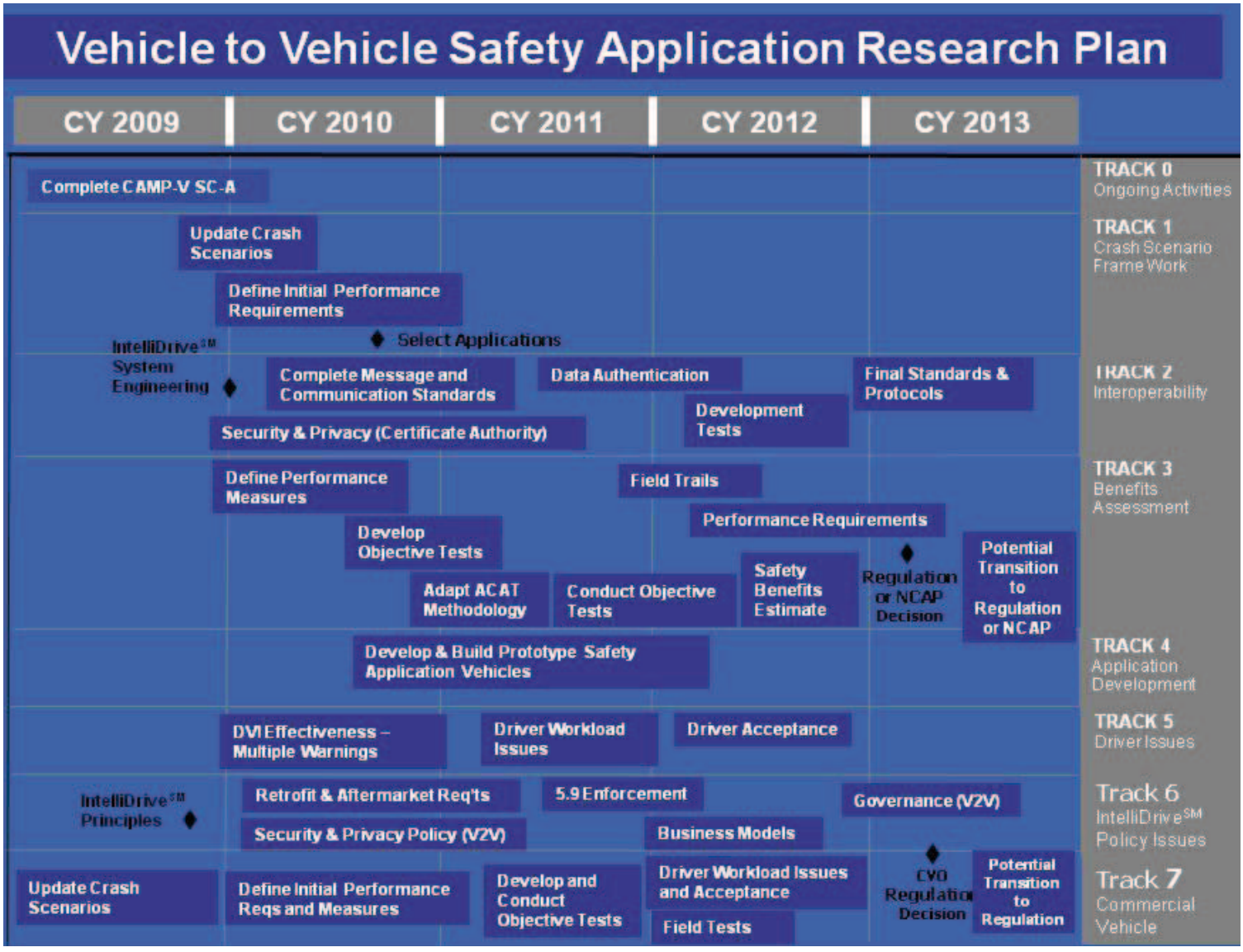


Figure - Draft V2V Roadmap

(by Mike Schagrin, USDOT)

if so, how the IntelliDriveSM systems would be deployed; (3) Addressing public acceptance issues such as user privacy, system effectiveness, safety, and ease of use; and (4) Understanding IntelliDriveSM infrastructure needs and developing strategies for addressing them.

Interoperability

One of the major thrusts of USDOT's ITS Strategic Plan is interoperability, which will be achieved through systems engineering, standards harmonization, and testing and certification. The systems engineering approach will focus on analyzing and eliciting stakeholder needs and required functionality; documenting requirements; and then proceeding with design synthesis and system validation, while considering the system life cycle. USDOT will foster development of consensus standards, supported by testing and certification programs where appropriate.

The USDOT Strategic Plan incorporates several component five-year research plans, which are in various stages of development: (1) the Vehicle-to-Vehicle (V2V) Research Plan; (2) the Vehicle-to-Infrastructure (V2I) Research Plan; (3)the Human Factors Research Plan; (4) the Mobility Research Plan; (5) the Environmental Research Plan; and (6) the Policy and Institutional Issues Research Plan. As these plans develop, information will be provided on the IntelliDriveSM website. For this article, the V2V, V2I, and Human Factors Plans are briefly described below. Also included is a description of International Collaboration Activities for cooperative safety.

V2V Five-Year Research Plan

The V2V Five-Year Research Plan is being developed based on input from the automotive industry, specialty equipment manufacturers, highway and transit agencies, commercial vehicle operators, and other stakeholders who provide comments to USDOT through workshops, written comments, and structured interviews with leaders of key stakeholder groups. The V2V research plan will identify the interrelated research activities needed to resolve technical and policy issues. The ultimate objective of the V2V plan is to support a 2013 decision point by USDOT's National Highway Transportation Safety Administration (NHTSA). NHTSA has set 2013 as its target date for deciding whether government regulations will be needed to speed deployment of potentially lifesaving technology and applications.

USDOT's research initiatives will include acceleration of in-vehicle safety technology. Slated for early development are enabling technologies such as "Here I Am" and "Heartbeat" messages. By incorporating this capability through retrofit and aftermarket devices, it is expected that the benefits of reduced crashes may be greatly accelerated. Since 2002, USDOT has been conducting research with automotive manufacturers to assess the feasibility of developing crash avoidance systems using vehicle-to-vehicle communications. Engineering prototypes have been developed and demonstrated with applications that address the most critical crash scenarios, which are:

- Emergency Brake Light Warning;
- Forward Collision Warning;
- Intersection Movement Assist;
- Blind Spot and Lane Change Warning;
- Do Not Pass Warning; and
- Control Loss Warning.

The development of these applications was critical to understanding the functional and performance requirements for the underlying technologies, such as positioning and communications. However, additional research is needed to address more complex crash scenarios for head-on collision avoidance, intersection collision avoidance, pedestrian crash warning, and prevention of motorcycle crashes. These capabilities could be achieved by providing V2V communication capabilities to complement other vehicle-based safety technologies.

The research plan currently consists of seven tracks that represent the major activities required to accelerate deployment of V2V-based safety systems: (1) Track 1 — Crash Scenario Framework; (2) Track 2 — Interoperability; (3)Track 3 — Benefits Assessment; (4) Track 4 — Application Development; (5) Track 5 — Driver Issues; (6) Track 6 — Policy Issues; Track 7 — Commercial Vehicles. Transit Safety applications will be incorporated into the next draft of the V2V Roadmap.

The Draft V2V Roadmap (below) depicts the key activities in each track over the five-year period.

V2I Research Plan

The IntelliDriveSM Vehicle-To-Infrastructure (V2I) for Safety Research Plan is currently under development by USDOT, with input from IntelliDriveSM stakeholders. The program will build on the results of the USDOT's Cooperative Intersection Collision Avoidance Systems (CICAS) and VII Proof of Concept research programs.

V2I technology development is focusing on prevention of crash types and crash scenarios that are associated with high fatality and injury rates, including: (1) Intersection crashes; (2) Roadway Departure crashes; (3) Speed-Related crashes; and (4) Commercial Vehicle crashes. There will also be non-crash safety elements in the plan for commercial vehicle operations and transit operations.

The technologies under investigation will provide a graduated spectrum of safety interfaces, including: (1) In-vehicle information and advisories; and (2) In-vehicle driver warnings of imminent crash scenarios.

USDOT also will sponsor research to foster early development of enabling infrastructure communications technology such as Signal Phase and Timing (SPaT), and on-road demonstrations for high-value applications. By enabling the generation of SPaT data, numerous applications are envisioned, not only for safety but also for mobility and environmental purposes.

Interfaces will be based on open standards for data and communications, including: (1) Dedicated Short Range Communications (DSRC)-based for time critical applications; (2) Open platform concept for non-time-critical applications.

Human Factors Research Plan

Driver distraction is a central concern. IntelliDriveSM applications that are provided to users in their vehicles must be designed so that drivers can use them safely. Toward that end, USDOT is launching a new research initiative on Human Factors for IntelliDrive.SM USDOT will work cooperatively with vehicle manufacturers and suppliers, fleet operators, the consumer electronics industry, and other stakeholders on this initiative. Stakeholders will help USDOT identify human factors requirements—such as information needs and usability issues—to help ensure that the results of the research program are publicly acceptable. The research program's scope will include assessment of the distraction potential and usability of systems in production vehicles and nomadic devices, including evaluation of longer-term exposure implications. An important goal is creation of an environment that allows nomadic systems to be functionally integrated with vehicle-based systems. USDOT will work with industry to determine how to develop voluntary implementation strategies that will encourage vehicle and equipment manufacturers to design interfaces with minimal demands on workload. Goals of the research program also include development of performance metrics for distraction mitigation.

International Collaboration

International collaboration is critical to the success of IntelliDrive.SM In January 2009, the European Union (EU) and United States took a very important step forward by signing an Implementing Arrangement to strengthen cooperation in ITS applications. Under this Implementing Arrangement, three meetings were organized this past year in Stockholm: A high-level meeting of the international delegates; a Steering Committee meeting; and a meeting of the joint ITS Technical Task Force, which was charged with developing strategies for meeting the objectives set by the Steering Committee. A key initial objective is international collaboration on research related to cooperative systems.

When the Technical Task Force met in September, 2009, it established the following as priority action areas: (1) standards harmonization; (2) applications; (3) testing; (4) driver distraction; and (5) terminology.

In the standards harmonization area, a near-term goal is for the European Commission and the USDOT Research and Innovative Technology Administration (RITA) to sign a joint statement of intent, including reference to welcome Japan and other countries in the Asia-Pacific region to join in future. Goals for 2010 include establishment of an international standards harmonization task force; conducting an inventory and assessment of current standardization work; and developing an action plan. Near-term tasks include establishment of a common working definition of harmonization; identification of a short list of priority standards for international harmonization; identifying standards development organizations for conducting the work; and identifying support mechanisms for expeditious balloting of standards.

In the applications area, two cooperative applications (one V2V, one V2I) will be selected for cooperative research. The goal will be to define technical solutions to common critical technology issues such as security, positioning, and/or communications.

In the testing area, initial goals are to share and leverage benefits estimation tools and Field Operational Test design structures. Establishment of a common data structure to promote data sharing opportunities related to benefits estimation is another action item.

Important goals related to driver distraction issues include establishment of common metrics, and data collection and sharing. Establishment of voluntary guidelines is a potential long-term goal.

In the terminology area, establishment of common working definitions for key terms and concepts is an important early step that will facilitate international collaboration.

Continued Stakeholder Involvement, Transparency and Information-Sharing

USDOT is committed to IntelliDriveSM and committed to ongoing collaboration with stakeholders through increased program transparency, information-sharing, stakeholder workshops, webinars, and other interactive opportunities. The USDOT-supported website at www.intellidrive.org provides opportunities to sign up for "Friends of IntelliDriveSM news alerts, and RSS Feeds.

For more information about USDOT's ITS Strategic Research Plan, see www.its.dot.gov/strat_plan/index.htm.

iTETRIS: The Integrated Wireless and Traffic Simulation Platform for Real-Time Road Traffic Management Solutions

(by Michele Rondinone, University Miguel Hernández of Elche)

iTETRIS is a 30 months (July 2008 – December 2010) EU FP7 funded research project involving 9 partners operating in different areas (ICT, Traffic Engineering, Traffic management) and belonging to 5 different countries.

Objective

Cooperative V2X communication systems are a possible supporting solution for an innovative, cheaper, safer and cleaner traffic management. The Field Operational Tests currently conduced within dedicated research activities are not the most suitable tool to study the effectiveness of such systems from a large-scale perspective. When considering traffic management, a vision involving more cars, wider areas and longer times is a must, since traffic decisions taken in a given location do generally affect road mobility in other areas. With the intention of filling this gap, *iTETRIS is implementing a European standard compliant, sustainable and open source platform combining traffic mobility and wireless communications simulation abilities to investigate the use of V2X technologies in cooperative traffic management strategies over large-scale scenarios.* Its capacity to investigate in these conditions the reactions that V2X exchange of messages implies on vehicles' routes and vice-versa will generate reliable, accurate and multidimensional results to fully examine the potential of ITS cooperative systems before massive deployments are realised.

Architecture

iTETRIS aims at building a standard compliant, interoperable, maintainable but, most of all, modular platform architecture. Autonomous and programming language-independent development of each architecture subsystem must be allowed as well as unconditional access for testing external traffic applications. To achieve this, a 3-Blocks architecture is adopted (see the figure). SUMO and ns-3 are two open source platforms, respectively for traffic and wireless simulation, which are integrated by a third block called iTETRIS Control System (iCS). Application algorithms supporting traffic strategies are independently implemented and run out of the platform, on the top of the iCS.

Triggered by Application commands, ns-3 simulates V2X transmissions in vehicular scenarios. Receptions deriving from these communication sessions are notified to the Application, which, in consequence, cooperatively manages the road traffic on the SUMO simulated network. As a result of this, SUMO continuously feeds the other blocks with vehicles' position updates, whose knowledge is essential for wireless simulations. As the central module in the architecture, the iCS facilitates the exchange of data between all the functional blocks and supports the simulation flow by control and synchronisation functions.

As shown in the figure, COMeSafety European ITS Communication Architecture is implemented in iTETRIS over the combination of ns-3 and iCS. Moreover, CALM prerogative to allow seamless V2X radio communications over different coexisting technologies is respected. The radio access technologies considered in iTETRIS are IEEE 802.11p (WAVE or European ITS-G5A), UMTS, IEEE 802.16 (WiMAX) and DVB-H.

Strategies

iTETRIS identifies and defines a set of practical solutions for both traffic condition estimation and traffic management strategies. To support them, the entire set of communication capabilities offered by the iTETRIS radio access technologies is exploited. The first class of strategies use dynamic V2X communications to monitor traffic situations and detect

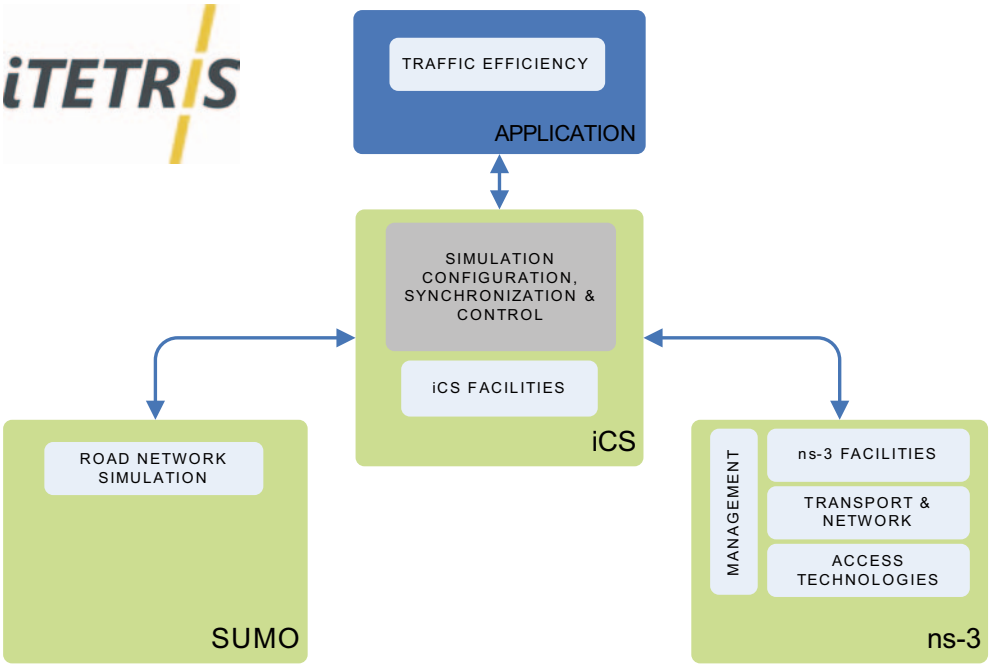


Figure 1 - COMeSafety European ITS Communication Architecture is implemented in iTETRIS

anomalous conditions in a more reactive, precise and efficient way. For example, in *"Distributed traffic jam detection"*, vehicles adopt ad hoc inter-vehicle communications to detect traffic congestions in a fully distributed fashion. In *"Centralised travel time estimation"*, on the contrary, communication infrastructure units use broadcast messages to request vehicles to compute travel times over certain road segments and to return these values via unicast transmissions. In addition, traffic management strategies employ cooperative V2X technologies to improve traffic conditions, completing the detection phase by reaction policies or rerouting information dissemination. *"Event based traffic condition notification"*, for example, concerns situations where vehicles are informed about a given traffic event through the use of suitable communication modes (broadcast messages from fixed stations, multi-hop georouting messages over vehicular communication systems, etc). Also, in *"Emergency vehicle"*, a V2I interactive exchange of messages is used to optimise the flow of emergency vehicles over their routes. For the sake of completeness, the following table lists the main strategies considered in iTETRIS.

Scenarios

iTETRIS strategies will be evaluated over four scenarios reproducing existing locations and common traffic situations identified on the city of Bologna (Italy). The scenarios concern areas of different size and capacity, ranging from urban streets to secondary roads and motorways resolution. The analysed traffic features and behaviors are easily applicable to other European cities. For example, the scenario *"Pasubio/A. Costa"* represents a district containing the city stadium and thereby is fit to emulate increase of traffic flows due to particular events at the stadium. The traffic management of such situations will be made by exploiting local alternative routes which in turn may affect the traffic on adjacent parts of the road network. Another traffic scenario is the *"Orbital/highway"*. Since orbital road and highway run parallel to each other, vehicles driving on one of the two can be suggested to switch on the other one to avoid high traffic loads. The effects that local traffic decisions imply on other zones can be analysed in this scenario in the same way as in *"Pasubio/A. Costa"*, but here over areas of much larger dimension. The remaining *"Open Market Fair/Irnerio"* and *"Ring way/Irnerio"* scenarios involve the ring way surrounding the city center, and a shortcut road connecting two points of the ring. These two scenarios only differ in terms of anomalous traffic situations which can occur. In particular, they are suitable to implement strategies to compensate malfunctioning of the deployed induction loop detectors, to control the traffic lights, to compute optimal routes to connect two points or to analyse rerouting solutions based on traffic conditions notifications.

More information about iTETRIS can be found on the project website: www.ict-itetris.eu.

Traffic Condition Estimation	S1: Traffic Jam detection
	S2: Travel Time Estimation
Traffic Management	S3: Bus Lane Management
	S4: Limited Access Warning
	S5: Request Based Personalised Navigation
	S6: Regulatory and Contextual Speed Information
	S7: Emergency Vehicle
	S8: Event Based Traffic Condition Notification

Figure 2 - Main strategies considered in iTETRIS

VICS – connecting the car navigation to real world

(by Takaaki Sugiura, Mitsubishi Research Institute)

In Japan, VICS (Vehicle Information and Communication System) center has been established in 1995 and VICS center started VICS service in April 1996..
VICS provides real time road traffic information for car navigation systems. Next, the data format of VICS will not only be used for road traffic information but also for safety information within the Smartway project.

1. VICS – history and expansion

VICS started in April, 1996 in Japan and has been providing real time traffic information for more than 13 years. VICS provides the information by the three media FM sub-carrier, infrared beacons and 2.4GHz radio beacons.
Nowadays , almost all car navigation systems sold in Japan are equipped with FM sub-carrier receivers.
Since the start of VICS in 1996, more than 25 million car navigation systems equipped with VICS receivers have been sold in Japan. On the Japanese market VICS has already become one of the standards for car navigation systems.

2. Real time traffic information in car navigation systems

VICS real time traffic information is provided by three bodies which are prefecture police agencies, highway road operator companies and the Ministry of Land, Infrastructure, Transport and Tourism as road administrator. All the traffic information gathered by these bodies are merged by Japan Road Traffic Information Center (JARTIC) and sent to VICS.
VICS center is the organisation established for providing real time traffic information via data transmission specification called 'DARC' (Data Radio Channel), 2.4GHz radio beacons and infrared beacons.

If the vehicle is in scope of an infrared- or 2.4GHz radio beacon the system receives information about travel time and the following junctions to calculate the fastest route under consideration of the real time traffic conditions. The system informs the driver about traffic information within the surrounding area of the current car position by means of simplified figures that indicates traffic condition and travel time (fig. 1).

3. Close Collaboration with manufacturers of car navigation systems and the Smartway project

VICS center developed the data format specifications in collaboration with most of the Japanese car navigation manufacturers. The result is that most of the manufacturers are able to develop car navigation systems corresponding to the VICS format easily.
Within the Smartway project the VICS format is also used for safety information and for corresponding field operational tests ongoing in Tokyo, Osaka and major metropolitan areas in Japan. These field operational tests are promoted by the Japanese Ministry of Land, Infrastructure, Transport and Tourism.

Most of the Smartway road driver information services use the VICS format. For example, the safety service that provides obstacle information at the Sangubashi curve on the Shinjuku Metropolitan Expressway route 4 uses VICS format to display the traffic situation on the navigation system's display.
Due to the usage of the VICS format the upcoming implementation of the Smartway services in Japan's public transport will be easily done.
For further information please visit:
www.vics.or.jp/english/vics/index.html

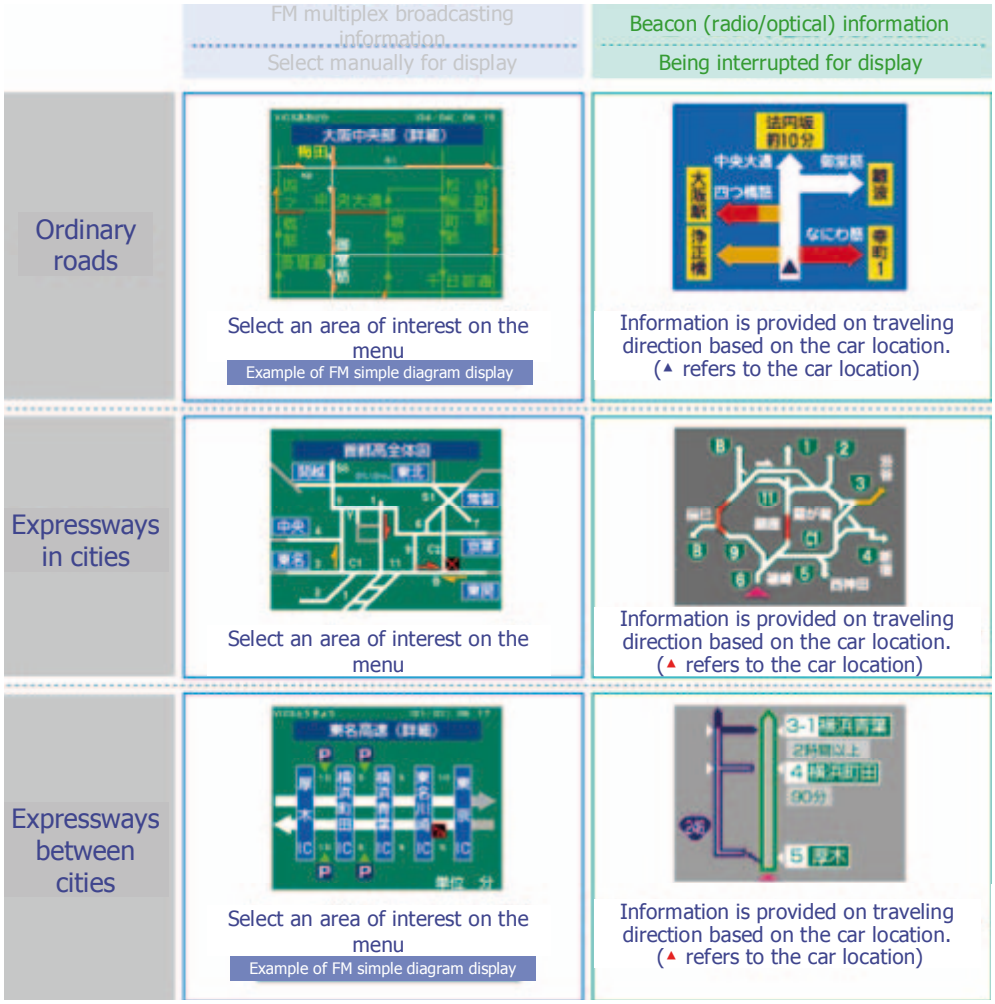


Fig. 1 - Examples of simplified figures provided by VICS | Source: VICS center

Imprint

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COMeSafety will provide a CD containing all relevant documents and results of the project. In addition, a public report will be available soon, which summarises the results of COMeSafety. Moreover, the COMeSafety website will be alive until mid of 2011. Thus all relevant information remains accessible by then.
For more information, please, contact Karl-Oskar Proskawetz, ITS Niedersachsen GmbH.

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