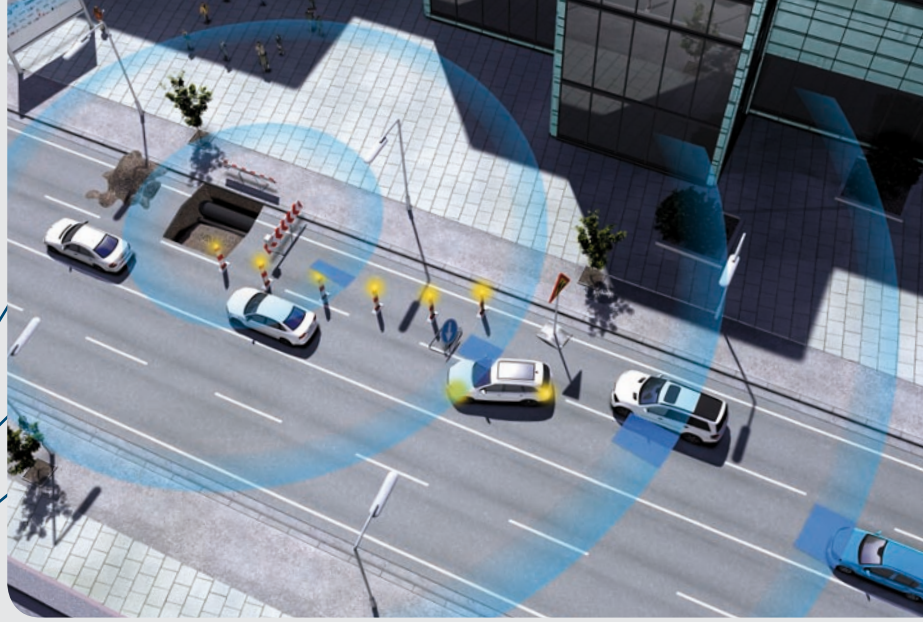
CAR 2 CAR -Newsletter-

Issue 4 / May 2009



CAR 2 CAR COMMUNICATION CONSORTIUM

In the fourth issue:

Editorial

by Soeren Hess

The CAR 2 CAR Communication Consortium is a key player in the European and world wide development of cooperative Intelligent Transport Systems. This unique industry organisation is highly respected for the active promotion of the technical as well as commercial development of ITS. For a number of years the C2C-CC has been working closely together with the European Research & Development projects in securing the technical basis for the ITS technology with Car-2-Car Communication but also roadside and infrastructure support in order to create cooperative communication systems to improve road safety in Europe.

It is clear that cooperative Intelligent Transport Systems with driver assistance will strongly contribute to the European Commission policy goals to reduce the currently more than 40.000 road fatalities and more than 2 million accidents on roads every year in Europe.

We are now in a phase where standardisation both European and world wide is needed to ensure interoperability in the development and deployment of cooperative ITS Systems and thus transform research and scenarios into live systems on the roads in Europe. The CAR 2 CAR Communication Consortium has decided to actively support standardisation activities within the ETSI Technical Committee ITS that was established beginning 2008 to ensure that the strong ETSI standardisation expertise be focused also on ITS standardisation.

Another important activity to achieve the goals of ITS on the roads is the field operational tests which are being developed all over Europe and the development of a technical and business roadmap towards a deployment strategy for ITS in Europe.

The need for closer cooperation with the standardisation activities is further underlined by the appointment of me as the new General Manager of the CAR 2 CAR Communication Consortium. I am already chairing the ETIS TC ITS and will be able to further increase the cooperation and influence of the C2C-CC in the ETSI standardisation as well as the regulatory activities for a harmonised implementation.

The regulatory activities for ITS are increasing both European and worldwide. We have seen a number of European Commission initiatives with

a Commission Communication underlining the commission policy goals for ITS and a detailed ITS action plan. This includes a Standardisation Mandate to the European Standardisation Organisations including ETSI and a draft European Commission Directive for implementation and deployment of ITS in Europe.
We are also seeing coordination of initiatives between research projects as well as standardisation organisations worldwide where the C2C-CC should also play a strong role.
The CAR 2 CAR Communication Consortium is prepared to meet the challenges towards development and deployment of cooperative ITS in Europe. We have recently adjusted the organisation to ensure focus on standardisation, test and simulations, architecture, application requirements, security and communication as well as the development of a roadmap for deployment strategies both technical and business related.
The CAR 2 CAR Communication Consortium will continue to be a key player to bring cooperative Intelligent Transport Systems on the roads in Europe to the benefit of all European citizens.
I look forward to work with all the members of the CAR 2 CAR Communication Consortium.

Membership News:

CAR 2 CAR Communication Consortium Forum & Demonstration 2008

by Gunnar Heyms (GZVB)

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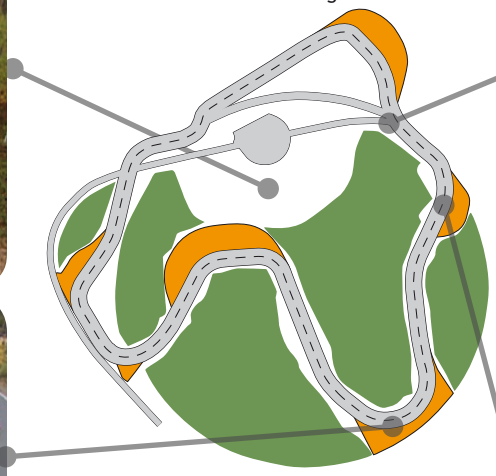
In the course of its second international Forum on the 22nd and 23rd of October the CAR 2 CAR Communication Consortium, in short C2C-CC, demonstrated manufacturer spanning applications of the C2X Communication system independent of vehicle-type to more than 250 participants from all over the world for the first time ever.



With driving demonstrations on a circuit at the test center of the Adam Opel GmbH (fig. 1) cars, trucks and motorbikes of the manufacturers involved exemplified traffic situations where the C2X Communication system can particularly assist efficiently the driver. All registered participants had the opportunity to experience the advancement of active safety technologies in four use cases shown on the demo track.

Approaching Motorcycle Warning

The first use case demonstrated a critical situation with a car and a motorcycle on an intersection. European in-depth motorcycle accident analyses highlights that human error, and more specifically not seeing the motorcycle coming or misinterpreting distance and speed is the primary cause of accidents involving motorcycles. On the demo track the motorcycle is riding on the main road while a car is approaching the intersection from the right-hand side. Due to a view obstruction of a parking truck the car driver is unable to see the approaching motorcycle. When driving onto the intersection, the car driver receives a warning of the approaching motorcycle. The rider also receives a warning on its HMI

Warning of Roadworks

Construction sites and temporary maintenance working areas are accident black spots, because static traffic signs are ignored or realised too late.
The second use case on the test drive demonstrated the possibility of infrastructure-2-vehicle communication. A roadside unit within a construction vehicle provides information about a construction zone to vehicles by broadcasting messages in the vicinity of the dangerous location. This warns the driver about dangerous spots and informs about location and duration of the roadwork.

Warning lights on

The third use case demonstrated the danger emanating from a car stopped on the roadside directly behind a bend. Two mechanisms are used to provide other vehicles information about this event. The first provides information to its periodically broadcasted Cooperative Awareness Message which is sent to all vehicles in the close vicinity. The second sends out a Decentralised Environmental Notification Message. This information is distributed between all communicating vehicles in a larger region and provides early information to the communication partners.

Approaching Emergency Vehicle

The fourth use case on the circuit demonstrated the vantages of Emergency-Vehicle-2-CAR communication. The Approaching Emergency Vehicle Warning – Car-2-Car System uses information provided in the Cooperative Awareness Message of the Emergency Vehicle (EV) to help the driver on how to clear the road for the emergency vehicle even when the siren and light bar may not yet be audible or visible. On the other hand the cars on the test track will be advised precisely and in time by the HMI to stop at the road side and let the EV pass by.

Membership News:

CAR 2 CAR Communication Consortium Forum & Demonstration 2008

by Gunnar Heyms (GZVB)

The CAR 2 CAR Forum

Figure 1: lectures and workgroups

In lectures and workgroups the participants of the meeting collectively discussed and elaborated the future of C2X Communication systems (fig. 1).

The world premier of manufacturer spanning C2X Applications was supported technically by ETSI (European Telecommunications Standards Institute) who evaluated the specifications and documents used during the demonstrations in relation to their potential for future use in standardisation.

Via WLAN radio contact the C2X Communication system interlinks cars and the street infrastructure and, thus, informs the car driver immediately and in time on potentially dangerous road traffic situations. By use of this system it is possible to avoid accidents or reduce their impacts particularly at tail ends of traffic jams, scenes of an accident or with smooth roadway surfaces. To offer the C2X Communication system all over Europe and, thus, entirely tap its full potential two preconditions must be met: A jointly shared technological base of operations and a uniform radio frequency. With the 5.9 GHz European frequency band for C2X Communication applications which has recently been activated - as previously in the USA or Japan - a major milestone regarding standardisation has been achieved. Within the C2C-CC the manufacturers Audi, BMW Group, Daimler, Fiat, Honda, Opel, Renault, Volvo Truck and Volkswagen have joined forces with hardware and software suppliers as well as research institutes. This consortium aims at developing and testing a radio system which is compatible all over Europe. Furthermore, together with ETSI the consortium develops a European norm for manufacturer spanning and vehicle-type independent C2X Communication systems. Therefore, the consortium runs a series of projects which are funded both by national and European agencies: As an example, technological development is supported by COMeSafety. To verify the systems under real conditions PRE-DRIVE C2X and SIM-TD (Safe Intelligent Mobility – Testfield Germany) have been initiated.

Membership News:

Changeover of the General Manager

by Karl-Oskar Proskawetz (GZVB)

With turn of the year the function of the General Manager of the CAR 2 CAR Communication Consortium changed over from Rudolf Mietzner (Cirquent GmbH) to Soeren Hess (Hess Consult).

Rudolf Mietzner started as General Manager in October 2005. During his term of office the C2C-CC Agreement was revised and the membership of the consortium did grow from 14 members up to 9 Partners, 10 Associate Members and 16 Development Members of today. For opening the consortium the Basic Membership was introduced and the first CAR 2 CAR Forum organised at Audi in 2007 followed by the second CAR 2 CAR Forum with Demonstrations at Opel last year. Closely cooperating with the COMeSafety project the consortium succeeded in allocating a 30 MHz European frequency band at 5.9 GHz and in initiating European standardisation for Intelligent Transport Systems at ETSI as European standardisation body. As consequence of this success the mission, objectives and mandates of the CAR 2 CAR Communication Consortium are currently revised and the Steering Committee decided to appoint Soeren Hess as new General Manager to ensure a close link and cooperation with ETSI TC ITS in future.

The Steering Committee cordially thanks Mr. Mietzner for his engagement in positioning the consortium and pushing the standardisation work forward during the past more than three years and looks forward for successful development and release of an open European standard

and associated validation process for cooperative Intelligent Transport Systems with focus on inter-vehicle-communication systems in close cooperation with ETSI TC ITS during the next years.

Workgroup Application: Cooperation with ETSI TC ITS WG 1

by Cornelius Menig (AUDI)

The Working group Application (WG APP) and the ETSI TC ITS WG 1 (WG 1) have agreed to cooperate regarding the standardisation of vehicle to vehicle and vehicle to infrastructure communication. Both meeting dates and topics have been synchronised. The cooperation is bidirectional. On the one hand, Working Group Application invites European, national and international projects and organisations like Safespot, CVIS, SIM-TD, PIARC to present and discuss their ideas to certain topics within the WG APP meeting. The results of the discussions are collected and delivered to WG 1 as input for Workitems addressing certain topics. On the other hand, ideas and results of WG 1 are sent to WG APP for discussion and comments. Exchange between both Working Groups is enabled and enriched through members participating in both meetings. This year's topics involve standardisation of Cooperative Awareness Messages, Decentralised Environmental Notification Message (both messages for Vehicle to X and Infrastructure to Vehicle), selecting basic applications and use cases and working on operational and functional requirements.

Workgroup Architecture

by Markus Straßberger (BMW)

The Working Group Architecture strengthened its activity to review and refine the ongoing European efforts with respect to a common overall architecture for intelligent transportations systems. Thereby, one of the key aspects is a common architecture document driven in the context of COMeSaftey, which forms the basis for the process of a common European standardisation within ETSI TC ITS WG 2.The WG Architecture is actively taking part in this consolidation process. Therefore, the mission statement of the working group has been refined, now emphasizing the importance of an active role of the working group within a concerted European standardisation process. For that reason, close bidirectional cooperation with ETSI TC ITS WG 2 is being established. The discussed topics as well as the overall roadmap shall be synchronised with WG 2. WG Arch will provide a lively platform, where stakeholders from different projects and organisations are invited to discuss their views and ideas together with the C2C-CC part-

ners, thus speeding up the progress of a consolidated view on certain topics. The respective results in turn will be delivered as inputs and comments to COMeSafety and WG 2 for further standardisation.
During the last joint workshop of COMeSafety and PREDRIVE CAR2X that has taken place at in Munich at March 12th, several topics with respect to the overall architecture of intelligent transportation systems have been identified that need to be discussed and specified in more detail. For that reason, a number of teams have been formed whose task is – in the beginning – to ensure the harmonisation of the respective chapter between COMeSafety and PRE-DRIVE C2X, as well as the harmonisation with other projects (represented by respective participants). In particular, the following teams have been set up: Facilities Management, Security, Networking, Access Technologies, Applications, Backend Services, Frame / Requirements and ITS Operational Support Center. The working group architecture is kindly invited to and will support those teams and take part in their discussions.

Workgroup PHY/MAC and WG NET joined

by Achim Brakemeier (Daimler)

Since 2006 there have been no separate meetings of the working groups PHY/MAC and NET. Now the two working groups have officially joined to form the new working group WG COM (COMmunication system). The organisation of the work has been reorganised as well. Task forces are formed on an ad hoc basis to investigate relevant topics, e.g. for active support of the work at ETSI TC ITS, especially the ETSI work items. Such a task force is e.g. the task force "Transmit Power Control" whereas TPC is directly linked to all activities regarding congestion control.

Workgroup Phy/Mac: Transmit Power Control

by Jérôme Härri (University of Karlsruhe)

Following the European commission's decision to allocate a 30MHz wireless spectrum for vehicular communication at the 5 GHz range, three 10MHz channels-one low latency control channel (CCH) and two service channels (SCH)-have been proposed by the C2C-CC which must now define efficient communication policies to ensure a proper usage of this spectrum. It is not only important to mitigate the impact of communication policies on adjacent channels (co-channel or even out-of-band interferences) but also the interferences generated by transmissions on the same channel which contribute to its global congestion.
Mitigating potential interferences generated on a wireless channel is called wireless channel con-

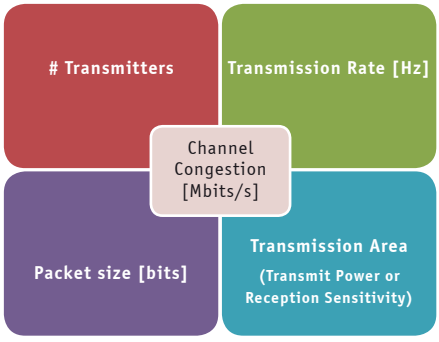


Figure 1: Levers controlling the channel congestion

gestion control. As illustrated by Figure 1, channel congestions are mainly influenced by four levers: the number of transmitters, the transmission rate in hertz, the packet size in bits and the transmission area (which is jointly controlled by the transmit power in dBm (or watts) and the receiver sensitivity in dBm (or watts)).

Transmit Power Control (TPC) is probably one of the mostly important lever among the others as it is able to determine the extent of the geographical area under the influence of the transmitted bits. It is therefore important to control the transmit power such that a sufficient number of neighbors are reached without congesting the channel and ensuring a fair and efficient channel access to all other communicating nodes notably for transmitting critical low latency emergency messages.
In order to adjust the congestion of a wireless channel, we need to define a metric representing this congestion. One possible metric is called the "Channel Load", which precise definition has not been standardised but globally defines the number of bits/sec that are sensed by a node, thus which contributes to the channel load as seen by this node.
Considering the general picture where multiple transmissions on different channels are mutually influencing the "per-channel" load, the ETSI WG4 recommends in a TS draft related to the description of multichannel usage to limit the load to 25% on the control channel (CCH) and to 40% on each of the two service channels (SCH) of the operational bandwidth defined by the IEEE 802.11p. Such threshold is expected to act as a network design limitation minimising the interferences and optimising the probability of reception on each channel. Concretely, considering a 25% channel load limitation on the CCH and a 6 Mbits/s bandwidth, a 1.5 Mbits/s channel load on the CCH should therefore be enforced.
The major consequence of such threshold is an analysis requirement of its impact on the channels communication policies. If the channel load limitation is large enough for any situation, it will not be a limiting factor. But if it is not, the consequences on the transmit power, the transmit rate or packet size in different traffic situations need to be identified.

Level of Service	Density (vehicles/km/lane)	Average Speed (km/h)	
A	0-7	100.0	free flow conditions
B	7-11	100.0	reasonable free flow
C	11-16	98.4	reasonable free flow
D	16-22	91.5	stable traffic operation
E	22-25	88	unstable traffic

Figure 2: Highway Capacity Manual 2000, Transportation Research Board

Figure 2 and Figure 3 illustrate such analysis. Figure 2 represents a benchmark for traffic densities that is then used to compute the respective channel load considering a packet size of 400 bytes, a transmission rate of 10Hz and different transmit powers. As it can be seen on Figure 3, only the lowest density and transmit power together manage to reach the 25% limitation on the CCH, and even if the limitation was at a higher value, such as 50%, only the green values would satisfy the threshold. Considering that the benchmark provided in Figure 2 unfortunately represents an optimistic traffic density, the investigation and standardisation of efficient transmit power control mechanisms are necessary.
Moreover, by observing the values in Figure 3 and independently of a particular threshold, selecting a specific transmit power for all vehicles may not comply with the threshold in all conditions. It is therefore important to design transmit power control algorithms that dynamically adapt the transmit power as a function of the channel load. (Figure 3).
Without loss of generality, we assume that a TPC algorithm sets all transmit policies except the transmit power that is adjusted to respect the channel load metric. If it is high, then the algorithm increases the power, while when it is low, it decreases it. The lever to adjust the trans-

Workgroup Phy/Mac: Transmit Power Control

by Jérôme Härri (University of Karlsruhe)

mit power is the available power steps provided by the hardware. In theory, the more power steps an algorithm can use, the most precise will be the adjustment to the optimal channel load. In practice, this also depends on the operating power range of these power steps, their granularities or even the tolerated power variance (the error), all of them being different for each hardware vendor.

The objective of standardisation notably at the C2C-CC or at the ETSI is to provide efficient inter-operable TPC solutions independently of the hardware. It is accordingly important that a particular power step means the same transmit power or coverage range for all hardware or that a minimal number of power steps is available by all hardware for the proper functioning of the standardised TPC solutions.

Density (vehicles/km/lane)	Transmission Power			
	20 dBm	15 dBm	10 dBm	5 dBm
25	10.18 Mbps	7.64 Mbps	5.73 Mbps	3.46 Mbps
22	8.95 Mbps	6.72 Mbps	5.04 Mbps	3.04 Mbps
16	6.51 Mbps	4.89 Mbps	3.67 Mbps	2.21 Mbps
11	4.48 Mbps	3.36 Mbps	2.52 Mbps	1.52 Mbps
7	2.85 Mbps	2.14 Mbps	1.60 Mbps	0.97 Mbps

Figure 3: Expected Channel Load considering message sizes of 400 bytes, a 6 lanes highway and a 10Hz transmission rate

To this objective and understanding the significant role to be played by the different hardware vendors in the C2C-CC, the WG PHY/MAC created a Task Force for Transmit Power Control (TF-TPC) which is charted to provide a document standardising values for the metrics required by TPC algorithms and supported by all hardware vendors (maximum/minimum EIRP power, number of steps, carrier sense threshold, etc…). The objective of such document is to represent a basic information database for the design of collaborative transmit power strategies.

The approach currently followed by the task force is to evaluate basic knowledge such as the relationship between the transmit power at the chip and a typical communication range, or the real output EIRP power at the antenna for each configured transmit power step. It therefore needs to assess the various hardware capabilities taking part in power control such as antenna gain or cable/connector losses.

Considering that the transmit power process between IEEE 802.11p compliant chips and the effective output power contains a complex hardware chain which OEMs would like to freely choose or adjust, standardising each component of the chain might be seen as a serious constraint by the OEMs and hardware vendors. The TF therefore aims at standardising only a minimal set of metrics for a sufficient inter-operability between communicating vehicles, yet at the same time providing enough integration liberty to the OEMs (chip and antenna type, position, cable type and capabilities, etc.).

The Task Force met at a consolidation meeting in February at the University of Karlsruhe and reported at the WG PHY/MAC meeting in EURECOM, France in March. Action items have been identified and will be conducted by the TF for the generation of the standardisation document. It is expected that based on this document and also on the work of the WGs SIM and APP, the performance of the different transmit power control solutions proposed by the members of the C2C-CC could eventually be simulatively or experimentally evaluated before being standardised.

Workgroup Simulation: Preparation of the kick off meeting

by Michael Lemke (DLR)

In preparation of the kick off meeting of the Working Group Simulation a set up meeting has been held in August 2008 based on the CAR 2 CAR Communication Consortiums Technical Committee to focus and direct the near term goals for this group.

At this meeting simulation has been identified as being a crucial element of the development chain between prototype, hardware test, field operational test and market. As such is has to cover distinguished areas like signal propagation, message distribution, driver and vehicle behaviour, ADAS functionality, application functionality and influences on traffic systems. Simulation has to cover macroscopic behaviour in traffic simulation, microscopic behaviour in motion simulation, and physical effects in physical simulation. Covering such a comprehensive field simulation has to take into account different levels of detail in the models. Furthermore, reference scenarios and respective test cases have to be defined and models and components have to be integrated across the other working groups. Comparable rules and measures for simulations are the prerequisites for a seamless development chain from prototype to market. It was stated, that also scenarios for testing purposes have to be defined. To achieve this in an efficient manner, scenarios from other working groups have to be collected and integrated in the WG Simulation. Crucial factors and procedures for the setup of simulations for future investigations must be found.

To achieve their applicability simulations and models have to be verified and validated: Rules for these processes have to be established. The process of certification also concerns the simulations in two respects: Simulations have to be in the first place "certified" to allow their comparability and seamless integration into the development chain. Simulations could in the second place be an element of the certification process of future applications prior to field operational tests.

In the set up meeting two questionnaires have been issued to cover the following questions:

Experiences with simulations: Questions regarding the experiences with simulations

Tasks for simulations: Tasks to be investigated via simulation

One major topic of the kick off meeting was to define short term and long term tasks of the WG Simulation. Further on these tasks have to be prioritised and assigned to the appropriate members of the working group. To achieve this, special areas of interest and experience of the members of the WG Simulation were collected.

Workgroup Demo: Short note

by Soeren Hess (CAR 2 CAR)

Following the successful C2C-CC Forum and Demonstration event October 2008 ETSI has developed a Technical Report with detailed description of Use Cases demonstrated and the corresponding technical specification of the demonstrator system covering all communication layers.

The ETSI report was adopted by ETSI TC ITS at its meeting 24 April 2009 and will be published by ETSI (www.etsi.org) within the next month.

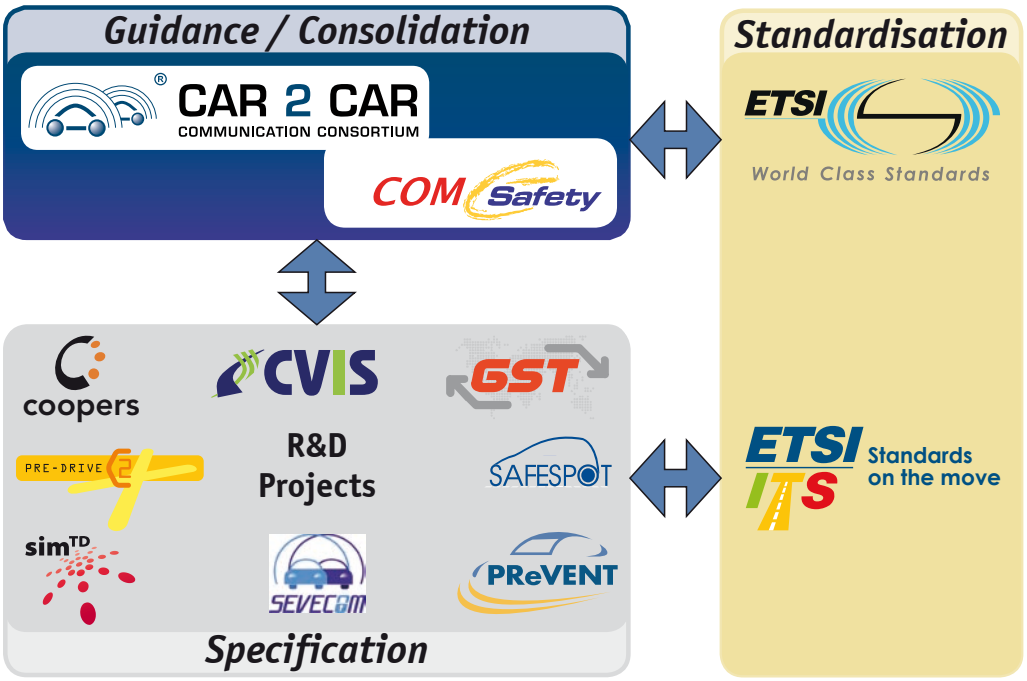
The technical report will contribute to the future standardisation of ITS for the selected use cases – the definition of basic set of application support facilities and specification of basic settings of the underlying communication layers (Physical layer - Transport layer) including communication security.

Standardisation Coordinator (former WG STA)

by Dieter Seeberger (Daimler)

In its second year of existence the ETSI TC ITS is well established and the C2C-CC is actively supporting the standardisation in this committee. Several members of the C2C-CC are also members of ETSI and hold official positions in the TC ITS, which are the TC chairman, 2 WG chairmen and 70 % of the rapporteuers for the work items on C2X Communications. Also the other members of the C2C-CC support the standardisation work when they consult their ETSI colleagues in the WGs and via participation in projects, which as well provide input to the ETSI work.

The following figure shows the collaboration of the C2C-CC with ETSI.



The main specification work is done in the projects funded by the EC. With regard to their description of work they directly provide their results to the relevant ETSI working groups. Other results are provided to the COMeSafety project, which as a specific support activity is mandated to support the consolidation of project results towards standardisation. All partners of COMeSafety are members of the C2C-CC, where also consolidation of results from the projects and from the C2C-CC WGs takes place. The cooperation with the projects happens through personal involvement of C2C-CC partners in the projects and as well on basis of official liaisons. Authorised by its membership structure and in line with its mission the C2C-CC has also the role to provide guidance.

In order to provide in good time a set of standards for testing and validation it is agreed in ETSI TC ITS to follow a two step approach towards the complete set of standards for C2X Communications. In a first step the standards should meet the requirements of a basic set of applications. An enthusiastic schedule of the work considers the finalisation of this step by the end of 2009. In the second step the set of standards should be extended and completed with consideration of the requirements of all applications.

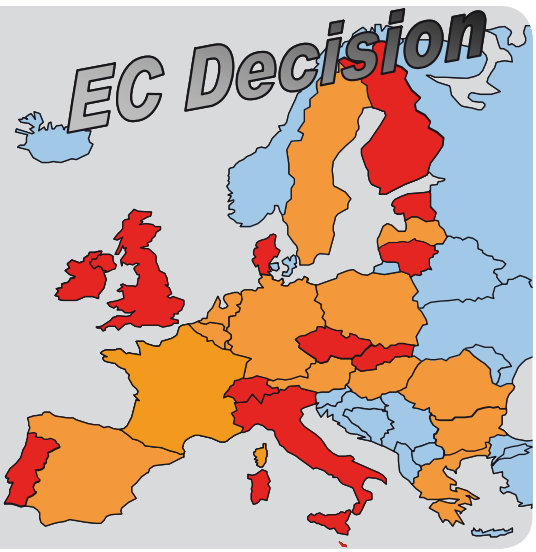
The report on the basic set of applications was recently finalised and is now ready for approval in the TC. Another fundamental work is the still ongoing specification of the ITS communications architecture. Significant input for this is coming from the European projects Safespot, CVIS and Coopers coordinated by COMeSafety and as well from the Europen project PRE-DRIVE C2X, which among other objectives is preparing a European field trial for a C2X System. The approval of the ITS communications architecture is planed for October this year. Beside this most essential work there are 20 other active work items for the C2x Communication system at ETSI and for almost all of them first drafts are under way.

The demonstration during our Forum in 2008 was done in cooperation with Interopolis, the ETSI centre for testing. In the meantime a complete documentation of the demonstration from the use case description up to the technical system specification is prepared as ETSI Technical Report: TR 102 698 Intelligent Transport Systems (ITS); Vehicular Communications; C2C-CC Demonstrator 2008; Use Cases and Technical Specifications. This report was approved during the last ETSI TC ITS meeting in April and will soon be available on the ETSI portal for download.

Spectrum Allocation

The European Commission Decision on the spectrum for ITS safety applications in the range from 5.875 – 5.905 GHz requested the spectrum designation from the member states of the European Union until mid February 2009. The following figure shows the status of the decision implementation in the mid of March. There is some delay caused by national procedures, which e.g. in Germany requires a new entry in the frequency usage plan including a phase of public commenting.

MS	Status	MS	Status
BE	Under way	LU	Under way
BG	Under way	HU	Under way
CZ	Implemented	MT	Implemented
DK	Implemented	NL	Under way
DE	Under way	AT	Under way
EE	Implemented	PL	Under way
IE	Implemented	PT	Implemented
EL	Under way	RO	Under way
ES	Under way	SI	Under way
FR	Under way	SK	Implemented
IT	Implemented	FI	Implemented
CY	Implemented	SE	Under way
LV	Under way	UK	Implemented
LT	Implemented		



RSCOM Meeting 18 March 2009

Workgroup Security: Demonstrating Security

by Matthias Gerlach (FOKUS - Fraunhofer)

Demonstrating Security – Security in the CAR 2 CAR Demo in Dudenhofen

Cooperative applications considered by the CAR 2 CAR Communication Consortium will improve road traffic safety and passenger safety. Information security is an enabling technology which provides mechanisms against malicious attacks, e.g. injecting false information. In order to protect the users' privacy, respective privacy preserving mechanisms are provided by the CAR 2 CAR CC System.

The CAR 2 CAR Consortium security solution provides measures to ensure authenticity and trustworthiness of data, legitimacy of nodes and privacy protection mechanisms in order to prevent misuse and corruption of the system and information. Without trustworthy data, Car-2-Car Applications will fail to provide reliable services; system decisions, such as displaying a local danger warning to the drivers requires the trustworthiness of the provided information. Applications, such as the provisioning of information by an approaching emergency vehicle, require dedicated permissions in order to authorise special vehicles. Finally, applications which require periodic broadcast of location data, must not enable anyone to derive your whereabouts – location privacy is an important objective of the security solution. As part of the Demonstration Event 2008 in Dudenhofen, a security solution has been developed and integrated by the C2C-CC Security WG which demonstrates some of the aspects of security from C2C-CC.

The security demonstration included a certificate-based solution based on existing standards and project results for showing the legitimacy of an emergency vehicle in use. In addition, simulations were shown to demonstrate algorithms to ensure location privacy of vehicles using the C2C-CC System. Exemplarily, different attack scenarios were shown at the security booth.

All cooperative awareness messages exchanged in the demo passed through the security services module provided by the CAR 2 CAR Security WG. For outgoing messages of emergency vehicles, the security services added the credentials proving their legitimacy. Receiving nodes used the security services to check the legitimacy of the emergency vehicle and dropped messages from attackers without the correct credentials.

The security services are based on the IEEE 1609.2 draft standard for security in the vehicular environment and included security mechanisms developed in the SeVeCom project. The software module was developed in C++ available under an open source license and provided a Java and C++ API for easy access to use the security services. As currently proposed by the C2C-CC for securing Car-2-Car Communication, the security services use Elliptic Curve Cryptography. As cryptographic API, OpenSSL was used. Integration with the existing cooperative awareness applications was as easy as including a function call to the security API. Credentials and security parameters were pre-distributed to all vehicles.

First modules of the C2C-CC security concepts have been successfully deployed within all vehicles at the CAR 2 CAR Forum. Future work will need to extend the implemented security solution with further security services, such as cross layer issues, scalable pseudonym management, efficient implementations of Elliptic Curve Cryptography and hardware-based trust anchors. This work has been and will be accomplished in close collaboration with projects, such as the European funded projects SeVeCom (www.sevecom.org), EVITA (www.evita-project.org) and PRE-DRIVE C2X (www.pre-drive-c2x.eu) as well as with a link to the "Fraunhofer Innovationscluster Sichere Identität Berlin Brandenburg". In collaboration with these and other projects, the security and privacy solutions will be further developed.

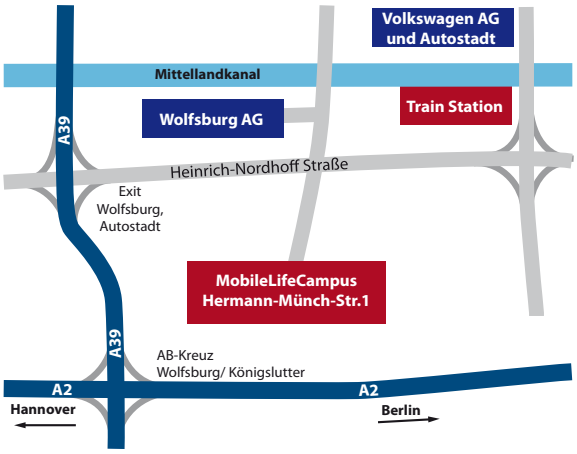
In addition, the C2CC-CC WG Security is in close collaboration with the ETSI TC ITS WG5 working on the standardisation of security and privacy preserving mechanisms.

Announcement: CAR 2 CAR Forum 2009, 03rd-04th November 2009

by Gunnar Heyms (GZVB)

This year's CAR 2 CAR Forum will take place on the 3rd and 4th November 2009 at the Volkswagen, MobileLifeCampus in Wolfsburg, Germany. This will be the third event of the annually Forum for all active and basic members to provide and discuss the latest news of the CAR 2 CAR Communication Consortium. The highly interesting plenary sessions given during the CAR 2 CAR Forum will be complemented by presentations of projects related to the CAR 2 CAR Communication Consortium. Please check the CAR 2 CAR website for further information betimes:
www.car-2-car.org/index.php?id=156

As every year the registration for this year's Form is also mandatory. A web registration facility will be prepared within the next weeks. As a member of the CAR 2 CAR Communication Consortium you will receive an e-mail with a call for participation and all relevant information.



Approaching Motorcycle Warning Use Case

by Filip Sergeys (Honda)

One of the four use cases presented and demonstrated at the first CAR 2 CAR Demonstration in Dudenhofen focused on the motorcycle. Motorcycles are for many people across Europe, even worldwide, and across all layers of society an important means of transport and leisure. Their lower weight and smaller size than many other road vehicles provides them with an enhanced agility in traffic and a certain mobility benefit in dense traffic. The downside of the medal is a higher vulnerability in traffic and higher accident involvement. This is mainly due to human error (of both drivers and riders), and the lack of passive safety features like crumble zones and airbags.

The CAR 2 CAR Communication Consortium (C2C-CC) aims to cover as many vehicle types as possible, representative to what can be observed in a real traffic environment. Consequently and in an effort to enhance motorcycle safety, the Approaching Motorcycles Warning Use Case was initiated within the C2C-CC, to the benefit of motorcycle riders, car drivers and society at large. All C2C-CC member companies actively contributed to the successful and fully interoperable implementation of this challenging use case. Three motorcycles –provided by the two motorcycle members BMW and Honda- were used for the demonstration, offering an attractive mix of a commuter scooter, a sporty motorcycle and a luxurious cruiser. Two static motorcycles in the tent allowed for a more extensive explanation of the use case and the HMI with the support of experts.

The Approaching Motorcycle Warning Use Case – for which Honda was designated as use case leader - is based on European In-Depth Accident data, which reveals that 33% of accidents involving a motorcycle take place at an intersection. Here, 19% are accidents with perpendicular paths of the

colliding vehicles and 9% are left-turn accidents where the other vehicle cuts the path of the oncoming motorcycle. The scenario for the CAR 2 CAR Demonstration focused on the first accident configuration, with the motorcycle riding on the priority road, while another vehicle suddenly emerges from a side street.

Both vehicles approaching the intersection broadcast and receive the CAM message. This Cooperative Awareness Message allows the receiving vehicle to monitor the position, driving direction and dynamics of other surrounding vehicles, even if the drivers can not yet see each other, or unintentionally fail to see each other. Both the driver and the rider receive a timely warning of a potential danger when approaching the intersection, allowing them to take remedial action. As the CAM contains an identifier for "motorcycle", the other vehicle can generate a "motorcycle warning" when the Car-2-Car System determines a certain risk of collision.

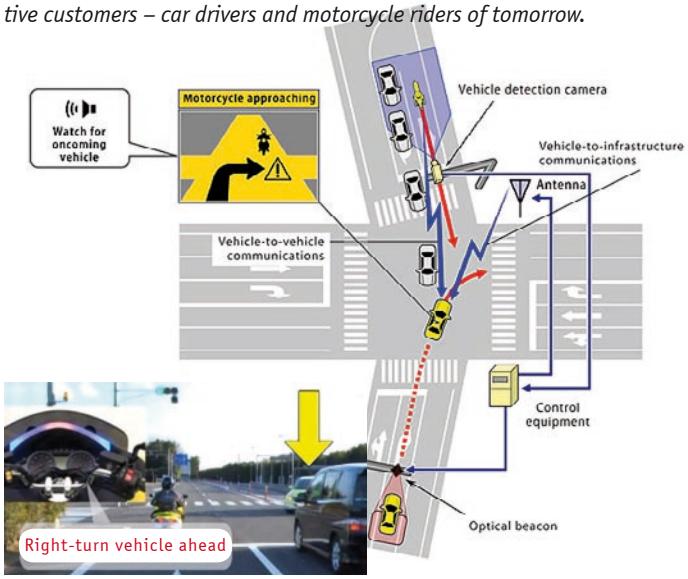
The HMI – ensuring a proper communication between the ego-vehicle and his driver – is a pivotal element in the overall effectiveness of any safety system and thus also V2X system. The C2C-CC members have applied a varied range of HMI concepts and technologies at the demonstration. For the Approaching Motorcycle Use case, the HMI could for example make use of visual warnings in the dashboard, and by acoustic warnings in the helmet. Because of the vulnerability of the rider and the stability of the motorcycle, it is even more important than for the car to ensure that safety-critical warnings be provided in the least distractive possible way, ensuring that the rider keeps his eyes on the road.

Visitors to the Forum and Demonstration were offered the possibility of a passenger ride on two motorcycles, in order to experience the use case from the motorcycle-rider perspective. Around 30 visitors enjoyed the ride, returning with a large smile. A total of 9 motorcycle journalists originating from Austria, Belgium, Germany and the Netherlands experienced the use case and released articles in the subsequent weeks in the paper press and on internet.

These Motorcycle concepts have also been presented to the Motorcycle Industry in Europe at the 5th ACEM conference "Shaping the future" which took place in Brussels in 2008.

After the successful CAR 2 CAR Demonstration in Dudenhofen, the second most occurring intersection accident configuration of oncoming vehicles was demonstrated at the Safety 2010 event in Tokyo in February 2009. While the motorcycle and car communicate directly with each other, the vehicles additionally receive more accurate positional information of oncoming vehicles by means of a Road Side Unit.

The next challenge beyond the demonstration is to further standardise the motorcycle use case and to include it in longer term Field Operational Tests. These activities would not only allow the Approaching Motorcycle Warning Use Case to advance towards potential market introduction, but also ensure that it becomes part of an attractive mix of use cases offered by the C2C-CC members for enhanced comfort and safety towards prospective customers – car drivers and motorcycle riders of tomorrow.



Shaping ITS standardisation for a realistic industrial use

by Gérard Segarra (Renault)

It is world wide recognised that active road safety and traffic efficiency management can take a huge profit from road co-operative systems deployment. However, it is also admitted that the customer / societal values will not be immediately visible and so require reaching some deployment threshold before perceiving them.

Currently, at Western Europe level we can consider that we could have at the 2012 horizon, about 250 Million vehicles in service with a replacement rate of about 15 million each year. This means that to start to obtain some benefits of road co-operative systems, we need to get between 5 to 10 % of these vehicles being equipped. Deploying 12 to 25 million of equipped vehicles will take a certain number of years according to a committed deployment strategy.

In such context, the only possible economical approach for involved stakeholders is to combine some medium term valuable societal services (road safety and traffic efficient management) with some short term commercially profitable customer services so constituting what has been called by ETSI a "Basic Set of Applications (BSA)". Such BSA shall of course be based on commercially available, off the shelf technologies. These technologies shall meet the active road safety performance requirements while staying at reasonable cost for our customers.

On this basis, the ETSI TC ITS WG1 has been conducting some ETSI internal inquiry and external consultations of some well established European projects such as CVIS, SAFESPOT and PRE-DRIVE C2X to select the use cases which can constitute the building blocks of the BSA. The C2C-CC application working group (WG APP) has also been providing its vision of what should be the BSA.

The result of this task is now provided and will be available in the ETSI Technical Report TR 102 638 which will likely be published in June 2009 after some editorial polishing.

32 use cases have been retained. As many of these use cases are presenting some important commonalities, these use cases have been regrouped into 7 applications constituting the BSA (see the following table which summarises the BSA). These applications have been themselves regrouped in 4 application classes which can be easily integrated in the three high level categories proposed by the COMeSafety ITS Station architecture model. The next step will be now to analyse the generic functional and operating requirements of these application classes and applications, as well as the specific requirements of each use case.

Functional requirements will allow us to verify that the proposed facilities layer functions which are supporting the applications are relevant to them.

Operating requirements will provide some Quality of Service and performances which shall be guaranteed by the complete ITS system through the co-operation of distributed ITS stations.

More particularly, the BSA will be used by the WG1 to identify the data to be provided by the Co-operative Awareness Messages (CAMs) generated as well as by Vehicles ITS Stations as by Road Side Units ITS Stations for services announcement.

By defining a realistic, short term, Basic Set of Applications, we expect also to have the possibility to contribute to the whole ITS system and station management as this BSA is constituted of various applications running in parallel and presenting a diversity of functional and operating requirements.

APPLICATION CLASSES	APPLICATIONS	USE CASES
Co-operative road safety	Driving assistance – Co-operative awareness	Emergency vehicle warning
		Slow vehicle indication
		Intersection collision warning
		Motorcycle approaching indication
	Driving assistance – Road Hazard Warning	Emergency brake lights
		Wrong way driving
		Stationary vehicle - accident
		Stationary vehicle – vehicle problem
		Traffic condition warning
		Signal violation warning
		Roadwork warning
		Collision risk warning
		Decentralised floating car data – Hazardous location
		Decentralised floating car data - Precipitations
		Decentralised floating car data – Road adhesion
		Decentralised floating car data – Visibility
		Decentralised floating car data – Wind
Co-operative traffic management	Co-operative speed management	Regulatory / contextual speed limits notification
		Greenlight optimal speed advisory
	Co-operative navigation	Traffic information and recommended itinerary
		Enhanced route guidance and navigation
		Limited access and detour notification
		In-vehicle signage
Co-operative local services	Co-operative location based services	Point of Interest notification
		Automatic access control and parking management
		ITS local electronic commerce
		Media downloading
Global Internet services	Communities services	Insurance and financial services
		Fleet management
		Parking zone management for freight vehicle fleet
	Vehicle life cycle management	Vehicle software / data provisioning and update
		Vehicle and RSU data calibration

In this basic set of application, the following observations have to be made:

- *The applications and associated use cases have been regrouped into classes of applications according to their main contribution. However, some applications can also provide some contribution to other classes. For example, the Road hazard Warning application will also contribute to co-operative traffic management if the broadcasted events are collected by some road side units and uploaded to some traffic management system which may exploit them to regulate the traffic.*
- *The co-operative local services class considers only local communications which do not require access to a global network.*
- *The global internet service class can also, of course, be supported by other access technologies different than Wireless LAN. However, an econom-*

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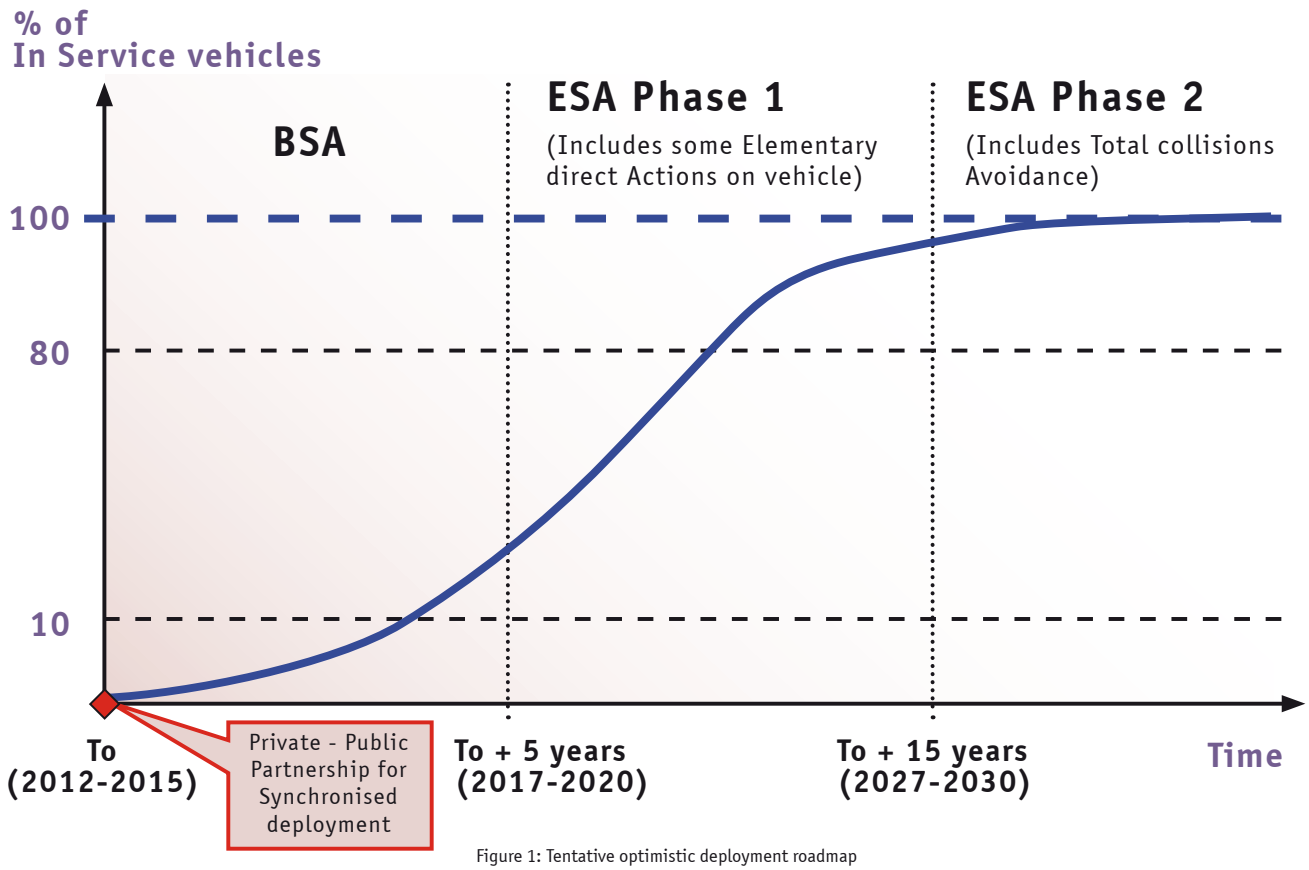

Figure 1: Tentative optimistic deployment roadmap

ical issue has to be considered for societal services and low range / entry game vehicles which sales' prices have to be optimised (digital divide issue). For some use cases, the cell network offered throughput will not be sufficient (e.g. the digital map downloading).

- *Communities' services addressing a generic application which can be covering various needs of users' communities. Examples of users' communities are:*
  - *Professional communities*
  - *Users belonging to an insurance / financial community,*
  - *An OEMs community,*
  - *Users belonging to a city community,*
  - *…etc.*

A user community may access a community blog through internet but may also benefit from some local services such as for example accessing some car sharing, car pooling facilities or getting some parking, fuel…etc. discount.

One important goal of the ETSI TC ITS is to produce standards which can be quickly applied by the industry to solve societal problem and enable the development of a viable business.
Consequently, it is expected that the BSA be deployable according to the tentative optimistic roadmap such as presented on the following figure 1 below. As some of the BSA use cases will not be providing some societal / customer value before reaching some minimum threshold (e.g. 5 to 10% of in-service vehicles), it is important that some other uses cases provide a short term societal / customer value.
An important issue is still the achievement of Private- Public Partnership to synchronise the deployment of vehicle embedded ITS systems with the deployment of an interoperable suitable ITS road infrastructure.
Once the ITS deployment reaches a consistent level, some other use cases and applications can bring some new societal / customer values.
As a conclusion, the BSA shall be the first focus for developing relevant standards and their associated conformance testing procedures. Then some Enhanced Set of Applications (ESA) can be defined to improve road safety, traffic efficiency while maintaining a positive business model for involved stakeholders.
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