CAR 2 CAR -Newsletter-

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CAR 2 CAR
COMMUNICATION CONSORTIUM

In Issue 21

Take the CAR 2 CAR Forum as opportunity to get informed about latest C-ITS developments

by Dr. Karl-Oskar Proskawetz, Administrator of the CAR 2 CAR Communication Consortium

The past 12 months have been characterised by several important changes laying the foundation for the successful future work of the CAR 2 CAR Communication Consortium. The new Consortium Agreement became effective on 1st January 2018. In a next step, the migration of the Technical Organisation following a matrix structure has been initiated. The Competence Groups represent the skills and expertise of the Consortium. Three Working Groups take care for the functional and technical R&D issues as well as for all issues related to deployment and operation of C-ITS. Work items outline the multiple activities of the Technical Organisation and link the Working Groups to the Competence Groups.

Furthermore, the CAR 2 CAR Weeks have been established for supporting and improving the work flow of the Technical Organisation. Three CAR 2 CAR Weeks have been organised within 2018 and the processes have been improved step by step. For 2019, four CAR 2 CAR Weeks are planned, and at this point, I would like to thank the Consortium members for hosting a CAR 2 CAR Week. For receiving more detailed information on the planning for 2019, active members are encouraged to attend the General Assembly on 20 November 2018 during the CAR 2 CAR Forum.

In September 2018 the new CAR 2 CAR website has been launched. The redesign reflects the dynamic changes within the Consortium. In a next step, the tools supporting the work flow of CAR 2 CAR members will be revised. With the new website, the subscription service has been introduced complementing basic and active membership. A table shows the main services offered by the three options and related application forms can be easily accessed.

In 2018, the Technical Organisation has spent a lot of work on issues focusing on spectrum, hybrid communication and next generation of media access, roadmap, use cases and security. With respect to C-ITS deployment the latest version of the Basic System Profile 1.3.0 could be published by end of September. You should take the opportunity to participate in the oncoming CAR 2 CAR Forum on 20 and 21 November at Lelystad for networking and getting informed about the latest C-ITS developments and R&D activities towards cooperative automated driving, involving also further domains like agriculture and addressing specific modes of transport like trucks or vulnerable road users.

CONSORTIUM NEWS

New CAR 2 CAR Members
by Sonja Eickmann, CAR 2 CAR Communication Consortium

BRIGHTSIGHT

Type of Member: Associate Member

Type of Business: Brightsight is the world's largest independent security evaluation lab. The portfolio of Brightsight covers consultancy services, training and unique analysis tools. A precise preparation for the comprehensive product approval process is guaranteed. Brightsight is the only lab in the world accredited by five Common Criteria Schemes.

Infineon

Type of Member: Associate Member

Type of Business: Infineon Technologies AG is a world leader in semiconductor solutions that make life easier, safer and greener. Infineon designs, develops, manufactures and markets a broad range of semiconductors and system solutions focused on automotive electronics, industrial electronics, communication and information technologies, and hardware-based security. Infineon produces and refines its microelectronics in 35 R&D locations as well as 17 manufacturing locations around the globe.

Neusoft

Type of Member: Associate Member

Type of Business: Neusoft Technology Solutions GmbH is part of Neusoft Corporation, the largest IT software and service provider in China. Together with Neusoft Reach (a joint venture with Alpine, founded in 2015), they are an innovation oriented high-tech enterprise, focusing on mobile connectivity, artificial intelligence and application of sustainable energy technologies in automotive industry. Neusoft products comprise of connected-car solutions, driver assistance systems, world-wide car-navigation and map databases respectively, battery modules and charging systems for e-mobility and cloud services.

Oppida

Type of Member: Associate Member

Type of Business: Oppida provides expertise, evaluation and consulting services in the field of Information Systems Security (SSI) for administrations and private organisations. Oppida supports security, risk and project managers with a. o. developing security approaches, risk analysis, drafting security files, implementing information security management systems, security audits, intrusion tests, source code audits, and evaluating security products.

New CAR 2 CAR Members
by Sonja Eickmann, CAR 2 CAR Communication Consortium

AEF Agricultural Industry Electronics Foundation
Type of Member: Development Member
Type of Business: The objective of AEF, currently formed by eight manufacturers and three associations as core members and 200 general members, is to improve cross-manufacturer compatibility of electronic and electric components in agricultural equipment, to implement international electronics standards and to establish transparency about compatibility issues.

DeustoTech, Deusto Institute of Technology
Type of Member: Development Member
Type of Business: DeustoTech is the centre for transfer and research into new technologies of the Deusto Foundation - University of Deusto whose mission is to support, through research, the development of new technologies, innovation and the transfer of knowledge, the ICT activity of the social and business fabric. The activity of DeustoTech is articulated in four sectorial axes: Intelligent Industry, Sustainable Mobility, Energy & Environment, and Challenges of Society, having a fifth axis, the Applied Mathematics Chair, as a transversal activity and fundamental support to the four previous ones.

Technische Universität Ilmenau
Type of Member: Development Member
Type of Business: The TU Ilmenau represents a nearly 125 years old tradition in engineering sciences. Technologies, economies, and media form the pillars of today's research and education for about 6.300 students, offering a variety of German and international Bachelor, Master, and Diploma programs. The research is arranged in interdisciplinary priority areas, with one focus on mobile and wireless systems. It enjoys world-wide reputation and a third-party funding among the top third of German universitites.

Technical Organisation adapted: Competence groups, working groups and task forces

by Dr. Karl-Oskar Proskawetz, CAR 2 CAR Communication Consortium

In 2017, the CAR 2 CAR Communication Consortium discussed to adapt the Technical Organisation for meeting future needs on research, deployment and operation of C-ITS. During the CAR 2 CAR Weeks organised in 2018, the Consortium migrated the Technical Organisation and adjusted the processes step-by-step, based on the lessons learned. In the present article, the Technical Organisation and its transparent processes are briefly outlined. The Annexes of the C2C-CC Agreement have been revised for describing the organisation, rules and procedures in detail. The documents will be published after having been released by the Steering Committee.

The Technical Organisation is supposed to contribute to the scope of the Consortium and its objectives. It is formed by the Competence Groups, three Working Groups and related Taskforces working on released work items.

Competence Groups

The Competence Groups allow the experts of the active C2C-CC members to assign themselves to fields of interest and skills. The Technical Organisation might request updating the Competence Groups from time to time. Each Competence Group might have sub-groups focusing on specific areas. The Competence Groups or their sub-groups might be led by chairs driving and moderating the initiatives. All appointed chairs of the Technical Organisation have to be confirmed by the Steering Committee.

Working Groups

The Working Groups represent the two tracks of the Technical Organisation focusing on implementation and operation as well as on research and development for enabling future innovations.
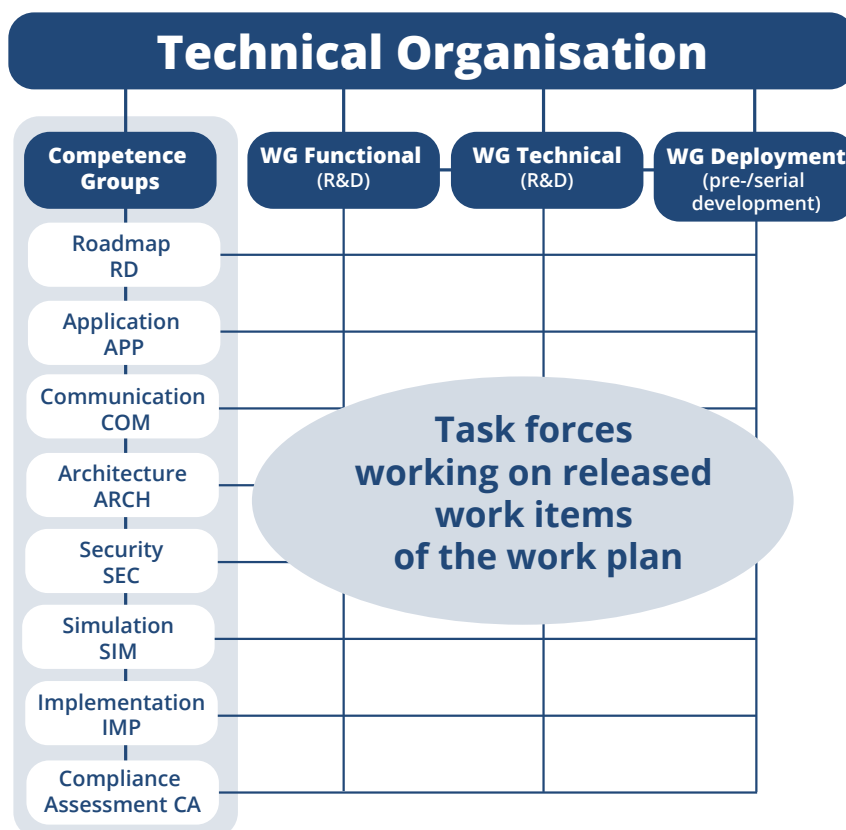
WG DEPLOYMENT is focusing on pre-deployment and serial issues of C-ITS, and considers also operational aspects. The established transparent document and release management processes are also driven by this Working Group. Currently, WG DEPLOYMENT focuses on the initial C-ITS deployment starting next year during 2019.

The research topics of C-ITS are clustered into functional and technical aspects covered by the two Working Groups *WG FUNCTIONAL* and *WG TECHNICAL*. The R&D Working Groups maintain the C2C-CC Roadmaps and are responsible for required research, development, testing and standardisation of future C-ITS innovations. Both R&D Working Groups cooperate closely with WG DEPLOYMENT for addressing issues related to the next C-ITS implementation phase.

Work Items

Competence Groups as well as Working Groups may draft a new Work Item outlining a specific contribution to the Consortium objectives. The Work Items shall be discussed between the relevant Competence and Working Groups. A chair for driving the activities as well as some first experts of the active C2C-CC members as supporters are required for setting-up the described Work Item.

► next page

Technical Organisation

Competence Groups	WG Functional (R&D)	WG Technical (R&D)	WG Deployment (pre-/serial development)
Roadmap RD			
Application APP			
Communication COM			
Architecture ARCH			
Security SEC			
Simulation SIM			
Implementation IMP			
Compliance Assessment CA			

Task forces working on released work items of the work plan

► *Continuation*

In a next step, the proposed Work Item shall be approved by the Technical Organisation in the final plenary meeting of the oncoming CAR 2 CAR Week. After approval by the Technical Organisation, the Steering Committee is requested to adopt the proposed Work Item which is then established and added to the Work Plan of the Consortium. For enabling the acitivities on the Work Item, a Taskforce is setup by the indicated chair and supporting experts. Furthermore, all experts of the Technical Organisation are invited to support the established Work Items of interest and may request to be added to the e-mail distribution list of the related Taskforce.

Task forces

The Taskforces link the Competence Groups with the Working Groups. As a result, the three Working Groups consist of the Taskforces and their experts. The Working Groups monitor the progress made on the Work Items based on the reports of the taskforce chairs. In case the work of a Taskforce has been finalised, the Working Group shall request to close the related Work Item and to terminate the Taskforce during the final closing plenary meeting of the oncoming CAR 2 CAR Week.

All experts of the active C2C-CC members are invited to support the outlined Technical Organisation and its processes, and to contribute to the Work Items. The Technical Organisation is cosidered a living lab providing feedback and lessons learned continuously. Based on the experiences, all experts are encouraged to make and discuss suggestions for improving the processes during the final closing plenary meetings of the Technical Organisation.

China Government MIT Delegation Workshop with C2C-CC experts

by Dr. Karl-Oskar Proskawetz, CAR 2 CAR Communication Consortium

On 24 October 2018, a China government MIT delegation of 25 experts met at Siemens Mobility in Munich with experts of the CAR 2 CAR Communication Consortium to discuss status and developments of V2X communication. Volkswagen, Renault and Siemens highlighted the ongoing preparation of the ETSI ITS G5 deployment in Europe starting 2019 based on IEEE 802.11p, and outlined next development steps planned. Siemens showed a live demonstration of realised V2I use cases at the Siemens campus. MIT and CAICT members provided a detailed overview on the C-V2X status and developments in China. The open-minded discussion encouraged all participants to consider further information exchange and opportunities for future cooperation.

The joint meeting of the C2C-CC experts with the China government delegation on 24 October 2018 was hosted by Siemens Mobility at Munich. As host, Philipp Hahn welcomed all participants and gave an overview on Siemens' worldwide engagement in ITS and the product portfolio. He emphasised that ATM/V2X builds the basis for complementing services in the areas of Fleet Management and Intermodal Mobility.

The CAR 2 CAR Communication Consortium General Manager Niels Andersen welcomed the participants on behalf of the C2C-CC. In his presentation, he outlined the political and spectrum framework conditions in Europe and highlighted the C2C-CC roadmap showing functionalities of initial deployment and further required functionalities towards cooperative automated driving. He highlighted the need of interoperability and backwards compatibility of C-ITS for building the future services on initial and already deployed functionalities as vehicles and especially infrastructure might be operated 10 to more than 30 years. Especially in Europe challenges arise from privacy goals conflicting with the goals on improving road safety by C-ITS. Finally, he addressed the spectrum situation in the 3.4-3.8 GHz, 5.9 GHz and 63-64 GHz frequency bands and outlined the C2C-CC activities in this area.

Teodor Buburuzan, VW, motivated WLANp communication being integral part of the vehicle safety strategy at Volkswagen. He highlighted the added value of V2X for active safety and addressed some measures for overcoming the hen – egg problem of initial deployment of day one services. On road side, C-Roads pilots ITS G5 infrastructure in 16 European member states aiming on interoperable operation across borders and brands. Looking to the evolution strategy of V2X, he pointed out that the first two phases will be based on IEEE 802.11p while the later phases might use the next generation of communication means. Road operators and vehicle manufacturers are going to deploy V2X starting 2019 to improve further traffic safety.

Christine Tissot, Renault, outlined the alliance and global presence of Renault – Nissan – Mitsubishi Motors. Future mobility is driven by three areas: electric vehicles, connected vehicles and autonomous driving. ITS G5 is seen as additional sensor improving the situational awareness and gains awareness worldwide. She outlined the pre-deployment project SCOOP and its main objectives. Already build up Infrastructure and vehicles form the initial starting point for the oncoming ITS G5 operation. The common hybrid platform integrates ITS G5 and cellular communication allowing to deploy day one service in large scale in geographical areas of mature markets. Design and testing of enhanced C-ITS services prepares the next phase for complementing the initial services.

Franz Schober, Siemens, highlighted that the Siemens portfolio addresses a vision of smart mobility and transport covering all means of transport. He further outlined the cooperative connected traffic management system and its enhancements towards automated driving. The Car2X solutions support cooperative vehicles and future cooperative automated driving. He highlighted that fully automated driving requires redundancy also on radio level. In addition to IEEE 802.11p in the 5.9 GHz band a second technology will be required in a different frequency band for fulfilling the functional safety requirements. Hybrid communication build on existing cellular and V2X communication is well suited for covering the needs of Road infrastructure. Worldwide, Siemens has already more than 780 cooperative roadside units in commercial operation. The Car2X technology has proven its maturity and is ready for growing deployment.

► Continuation

The discussion with experts of the Chinese MIT delegation provided insight into the latest status of the V2X situation in China. China has allocated 5905 – 5925 MHz for V2X as other parts of 5.9GHz band are occupied by other services. LTE-V2X PC5 mode 4 shall be used for V2X and mode 3 might be considered in the future. Currently, no plans exist to mandate the V2X implementations in vehicles. The standards have been published in Chinese and build the basis for testing to start in November 2018.

From the discussion the C2C-CC experts got the impression that evolution of V2X in China is considered via usage of new frequency bands as the Chinese experts did not find it feasible to multiplex 5G-V2X on the initial radio channels.

Following the discussion with the government MIT delegation Siemens offered a live demonstration of infrastructure based V2I services like GLOSA, pedestrian detection and hazard warning being demonstrated on the Siemens campus. At the end of the joint meeting the leader of the Chinese MIT delegation thanked C2C-CC and Siemens for the fruitful information exchange and expressed the willingness on further future information exchange and cooperation.

CAR 2 CAR Website has received a facelift
by Sonja Eickmann, CAR 2 CAR Communication Consortium

Since end of September 2018, the website of the CAR 2 CAR Communication Consortium **www.car-2-car.org** presents itself in a new styling. To keep up with the times, the website has received an essential facelift and now meets the requirements of a modern and user-friendly information platform responsively adapting to different screen sizes and devices.

Compared to the forerunner, the new website has a simplified structure and a reduced number of subpages in the second and third menu level.

What has essentially been improved is the navigation to parts of the website visible for active and/or basic CAR 2 CAR members and subscribers only: All subpages are directly visible in the menu for all visitors, and if a user selects a secured subpage, he is immediately asked to log-in with his access data. After log-in, the requested content gets straightly visible, without a detour to the option for changing password. The interface to the Collaboration area still exists and can be found in the meta menu on the top right of the page.

The access to the diverse documents the CAR 2 CAR Communication Consortium offers for download is eased by document previews and key document facts such as the publication date and document name. The list of members publications is now arranged as a table which can be sorted by publiation date, document name or author.

Take a look and enjoy!

WORKING GROUP NEWS

About 60 experts joined 2nd CAR 2 CAR Week in Wolfsburg
by Dr. Karl-Oskar Proskawetz, Administrator of the CAR 2 CAR Communication Consortium

The CAR 2 CAR Communication Consortium organised its second CAR 2 CAR Week from 19 to 21 June 2018 in Wolfsburg. About 60 experts participated in the event hosted by Volkswagen and Carmeq. During the first day, 12 parallel meeting time slots of 2.5 hours each were offered for up to four parallel meetings. While WG SEC and WG Deployment met the whole day other Competence Groups took the opportunity for organising own meetings in parallel. The following two days were organised as joint meetings of the three Working Groups DEPLOYMENT, FUNCTIONAL and TECHNICAL and a Closing Plenary session. Coffee and lunch breaks offered complementing opportunities for networking.

Following the new work mode of the CAR 2 CAR Communication Consortium, the 2nd CAR 2 CAR Week started with an Opening Plenary session. The session informed about the new work approach, the week organisation and the main issues to be discussed during the expert meetings. Afterwards, the experts split up into four (up to five) parallel meetings of the Competence Groups Deploy + APP-INF, APP-PTW, RD, COM-COSP, SEC and CA.

The results of these meetings were briefly highlighted during the Exchange Plenary session in the morning of the second day. The Exchange Plenary was followed by joint meetings of WG DEPLOYMENT and WG Functional. During the third day, the WG TECHNICAL meeting took place in the morning and the Closing Plenary meeting in the afternoon. All documents of the 2nd CAR 2 CAR Week can be found in the respective folder of the Collaboration Area.

It is important to note that the Closing Plenary meeting has taken over decision responsibilities of the Technical Organisation. Among others, this covers the Work Programme, the technical release of C2C-CC documents and requests/proposals to the Steering Committee.

In general, the new organisational structure of the CAR 2 CAR Week has shown its worth. The Competence Groups asked for more time slots for enabling the organisation of more and/or longer meetings in parallel.

3rd CAR 2 CAR Week in Magdeburg on four successive days
by Dr. Karl-Oskar Proskawetz, Administrator of the CAR 2 CAR Communication Consortium

Ifak hosted the third CAR 2 CAR Week from 24 to 27 September 2018 in Magdeburg. The organisation of this CAR 2 CAR Week already strongly resembled to the process aimed by the Technical Organisation. By extending the CAR 2 CAR Week to 3.5 / 4 days, more flexibility for organising parallel meetings of the Competence Groups and Taskforces during the first two days has been reached. The following two days were organised as joint meetings of the three Working Groups DEPLOYMENT, FUNCTIONAL and TECHNICAL, complemented by a Closing Plenary session. Among others, new and updated Work Items were discussed and adopted for final release by the Steering Committee. The Work Programme has been updated accordingly.

For the first time, a CAR 2 CAR Week has been organised on four successive days offering more timeslots for parallel meetings of Competence Groups and Taskforces at the beginning of the CAR 2 CAR Week. The new COM-POTI group took the opportunity to meet the whole first day. The Competence Groups SEC and COM-COSP met during the afternoon.

The second day started with the official Opening Plenary session. The director of the ifak institute Prof. Dr.-Ing. Ulrich Jumar welcomed all participants as host, briefly introduced the ifak institute and highlighted some interesting facts about Magdeburg. Afterwards, the General Manager Niels Andersen thanked ifak for hosting the CAR 2 CAR Week and highlighted the new processes of the Technical Organisation, the main issues to be addressed during the meetings and the power of the Final Closing Meeting to discuss outcomes and proposals and make decisions of the Technical Organisation. Then the groups DEPLOYMENT + APP-INF, SEC, CA and COM-COSP held their parallel meetings.

The third day started with the Exchange Plenary session in the morning followed by the WG DEPLOYMENT and WG FUNCTIONAL joint meetings. By exception, the new group Operation met in parallel during the afternoon.

The joint meeting of WG TECHNICAL took place during the morning of the fourth day. The Competence Groups and Taskforces reported their results and proposals to the joint WG meetings. In the afternoon, all Working Groups reported to the Final Closing Plenary. During this meeting, cross-working group aspects as well as new proposals and updates of Work Items were discussed and adopted. The experts of active members have been encouraged to join the taskforces of interest established for each of the Work Items. All documents of the 3rd CAR 2 CAR Week are found in the respective folder of the Collaboration Area.

Next year, four CAR 2 CAR Weeks will be organised:

(14)/15 to 17 January 2019
4th CAR 2 CAR Week, Bergisch Gladbach (hosted by BASt)

(11)/12 to 14 March 2019
5th CAR 2 CAR Week, Guyancourt (hosted by Renault)

(01)/02 to 04 July 2019
6th CAR 2 CAR Week, Sophia Antipolis (hosted by Eurecom)

(16)/17 to 19 September 2019
7th CAR 2 CAR Week, Wolfsburg (hosted by VW/Carmeq)

Simulation as a tool for research on V2X communications
by Ioannis Sarris, u-blox

Introduction

Measuring the performance of any communications system in the field can yield extremely valuable information, which is usually difficult or impossible to reproduce in a laboratory environment. In the case of ITS however, the complexity and cost associated with large-scale measurement campaigns is usually excessive. Furthermore, their value is usually weakened by difficulties in generalizing the results for other scenarios / topologies. On the other hand, simulation can provide vast breadth and depth of visibility, reproducibility and generalization at a reasonable cost. As a consequence, this proved to be the most popular method for conducting research on V2X systems.

An abundant collection of simulation software, focusing in different aspects of ITS, has emerged in recent years. To promote a unified methodology for research and development in V2X communication systems, the CAR 2 CAR Communications Consortium has put significant effort in defining a framework for the use of such software, in the form of guidelines and specific scenarios. Recently, a new work item was initiated with the intention of moving one step further. This will define and integrate a common simulation platform which could be used both for internal studies but also distributed to the broader V2X community for promoting research in this area.

A non-exhaustive list of use cases where this platform could be used is:

- Investigation of potential enhancements (eg. use of multiple antennas, enhanced channel coding, congestion control algorithms, etc.)
- Support the work of future standardization efforts (e.g. IEEE 802.11 NGV)
- Performance comparison of multiple access layer technologies (eg. ITS-G5, C-V2X)
- Investigation of potential coexistence issues between various communications technologies

The use cases above would benefit from a fully defined simulation environment by providing the experts with reproducible and undisputed results.

Simulation Entities

The scope of the C2C V2X Simulation Platform covers all aspects which have a significant contribution to the performance of ITS systems. To cover such a wide range of domains, a modular approach is followed which employs multiple simulation entities (or engines) (Fig.1). Some of the major components are described in the following paragraphs.

Vehicular traffic simulator

This software can reproduce the motion of vehicles through a given road network following a predefined set of rules (traffic lights, one-way roads etc). It can be used for both small-scale (eg intersection-level) or large-scale (eg city-wide) simulations and generate the position, velocity and acceleration of vehicles in a realistic way. In addition, information such as the use of direction indicators or brake lights can also be extracted. The most popular software in this domain is probably the Simulation of Urban Mobility (SUMO) software, developed by DLR[1].

Network simulation

This is a key component of any V2X simulation platform, responsible for simulating mobile devices, road side units or other components of the backbone network. Usually, implementations of the V2X protocols are not included with the simulation engine itself but can be imported from corresponding projects such as Artery[2]. It is common for network simulators to go beyond the link-layer, therefore simulating the network, transport protocols as well as applications. Network simulation is vital in V2X research since it can reproduce the type, timing and configuration of the messages being exchanged between vehicles and / or infrastructure. Large-scale simulations with hundreds of vehicles can usually be performed with modest hardware resources, however, the complexity and runtime increases rapidly for very large scenarios.
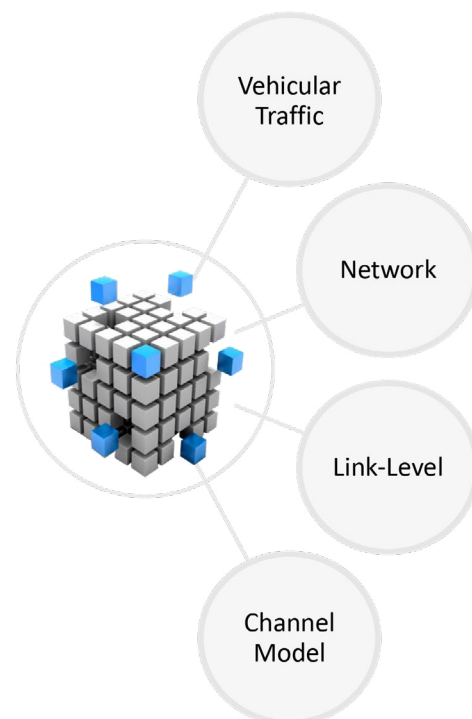
Fig. 1

► Continuation

The most popular implementations in this area are OMNET++[3] and ns-3[4]. Both simulators are event-driven, highly modular, enforce an object-oriented programming model and are very similar in terms of features and capabilities.

used for different purposes. Some implementations are the C2C tap-delay models, GEMV2 or even the fully detailed models produced by ray-tracing software[7][8].

Link Level Simulation

This engine simulates the processing performed at the physical layer (PHY) of a V2X transceiver and is commonly used for algorithmic research in this area. A common methodology to avoid the additional complexity of a detailed PHY model is to assume a one-to-one relationship between the level of received power on a device and the probability of packet delivery. Then, the PHY can be simplified by a simple look-up-table between these two values. Nonetheless, under this assumption any low-level performance issues are concealed and the behavior of real systems cannot be accurately reproduced.

There are currently a number of link level simulation models for indoor Wi-Fi (802.11a/g/n/ac) available, however these are not suitable for highly mobile scenarios as those involved in V2X. Recently u-blox has released an open-source implementation of a PHY layer simulator[5] which involves all transmitter and receiver processing necessary for performing research in this field (Fig.2).

Channel Models

In order to achieve a high level of link level simulation fidelity, suitable channel models are needed. These provide realistic information on the effect of the wireless medium on the transmitted signals accounting for various propagation phenomena such as small-scale fading, large-scale fading, etc. These usually account also for effects such as the antenna pattern or the existence of multiple antenna elements. Currently, there exist numerous models of various degrees of complexity which can be

Additional considerations

Integrated frameworks

In addition to the above discrete simulation engines, it is worth mentioning that there are also a number of integrated platforms such as Veins[9], iTetris[10] and VSimRTI[11] which combine multiple engines from the ones discussed above. These offer the highest level of completeness with minimal integration effort.

Hardware-in-the-loop

Moving one step further from simulation involves real-time emulation where some of the simulation elements are replaced by hardware components. For example, a channel fading emulator connected to a number of V2X transceivers can faithfully reproduce the effect of wireless propagation in real-time. This allows the assessment of hardware performance and gives maximum confidence on compliance. It also allows the integration of 3rd party sources (eg. external sensors). Compared to a test-drive, this method gives enhanced debugging and reproducibility capabilities, however the cost and complexity increases rapidly with increasing number of simulation nodes.

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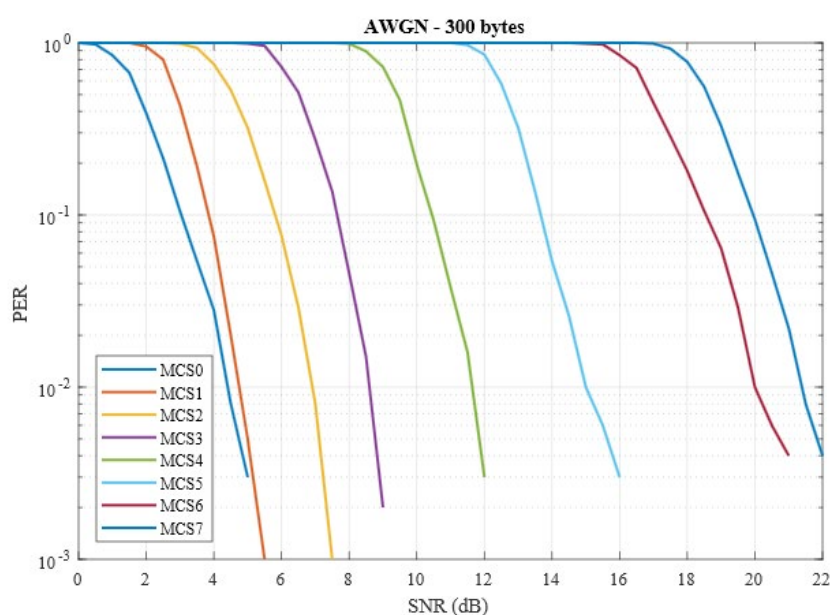10) altairhyperworks.com
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Fig. 2

PROJECT ENVIRONMENT

Multi-brand platooning will become a reality in Europe
by Marika Hoedemaeker, TNO

Significant advances in platooning technology have been made in the last decade, but to achieve the next step towards deployment of truck platooning, an integral multi-brand approach is required. This ultimately requires cooperative automation on different hierarchical levels, encompassing automation of strategic, tactical, as well as operational functionalities, based on reliable short-range vehicle-to-vehicle and vehicle-to-smart-infrastructure communications (V2X), and long-range back-office communications.

Over the next 3 year the consortium behind ENSEMBLE, including six European commercial truck manufacturers, will implement and demonstrate multi-brand truck platooning on European roads.

Aiming for Europe-wide deployment of platooning, 'multi-brand' solutions are paramount. It will enable a single truck to form a platoon with any other truck. The project will ensure safe platooning and facilitate impact assessments on infrastructure, safety and traffic flow. This paves the way for the adoption of multi-brand truck platooning in Europe, which will improve fuel economy, CO_2 emissions, traffic safety and efficiency throughout the road freight sector.

It is the ambition of ENSEMBLE to realise pre-standards (i.e., mature input for standardisation) for interoperability between trucks, platoons and logistics solution providers, to speed up actual market pick-up of (sub) system development and implementation and to enable harmonisation of legal frameworks in the member states.

During the first year, the project partners will concentrate on setting the specifications and developing a reference design with acceptance criteria. This reference design will be taken up by the OEMs and suppliers for implementation on their own trucks during the second year, while the knowledge partners will perform impact assessments with several criteria. Year three of the project will focus on testing the multi-brand platoons on test tracks and international public roads. The technical results will be evaluated against the initial requirements. Also, the impact on fuel consumption, drivers and other road users will be established. In the end, all activities within the project aim to accelerate the deployment of multi-brand truck platooning in Europe.

ENSEMBLE

The ENSEMBLE partners

The ENSEMBLE project is led by TNO. All six European truck manufacturers will bring in their pre-eminent technological position on platooning: DAF, DAIMLER, IVECO, MAN, SCANIA and VOLVO Group (VOLVO TRUCKS & RENAULT TRUCKS). CLEPA represents the suppliers of automotive equipment and components and will support research, innovation and deployment as drivers for industrial growth. The following suppliers are also a partner of the project: NXP, ZF, Bosch, Continental, Brembo and WABCO. ERTICO – ITS Europe, being the platform for the cooperation of all relevant stakeholders to develop and deploy ITS in Europe, will ensure outbound focus by involving stakeholders and by being the link to the European Truck Platooning Community. The consortium is completed by the knowledge partners: IDIADA (validation and legal challenges), IFSTTAR (impact assessment on infrastructure, traffic flow, road safety and perception by users and logistics), KTH (platooning services) and VU Brussel (platooning business case). This project is partly funded by the European Commission.

MAVEN: V2X for future cooperative automated driving through road intersections

by Dr. Michele Rondinone, Hyundai

Highly and fully automated vehicles, especially when connected to the C-ITS infrastructure, can significantly contribute to meeting the EU objective of effectively accommodating growing mobility demands while still ensuring lower environmental impacts and increased road safety. An increase of driving automation functions in newly released car models is already a visible trend. Moreover, the deployment of ITS-G5 based C-ITS technology is about to start in 2019. The combination of automated driving and C-ITS is expected to be a key enabler for distributed coordination of highly automated vehicles, and will eventually permit the road infrastructure to monitor, support and orchestrate their movements.

In this context, the MAVEN project (Managing Automated Vehicles Enhances Network) is developing ITS-G5 based C-ITS-assisted solutions for managing Cooperative Automated Vehicles (CAVs) at signalised intersections and intersection corridors with the aim of increasing traffic efficiency and safety. For this purpose, traffic management algorithms for the inclusion and control of automated vehicles are developed at the infrastructure side. Thanks to V2X communications, these algorithms exchange information with automated vehicle systems that are in turn extended to include the V2X received information into the logic of their environmental perception and trajectory/manoeuvre planning modules. The MAVEN C-ITS assisted solutions include, among others, Infrastructure-to-Vehicle (I2V) interactions for optimal coordination of vehicle transit at intersection, consideration of small vehicle platoons and application of collective perception mechanisms.

In order to ensure the correct operation of the MAVEN solutions, it is key to identify and develop suitable V2X communication schemes and message sets to be concurrently adopted by CAVs and the C-ITS infrastructure deployed at signalized road intersections. For this purpose, MAVEN has developed V2X communication schemes and message sets for infrastructure-assisted automated driving. For the cooperative infrastructure, an I2V Lane Change Advisory service and a dedicated profiling of the SPaT (Signal Phase and Time) and MAP (topology) for lane-specific GLOSA were developed. For the cooperative automated vehicles, extensions of standard CAM (Cooperative Awareness Message) messages have been designed to allow interaction with cooperative intersections and to support management and control of platoons. Finally, the currently under standardization Collective Perception service has been adapted to the needs of MAVEN to support the applications of cooperative and automated vehicles aimed at increasing the safety of VRUs (Vulnerable Road Users) and vehicle drivers. The developed schemes are backward compatible as required by the car industry to foster their future deployment and are provided in terms of ASN.1 definitions.
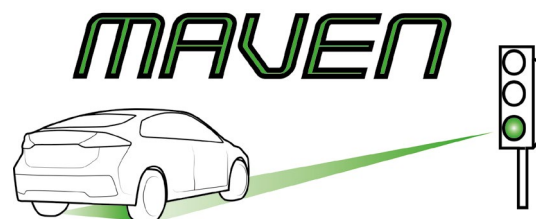
After having being validated on test benches, the MAVEN communications schemes are being integrated in infrastructure and vehicle prototypes for closed field- and real road tests involving vehicle automated reactions to infrastructure speed and lane change advices, as well as automated platooning in urban environments. In this context, the Hyundai Motor Europe Technical Center is closely collaborating with Dynniq for joint tests against a cooperative intersection in Helmond (Netherlands) as well as with DLR for small platooning trials with DLR cars and a cooperative traffic light in Braunschweig (Germany).
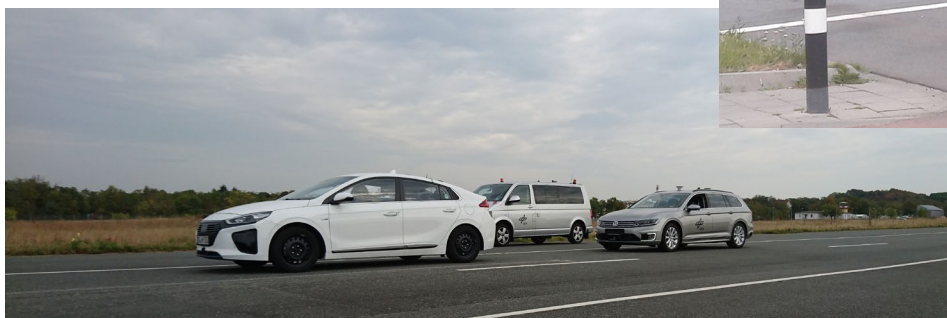
More information about maven can be found at
http://www.maven-its.eu/

V2X data recording at Helmond (NL) Maven test site.

Platooning tests with DLR at Griesheim (DE) Proving Ground.

The progress of C-Roads in 2018

by Wolfgang Kernstock, AustriaTech

Harmonisation took place in the C-Roads Platform both on technical and organisational level. Following intense cross-testing and cooperation with important players like the CAR 2 CAR Communication Consortium, three versions of the harmonised C-ITS specifications have already been released. Technical activities were underpinned by broad appearance of C-Roads on congresses and workshops, also including the highly successful VR demonstration.

In early 2018, efforts of C-Roads for coordination have taken another step forward with a new Memorandum of Understanding that has been signed by ASECAP and the C-Roads Platform. They share the common objective to harmonise as far as possible the deployment of ITS services for European travellers along the European road infrastructures. Hereby the C-Roads Platform concentrates its efforts on C-ITS services with the major aim to improve road safety while, in addition to this, ASECAP's major focus is on electronic tolling services. As tolling services and short-range C-ITS services use for communication issues nearby frequency bands, an interference-free co-existence of both services is a precondition for end-user acceptance.

All C-Roads partners have currently set up and tested their pilot implementations. In summer 2018, cross-border tests were conducted, meaning that vehicles were tested on foreign pilot sections in Europe. Cars from France and Portugal of the SCOOP project successfully tested the C-ITS Austrian services deployed by ASFINAG within the ECo-AT project. Despite the test participants originated from different countries and project environments, the transmission and display of messages between them was successful. Such tests ensure that all vehicles in Europe are speaking the same "C-ITS language" and can connect with each other and the road infrastructure.

Tests always go hand in hand with other test conducted by other renowned companies such as Hyundai, Opel, Honda, Volkswagen, Renault, Volvo Trucks, IVECO, FCA/CRF, Aricent, DENSO, Commsignia, Cohda Wireless, Hyundai Mobis, A-to-B, Viveris, Magna, Telemotive, Nordsys, Kapsch, Siemens, Swarco. The CAR 2 CAR Communication Consortium coordinates the interests of OEMs in the context of C-ITS and has been a valuable sparring partner in the discussions of technical questions and in the elaboration of the harmonised communication profiles.

But harmonisation must also involve the end users directly by explaining to them in a simple and entertaining way the beneficial impact that C-ITS can have on their daily driving. For this to be achieved, C-Roads makes use of a Virtual Reality (VR) application where users can get a hands-on feeling of how C-ITS services work. In addition, the demonstration offers a "hover-over" perspective where users can see the information flow between traffic management centre, road side units and cars for each use case.

In the beginning of October 2018, the C-Roads Platform has launched the latest version of the harmonised communication profile. It comprises the results of several test cycles of the C-Roads partners across Europe and is already fine-tuned with the automotive industry, thanks to intensive coordination with the CAR 2 CAR Communication Consortium. This new release focusses on the communication profile for IEEE 802.11p/ETSI ITS-G5 short range communication and defines the common base for the ITS-G5 functional and technical specifications. The specification targets the communication between roadside units and vehicles and is expected to be part of C-ITS deployment all over Europe.