5G-DRIVE

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5G HarmoniseD Research and TrIals for serVice Evolution between EU and China – is a Research and Innovation Action, running from 2018 to 2021, funded by the European Commission under the Horizon 2020 programme.

5G-DRIVE will trial and validate the interoperability between EU & China 5G networks operating at 3.5 GHz bands for enhanced Mobile Broadband (eMBB) and 3.5 & 5.9 GHz bands for V2X scenarios. 5G-DRIVE involves 17 European partners from 11 countries and different sectors.

Word from the Coordinator

The first project year is over and 5G-DRIVE is well on track. A first technical project review has been successfully passed in May in which the hard work of 5G-DRIVE partners has been appreciated. Until the end of August, 13 **Deliverables** have been submitted. They lay the basis for the project's own activities but also for the collaborative activities with our twin project in China. We have defined the joint trial plan, use cases and data sharing mechanisms. For each of the two application areas – **eMBB** and **V2X**– joint specifications for the trials have been prepared.
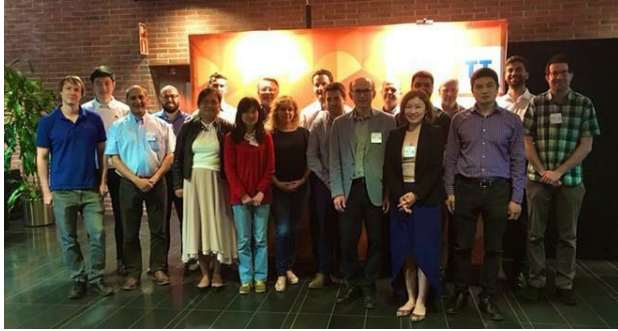
A great achievement that deserves being mentioned are the joint trialling activities that have been performed for eMBB in Hangzhou at a twin project partner trial site. Several of the 5G-DRIVE partners have participated in that and were able to gain interesting insights and lessons learnt from testing 5G networks and user equipment under real world conditions where tests were made under various parameters and configurations. These tests are still ongoing and 5G-DRIVE partners will again participate in these trials, testing the further and advanced features of the 5G network and user equipment.

I'd like to mention as well the work on 5G technology and service innovation which looks a bit beyond current 5G standardised technology, which has prepared a first report D5.1 which can be downloaded from the project website. Part of this is the cooperation between 5G-DRIVE and the Chinese twin project on the novel Open RAN (O-RAN) activities which are progressing at an amazing pace. Stay tuned for more news and enjoy reading our newsletter.

Uwe Herzog
5G-DRIVE Coordinator, Eurescom

5G-DRIVE project updates

A first year of intensive work

The 30-month 5G-DRIVE project kicked off in September 2018. Over the past 12 months, partners have been working hard on implementing planned project activities, and had the opportunity to discuss progress achieved in several consortium plenary meetings.

The most recent plenary meeting was held from June 25-27, 2019 in Espoo, Finland, hosted by local partner VTT. In addition to discussing progress within each of the work packages, the consortium also discussed how to address contributions from the first Advisory Board meeting in April, the results and next steps deriving from the first project review in May, and the status of cooperation with the twin Chinese project.

With another 18 months ahead, relevant progress has been made but additional work is still to be delivered. The consortium will meet again in Athens, Greece in early October.

5G-DRIVE and Chinese twin project making progress

Partners from 5G-DRIVE and the Chinese twin project "5G Large-scale trial" met up in Shanghai last May 2019 to discuss progress made in both projects. It was a good opportunity for the two projects to discuss progress made in regard to eMBB and V2X activities, as well as next steps for the forthcoming months. Following the meeting, the partners also visited trial sites in Shanghai and Hangzhou that are coordinated by China Mobile-led twin project. The group went to the Jiading District of Shanghai to visit Shanghai Automobile City, and later in Hangzhou, the partners were received by the Huawei and China Mobile team in the part of the city where 5G eMBB is being tested.
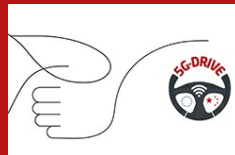
5G-DRIVE organised a successful '5G trials' workshop in Shanghai

5G-DRIVE successfully held its "5G-Trials – From 5G Experiments to Business Validation" workshop last May 20, 2019 in Shanghai, China. The workshop was held within the framework of the IEEE International Conference on Communications, which was held from the May 20-24, 2019. Attended by more than 40 participants, the workshop included relevant keynote and paper presentations focusing on the current progress of 5G-Trials from across the globe and in various domains. The presentations were grouped into three main sessions, covering "recent 5G trial activities and trial results", "5G architecture and enabling technologies", and "performance analysis of 5G technologies". Furthermore, two panel discussions were organised, one on the "potential of 5G for verticals" and another on "challenges in 5G trials". With a significant external participation, the workshop was considered a success and a provides strong motivation for the upcoming workshops the project will organise in the next 18 months. Read more here.

5G-DRIVE project video released

It has been a long process of scripting and animating, but the 5G-DRIVE animated video is out. The video provides viewers with a general overview of the objectives of the project, the eMBB and V2X scenarios being addressed in the project, as well as a quick overview of the characteristics of the three trial sites in Ispra, Espoo and Surrey.

We hope you enjoy the video! **Watch it here**

5G-DRIVE present at EuCNC 2019

5G-DRIVE had a successful participation in the 28th edition of the European Conference on Networks and Communications (EuCNC 2019), which was held in Valencia, Spain between June 17-20, 2019. 5G-DRIVE was present with a booth, where brochures were distributed to visitors, and a first screening of the project video and trial related videos were shown.

5G-DRIVE organising its "2nd workshop on 5G-Trials – From 5G Experiments to Business Validation" at the IEEE 5G World Forum

5G-DRIVE will be organising its second project workshop focussing on 5G-Trials – From 5G Experiments to Business Validation. The workshop, which will be held within the framework of the IEEE 5G World Forum in Dresden, Germany, will take place on October 1, 2019. The workshop will include key note speeches, including from Michael Meyer (Ericsson) and Didier Bourse (Nokia). The workshop will also include three paper sessions with a total of nine presentations, and two panel discussions that will focus on key 5G topics.

5G-DRIVE trial activities

EU-China V2X trials taking steps forward

5G-DRIVE is already in the implementation phase and will be executing the test sessions between September 2019 and June 2020 in Europe (Italy and Finland) and China (Shanghai and/or Wuxi). The test scenarios will address network accessibility, latencies and V2X messages. The tests on the European side are slightly more application orientated, addressing the demands of automated driving scenarios. However, the China twin project is more orientated for network support functionalities in transport applications.

The first test setups were realised in May 2019 to verify the test setup and equipment. Further developments were done, particularly developing applications tailored to measure the connected and automated driving scenarios. V2I communication testing is planned based on 5G networks using 2,6 GHz, 3,5 GHz and 5,9 GHz radio modules. The aim is to exploit PC5 based vehicle-2-vehicle communication units for having direct UE links between cars for minimising latency variation caused by network infrastructure.

EU-China eMBB trial progress further

EU-China eMBB trial progress further 5G-DRIVE is making progress in the eMBB trial in Europe, namely in the UK and Finland sites. Moreover, a first joint trial with China has finished regarding NSA basic performance in Hangzhou, having run from May 2019 to June 2019. The tests covered the peak data rate measurement, indoor coverage and MIMO beamforming test. The second joint trial regarding SA architecture basic performances will be done in September in Hangzhou by 5G-DRIVE partners UKent, VTT and UoS.

Another joint trial between European and Chinese partners is in preparation and will be hosted by UoS in the last quarter of 2019. The aim of this test is to measure the basic performance of NSA over 3.5GHz for further results calibration with the 5G network in China.

Catch up on some of the latest 5G-DRIVE **publications, including project deliverables, scientific publications, and other in-depth articles.**

Project deliverable D2.2: Joint Architecture, Use Cases and Spectrum Plan

Abstract: This deliverable presents the selected use cases for the two 5G-DRIVE project scenarios (eMBB and V2X). In addition, it describes the architectural setup for each use case, as well as the initial steps towards the realisation of a joint 5G-DRIVE EU-China architecture. Finally, some key radio frequency spectrum aspects for the deployment of eMBB and V2X services in the EU and China are also discussed.

Read the deliverable here.

Project deliverable D4.3: Report on Potential Vulnerabilities of V2X Communications

Abstract: The deliverable identifies the security requirements and standards that are proposed so far to ensure secure V2X communications. The deliverable addressee also the potential vulnerabilities for V2X communications, and provides definition of test setup and procedures for penetration, coexistence and performance evaluation of 3GPP and IEEE standards for V2I and V2V communications testing.

Read the deliverable here.

Project deliverable D5.1: First Year Report of 5G Technology and Service Innovations

Abstract: 5G-DRIVE dedicates Work Package 5 (WP5) to advancements in "5G Technology and Service Innovations". Its main purpose is to ensure that the 5G test-bed implementations continue to rigorously evolve along the lines of real-world use cases as well as the 5G PPP vision. The work focuses on four distinct aspects, each one forming the core of a dedicated task: (a) Radio Access and Transport Network; (b) Network Virtualisation and Slicing; (c) 5G New Services, and; (d) Security and Privacy.

Read the deliverable here.

Project deliverable D6.2: Plan for Standardisation

Abstract: The following document presents the Plan for Standardization of the 5G-DRIVE project. It serves as a document to steer and control standardization action and to support the members of the 5G-DRIVE consortium in their foreseen standardization activities. First, the deliverable outlines the 5G and V2X priorities in Europe and China. Next, it describes the methodology behind the Plan, as well as the target KPIs in the field of standardization, designed according to the priority of the consortium members.

Read the deliverable here.

Catch up on scientific publications

Over the past 12 months, partners have prepared, submitted and seen approved various scientific publications to some of the most prestigious international journals and conferences. 5G-DRIVE is keen on ensuring that scientific work is made available to all those interested.

You can consult the publications on our website or on the Zenodo platform.

5G-DRIVE event participation

5G-DRIVE partners have been active in participating and disseminating the project across a variety of different events. Read below a few of the key events we'd like to highlight.

5G-DRIVE at the Wuxi World Internet of Things (WIoT) Exposition 2019

5G-DRIVE was present at the recent Wuxi World Internet of Things (WIoT) Exposition 2019, which took place on September 6, 2019 in Wuxi, China. Partner VTT presented the project, delivering a keynote during the Intelligent Transportation and IoV Industry Development Summit Forum. The presentation was delivered to an of 300 people including ITS, telecom and automotive industries and authorities. The project was also recognised in the media.

Read more

5G-DRIVE at the 5th IEEE Conference on Network Softwarization in France

5G-DRIVE was represented at the 2nd Workshop on **Advances in Slicing for Softwarized Infrastructures 2019**, a flagship conference created by 5th IEEE International Conference on Network Softwarization, which took place on June 24-28, 2019 in Paris, France. Partner Orange participated with a presentation on relevant network slicing KPIs proposed within 5G-DRIVE.

Read more

5G-DRIVE at the 2nd edition of the 5G Autonomous Driving Workshop

5G-DRIVE was represented at 2nd International Workshop on 5G and Cooperative Autonomous Driving in conjunction with IEEE International Conference on Communications, which took place on 20-24, 2019 in Shanghai, China. Partner UL co-chaired the workshop and also engaged in networking with other researchers working in the field of 5G and connected vehicles.

Read more

Belt and Road Digitization Cooperation International Summit 2019

5G-DRIVE was represented at the Belt and Road Digitization Cooperation International Summit 2019, which took place on May 18, 2019 in Hangzhou, China. Partner UL delivered a key note speech, also addressing the 5G-DRIVE project.

Read more

5G-DRIVE at the 15th International Conference on Artificial Intelligence Applications and Innovations 2019 in Greece

5G-DRIVE was represented at the **15th International Conference on Artificial Intelligence Applications and Innovations 2019** from May 24-26, 2019 in Grete, Greece. Partner OTE participated in a specific workshop titled "5G – Putting Intelligence to the Network Edge".

Read more

Visit us at upcoming events

2019 IEEE 2nd 5G World Forum (5GWF'19)

The 2019 IEEE 2nd 5G World Forum will bring experts from industry, academia and research to exchange their vision and achievements towards 5G, and encourage innovative cross-domain studies, research, early deployment and large-scale pilot showcases that address the challenges of 5G. 5G-DRIVE will be organising its second workshop within the scope of this event. 5GWF'19 will take place from September 30 – October 2, 2019 in Dresden, Germany.

Read more

22nd IEEE Intelligent Transportation Systems Conference (ITSC 2019)

The 22nd Intelligent Transportation Systems Conference (ITSC 2019) is the annual flagship conference of the IEEE Intelligent Transportation Systems Society (IEEE-ITSS). ITSC 2019 will gather ITS industry practitioners (both technology makers and end-users) who will present their findings addressing ITS case studies, field operational tests and deployments. ITSC 2019 will take place from October 27-30, 2019 in Auckland, Australia.

Read more

The Transport Research Arena 2020 (TRA2020)

The Transport Research Arena is the biggest European Research and Technology Conference on transport and mobility. TRA2020 will discuss the newest innovations and the future of mobility and transport. It will provide an opportunity for researchers, policy makers and industry representatives to discuss how research and innovation can re-shape the transport and mobility system. TRA2020 will take place from April 27-30, 2020 in Helsinki, Finland.

Read more