



gan-on-Silicon Efficient mm-wave euROpean systEm iNtegration pLAtform

**Newsletter / January 2020 -
Issue 04**

Consortium

9 partners (5 countries)

Project Coordinator

Dr. Klaus-Michael KOCH
coordination@serena-h2020.eu

Technical Leader

Dr. Kristoffer Andersson
kristoffer.andersson@ericsson.com

Project number: **779305**

Project website: **www.serena-h2020.eu**

Project start: **1st January, 2018**

Duration: **36 months**

Total cost: **EUR 3,910,185**

EC contribution: **EUR 3,910,185**

Message from the Coordinator

The H2020 project SERENA has started two years ago. Since January 2018 a lot has happened – several WP dedicated, technical and General Assembly meetings were organized, a number of telcos were conducted and two review meetings took place where the project work was presented by the team and assessed by the European Commission. The highlight of the last project months was certainly the winter school, which was organized by the H2020 projects SERENA, car2TERA and GRACE. Another major milestone of the second project year was the finalisation and implementation of the proposal for the 5G proof-of-concept demonstrator. The project partners have just returned from a technical meeting with many ambitious goals for spring.



Upcoming Conferences and Meetings

24th International ITG Workshop on Smart Antennas (WSA 2020)

18th to 20th February 2020
@ Hamburg, Germany

The ITG Workshop on Smart Antennas provides a forum for presenting and discussing research results on smart antennas, spanning theoretical analyses as well as technical and implementation aspects, in modern wireless communications. The partners will present their research on a hardware-signal processing co-simulation of the SERENA platform.

Device Packaging Conference (DPC2020)

3rd to 5th May 2020

@ Fountain Hills, Arizona, USA

The conference is a major forum for the exchange of knowledge and provides numerous technical, social and networking opportunities for meeting leading experts in these fields. The conference will attract a diverse group of people within industry and academia.

2020 IEEE 70th Electronic Components and Technology Conference (ECTC 2020)

26th to 29th May 2020

@ Orlando, Florida

The Electronic Components and Technology Conference (ECTC) is the premier international event that brings together the best in packaging, components and microelectronic systems science, technology and education in an environment of cooperation and technical exchange. The partners will present their research on a multi-physical system-level simulation workflow of the SERENA platform.

Micro-/Nano-Electronics Packaging & Assembly, Design and Manufacturing Forum (Minapad2020)

27th to 28th May 2020

@ Grenoble, France

MiNaPAD is a 2-days conference with an exhibition. The objective of this event is to reinforce the design community (which constitutes the largest share of the semiconductor community in Europe) and the assembly and packaging community.

2020 IEEE 3rd 5G World Forum (5GWF'20)

10th to 12th September 2020

@ Bangalore, India

The 2020 IEEE 3rd 5G World Forum (5GWF'20) aims to bring experts from industry, academia and research to exchange their vision as well as their achieved advances towards 5G and encourage innovative cross-domain studies, research, early deployment and large-scale pilot showcases that address the challenges of 5G.

Technical Meeting

14th – 15th January 2020 in Gothenburg, Sweden



From the 14th – 15th January 2020 SERENA partners were hosted by CHALMERS in Gothenburg/Sweden to conduct the technical meeting, which was co-located with the Car2TERA/SERENA/GRACE winter school. The meeting started with a warm welcome of the host and the coordinator in the morning of the 14th January. The technical lead (EAB) started with a technical status overview, ongoing activities and further planned steps. Objectives for spring 2020 were presented. Afterwards, WP leaders and other involved partners held presentations about e.g. front-end specifications, the manufactured wafers and the measurement results, target specifications for the W-band multifunction single-chip front-end MMIC, multiphysical simulations, antenna properties, and the status of deliver-

ables and next steps. In addition, there were discussions about the 5G demonstrator and the W-band demonstrator and a need to revise the time-plan for the upcoming months. More informal, but still project related conversations continued during the common dinner. The second day was dedicated to small group meetings, where concrete tasks were discussed. Furthermore, partners used the time to prepare themselves for the winter school, which took place from 15th – 17th January, also at CHALMERS. The project meeting, as well as the winter school were a great success and the SERENA project partners return home with a common understanding of the next steps.



Winter School

15th – 17th January 2020 in Gothenburg, Sweden



The three H2020 projects SERENA, car-2TERA and GRACE have organized a winter school “Technology and Integration Platforms for Future mm-wave Communication and Radar Applications”, which took place from 15th – 17th January 2020 at Chalmers University in Gothenburg, Sweden. The winter school was particularly targeted towards PhD students and young researchers and the organizers attracted an international audience with participants from various countries.

The organizers have compiled a comprehensive three-day program where renowned international experts from academia and leading industries gave tutorial talks on up-to-date research trends for future wireless technology – from semiconductors to millimetre wave

systems. The first day was dedicated to trends and requirements in emerging wireless systems. Speakers from major companies and the Swedish Defence Research Agency gave insights in 5G and beyond mobile communications, sensor technologies for automotive industry and short-range mm-wave radar sensors for airborne applications. In the morning session of the second day industry experts, as well as university professors focused their talks on technology and circuits for mm-wave communication and sensing. Silicon and Gallium Nitride technology trends as well as SiGe and GaN circuit design research were discussed. In the afternoon the experts put their focus on emerging mm-wave technologies and system integration. To conclude the

comprehensive winter school, experts from academia concentrated on system level design and analysis, by presenting basic principles and research trends regarding mm-wave communication and radar sensing, as well as multi-physics simulation of mm-wave systems.

Offline discussions continued in a less formal setting during the breaks, common social activities or the lab tours. The winter school was a great success, with excellent collaboration among organizers and speakers and of course the high interest among the participants, who even joined the winter school via a live stream webinar.



Assessing the SERENA module performance using multi-physical and channel simulations

Millimeter-wave systems are the next step to increase the data rate of 5G networks. Hybrid analog-digital beamforming, which is investigated in SERENA, is one of the core technologies to enable millimeter-wave communication. Both the theoretical basics and the hardware design have been investigated in recent years. The SERENA project strives to develop a platform to demonstrate the performance gain of a complete system. Currently, the university partners TU Berlin and Chalmers are strongly involved in characterising the performance of the SERENA module using different numerical simulation techniques.

At TU Berlin, work is done on investigating the effect of hardware impairments

and design decisions on the system performance for the 5G mobile communication standard. The partners TUB, Chalmers and IZM will present a common paper on a simulation based analysis of the planned proof-of-concept system in the upcoming ITG Workshop on Smart Antennas (WSA 2020). The partners use a geometry-based stochastic channel simulator and simulate both certain hardware aspects and signal processing parts. Examples of hardware impairments include realistic antenna patterns and the effect of the array size. The focus of the signal processing simulation is on the parts directly related to the hybrid architecture used for multi-user MIMO precoding like the initial link acquisition

and the data precoding.

Research at Chalmers focuses on multi-physical system-level simulations that combine electromagnetic simulations of the antennas with simulated and modelled power amplifier and thermal results. Together with actual communication signals, this approach enables studying how the performance of the SERENA module and the obtained throughput are affected by various operating conditions and communication scenarios. The partners Chalmers and Ericsson will present a joint paper on multi-physical analysis and modelling workflow in the upcoming Electronic Components and Technology Conference.

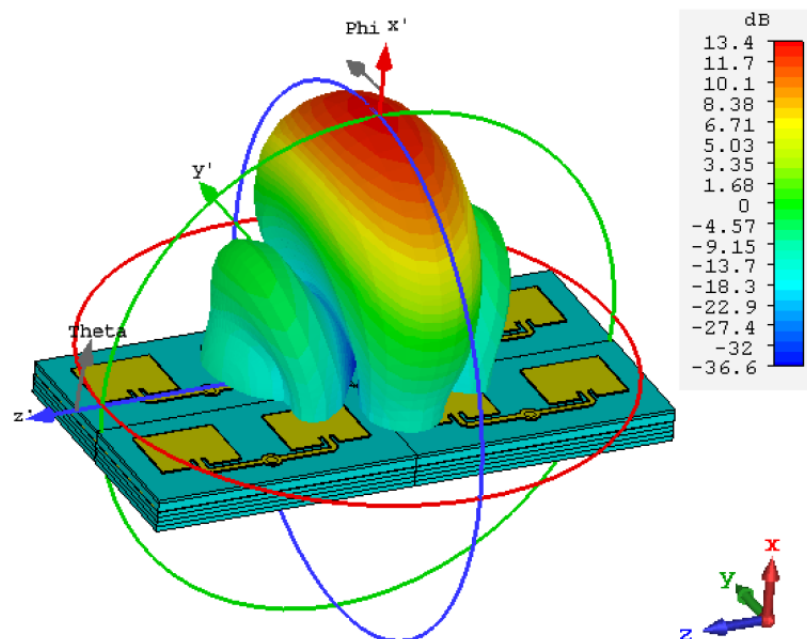


Fig. 1. Simulated combined E-field pattern of the 4x2 antenna array of the SERENA integration module at 39 GHz.



Review Meeting

31st July 2019 @ Brussels, Belgium

On the 31st of July 2019 the SERENA project review for the first period took place at the EC-premises in Brussels. On the 30th and 31st of July 2019 the SERENA consortium came together for the project review in Brussels. After a preparation meeting on the first day, two independent reviewers and the Project Officer (PO) assessed the overall status of the project on the second day. The results and achievements, as well as the ongoing work were presented by the project partners. The reviewers and the PO provided useful feedback that has been considered by the consortium within their future project work.

Uwe Maaß from Fraunhofer provides insights about their main tasks and achievements in the project. He also talks about the main challenges and the next steps to be taken to meet the overall objectives. Check out the video [here](#).



Past Conferences and Meetings

SEMICON China 2019

21st to 22nd March 2019
@ Shanghai, China

15th ConTEL – International Conference on Telecommunications

3rd to 5th July 2019
@ Graz, Austria

SERENA Preparation and Review Meeting

30th to 31st July 2019
@ Brussels, Belgium

45th European Solid-State Circuits Conference

23rd to 26th September 2019
@ Krakow, Poland

European Microwave Week 2019

29th September to 4th October 2019
@ Paris, France

CCI EUROLAM 2019

10th October 2019
@ Stuttgart, Germany

2019 IMAPS International Symposium

30th October 2019
@ Boston, MA, USA

2019 International Conference on Microwave, Communications, Antennas and Electronic Systems

4th to 6th November 2019
@ Tel Aviv, Israel

GaN European developments for Space and non-Space applications

19th November 2019
@ Brussels, Belgium

SERENA Technical Meeting

14th to 15th January 2020
@ Gothenburg, Sweden

winter school

15th to 17th January 2020
@ Gothenburg, Sweden

IEEE International Solid State Circuits Conference (ISSCC)

17th to 21st February 2019
@ San Francisco, USA

Follow SERENA on:



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 779305.