

## 6G-SHINE developing novel concepts for high performance short-range communication

In the last few months, 6G-SHINE has made significant progress in the development of novel physical layer, medium access control and radio resource management solutions for short-range in-X subnetworks.

Specifically, we have assessed the potential of antenna arrays with various form factors tailored to specific industrial and consumer use cases. A novel type of antenna array, based on metasurfaces, has been studied, capable of automatically adjusting to the direction of incoming signals, thereby eliminating the delays associated with traditional beam alignment processes. Initial solutions to

counteract jammers and malicious interference, utilizing channel hopping and advanced detectors, have also been investigated. Other emerging studies include the development of predictive schedulers that leverage knowledge of the underlying service within a subnetwork and predictive variations in radio conditions due to potential signal obstructions caused by mobility. Novel approaches to improving communication reliability, including cooperative communication and network-coded cooperation, were also explored. The project has further addressed the need to reduce latency in subnetworks operating over unlicensed spectrum. Moreover, significant effort has been devoted to studying different types of reconfigurable intelligent surfaces (RIS) and their potential applications in specific subnetwork deployments.

The 6G-SHINE Consortium has been developing initial solutions for managing radio resources in dense in-X subnetwork deployments, considering both centralized and distributed approaches, including deep neural network methods. We have also begun exploring goal-oriented approaches to radio resource management for industrial subnetworks, where performance is optimized based on control-related metrics rather than traditional communication metrics. Initial studies on routing data and control signaling within a subnetwork entity have also been conducted, including the preliminary definition of a functional architecture for distributed computing.

Check our deliverables D3.1, D3.2, D4.1 and D4.2 for all the details!

[LINK TO DELIVERABLES](#)

## Keysight presented the FR3 channel emulator demo at 8th COST INTERACT Event



Usman Virk and Pekka Kiosti, Keysight, showcased the channel emulator demo developed for 6G-SHINE at the 8th COST INTERACT meeting held in Helsinki, Finland, from June 17 to June 20, 2024. They also gave an overview presentation of the latest project activities and achievements.

The COST INTERACT Action (CA20120) aims focuses on the next generation of radio communication networks, and in particular on fundamental research in the fields of antennas and propagation, signal processing and localisation, network architectures and protocols.

**Introduction/Motivation**

- 6G in-X subnetworks are short range low power cells for entities like robots, vehicles, production modules, classrooms, etc [1].
- These subnetworks offer highly localized wireless coverage for various use cases [2].
- They are anticipated to support diverse services, possibly extreme requirements in terms of ultra-short control cycle time, reliability, and service availability, surpassing 5G capabilities.
- In-X subnetworks can be part of a larger 6G infrastructure, offloading the broader network of the most demanding services.

5G network of networks

6G in-X subnetworks

6G network facilities

- 6G in-X subnetwork
- 6G in-S subnetwork
- 6G in-T subnetwork

Focus of the challenge

AALBORG UNIVERSITY CENTRIC 6G SHINE

Presented by Saeed Hakimi

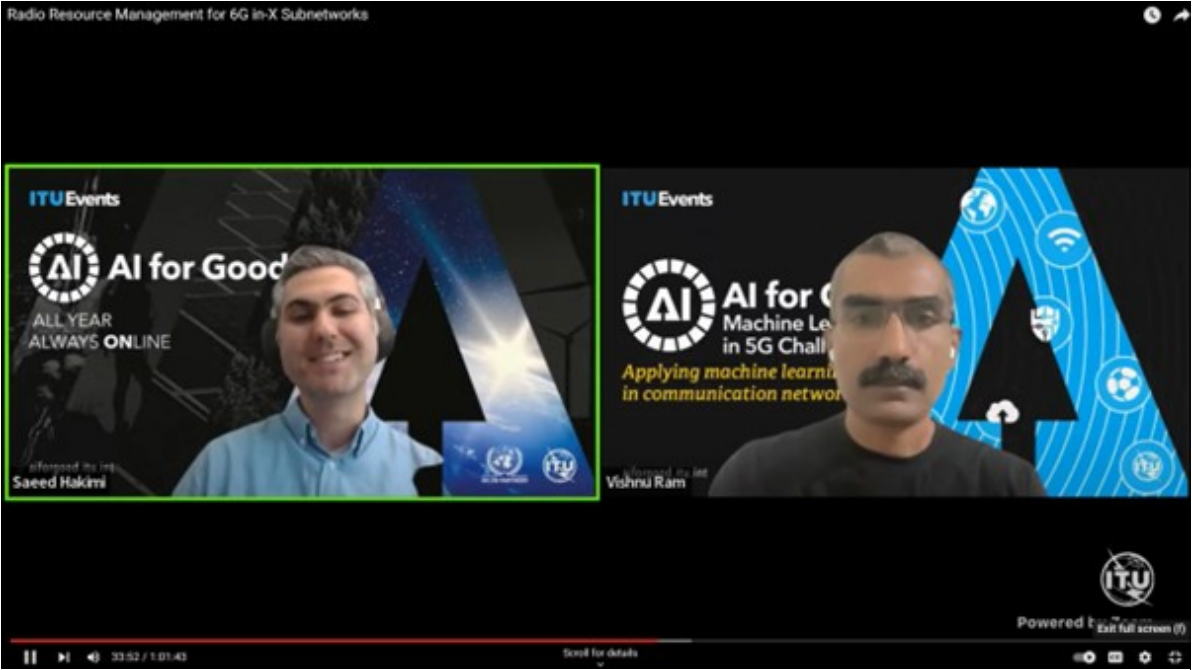
## ITU/ML challenge on Radio Resource Management for in-X subnetworks

On June 26, Saeed Hakimi (Aalborg University) gave a webinar presentation on Radio Resource Management for 6G in-S subnetworks organized by AI for Goog, kicking off a new ITU AI/ML challenge.

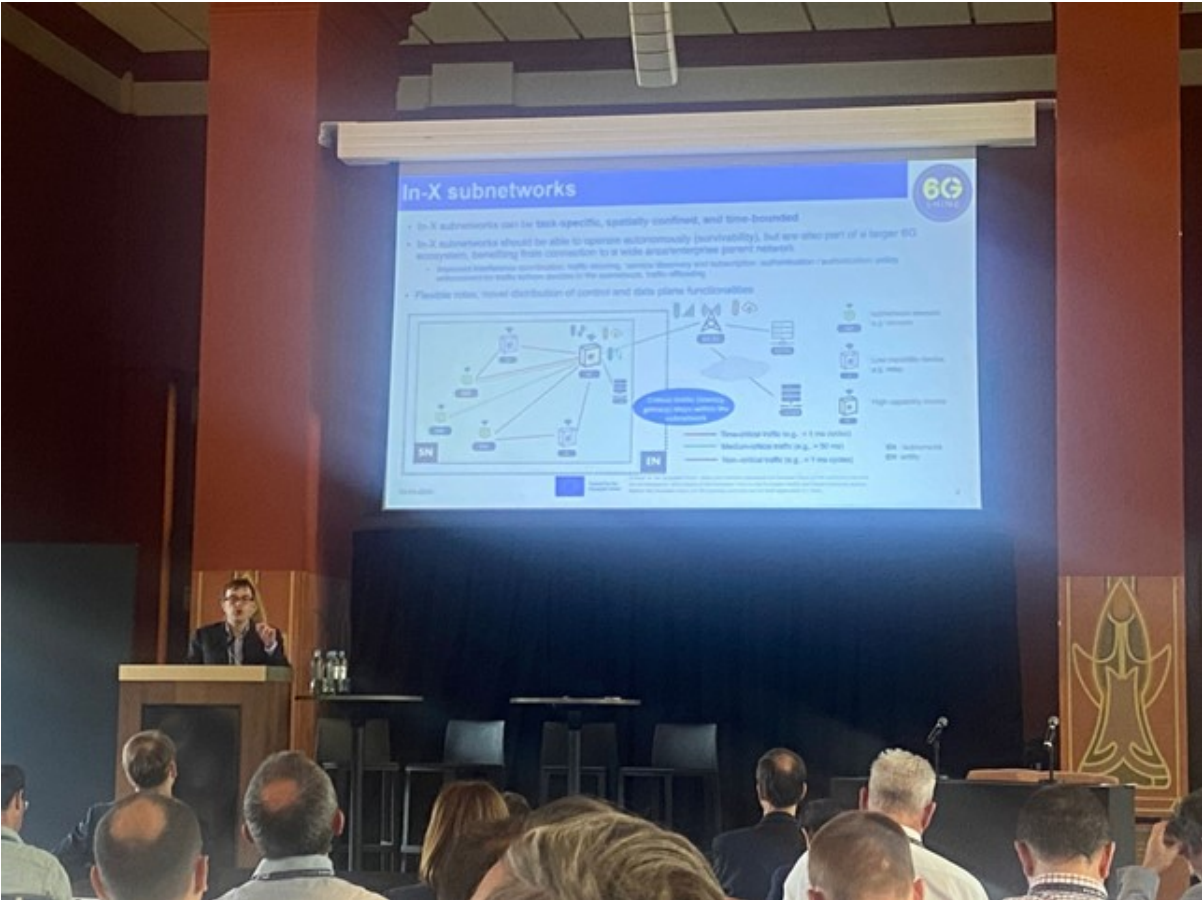
In an ITU AI/ML challenge, relevant wireless communication problems (in this case, radio resource management in dense deployments) are proposed to the broad scientific community along with the necessary information, open datasets and scripts for addressing them. The challenge is open to ITU Member States, Sector Members, Associates and Academic Institutions and to any individual from a country that is a member of ITU.

The challenge is supported by both SNS 6G-SHINE and CENTRIC projects. Click here for all the information you need to participate in the challenge:

[JOIN THE CHALLENGE!](#)



**WATCH THE WEBINAR HERE!**



## 6G-SHINE at EuCNC & 6G summit 2024

The workshop on 6G holistic radio design that we organised in collaboration with SNS Hexa-X-II and CENTRIC projects was a great success! There were many attendees, engaging talks, and discussions, including a presentation by Ramoni Adeogun on AI-based radio resource management for subnetworks.

Gilberto Berardinelli, the project coordinator, shared the vision of the 6G-SHINE project and the concept of in-X subnetworks at the 6G series workshop by Hexa-X-II. Our project booth was bustling with activity, with Lassi Hentilä from Keysight Technologies demonstrating a low-latency FR3 channel emulator based on measurements conducted at Aalborg University.

Various presentations on 6G-SHINE, such as our research on power-efficient cooperative in-X communication and AI-based sub-band allocation, were included in the technical sessions of the conference. Also, we are thrilled to have been recognized as one of the SNS projects contributing to the definition of 6G use cases at the 3GPP SA1 workshop held last May.

In summary, EuCNC & 6G summit was a very rewarding experience for 6G-SHINE. Looking forward to continue shaping the future of short-range wireless communications!



## 6G-SHINE at Hannover Messe

On Tuesday, the 23rd of April, a panel session of VDMA was held on the 5G and Industrial Wireless Conference Stage of Hannover Messe, tackling the question, "Is the Industry waiting for 6G?" This panel was composed of industrial participants of Belden, Bosch and SEW-EURODRIVE as well as representatives of the current European SNS JU 6G research projects 6G-SHINE, TERRAMETA and TIMES.

The discussion started with the question what is missing at the current stage in 5G lead over to the why still it is really worthwhile to use 5G now to what will come in 6G and if what research promises there is what industry really needs.

The summary of this discussion is that 5G is a door opener into bringing wireless to the industry and a highly valuable enabler for a major number of industrial use cases. 6G is apt to learn from that and will evolve 5G in the areas of communication about its features, the communication with the vertical industries about their requirements, as well as the provided new communication capabilities which will pave the road to the next industrial revolution.

---

## 6G-SHINE project

Fredrik Bajers Vej 7, A4-201  
9220 Aalborg East - Denmark



Co-funded by  
The European Union

# 6G SNS

Horizon Europe Grant Agreement No. 101095738. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or SNS JU. Neither the European Union nor the granting authority can be held responsible for them.

[Unsubscribe](#)