DoT-TSDSI joint workshop series on 'Advancing 5G towards 6G' aims to disseminate information about 3GPP Release 19 technology areas and timelines to the Indian technology ecosystem. The goal is to mobilize Indian Industry technologists and Academic researchers to actively participate and contribute to the ongoing and future work at 3GPP.

The fourth micro-workshop in the series, being conducted in partnership with IIT Kanpur, will focus on the 3GPP Studies related to 'Physical Layer Technologies'.

Schedule: February 17, 2023; 11:00 AM to 12:45 PM IST
Venue: Online
Participation: Open to all by prior registration at **link here**

About this micro workshop:
The workshop shall introduce the audience to the latest physical layer technologies from RAN1 (physical layer) perspective which have the potential to be a part of 3GPP Release-19 and beyond releases towards 6G. The following topics shall be discussed in this workshop:

Intelligent Reflective Surfaces (IRS) – This talk aims at providing an energy-efficient and cost-effective technology to realize smart radio environments. This will highlight the potential performance gains by integrating IRS in future releases of 5G and beyond. Implementation aspects and the related challenges will also be highlighted.

Network architecture: from cellular to cell-free - 5G networks use cellular network architecture where users connect to a particular base station. Cellular architecture suffers from cell-edge problem wherein users at the cell-edge observe low data rates due to multi-cell interference. This talk aims to introduce cell-free architecture which overcomes the cell-edge related limitations of cellular architecture and is shown to provide uniform quality of service to all the users in the network.

Evolution of smart network nodes – Network nodes such as Relays, integrated access and backhaul, and network-controlled repeater (NCR) have been a part of LTE and NR for improving the coverage of the cellular network. This talk describes how intelligent reflective surface (IRS) can be incorporated in 5G networks for Release 19 and beyond. We also discuss the enhancements on Release-18 NCR as a potential item for Release-19.

Evolution of Positioning framework - Positioning is constantly evolving with every generation to meet the market demands. This talk will discuss enhancements on positioning in terms of accuracy and power consumption for SideLink (device-device), and reduced capability (RedCap) devices, which are potential work items for Release 19.

New Waveform design – This talk focuses on requirements of new waveforms and investigates the potential candidate waveforms based on performance in different frequency bands and various deployment use cases e.g., terrestrial mobile, NTN, Integrated-Sensing and high-speed scenarios.

Study on AI/ML assisted PHY layer communication - This talk first provides a brief overview of how AI/ML is being used to design NR Air Interface in Rel-18. We then discuss how AI/ML can be used for incorporating integrated sensing and communications (ISAC) and IRS for Rel-19 and beyond.

The profile of the speakers is given below:

- ***Prof Ajit K Chaturvedi*** *is currently a Professor at IIT Kanpur. He has held the positions of Sanjay and Rachna Pradhan Chair Professor, Head of the Department of Electrical Engineering, Dean of Research and Development and Deputy Director at IIT Kanpur. Prof Chaturvedi has also been the Director of IIT Roorkee, IIT Mandi and IIAS Shimla. He was the Coordinator of BSNL-IITK Telecom Centre of Excellence which has done several projects for the Indian telecom sector. He is a recipient of INSA Teachers award, Distinguished Teacher award of IIT Kanpur and Tan Chin Tuan Fellowship of Nanyang Technical University, Singapore. Prof Chaturvedi is a founding member of TSDSI. He was a member of the DoT committee which recommended criteria for spectrum allocation to telecom operators, in 2008.*

- ***Dr Rohit Budhiraja*** *is currently an Associate Professor in IIT Kanpur, where he led the effort to design the indigenous 5G network. He is also currently leading the 5G and beyond standardization project from IIT Kanpur. From 2004 to 2011, he worked for two companies, where he designed, from scratch, both hardware and software algorithms, for WiMAX- and LTE-based cellular systems. His theoretical interests are in analyzing and optimizing state-of-the-art wireless systems.*

- ***Mr Shyam Vijay Gadhai*** *is currently working as Project Executive Officer in 5G+/6G research and standardization project at IIT Kanpur. He is a 3GPP RAN1 delegate contributing to Release-18 Network-Controlled Repeater. He has worked as a 5G PHY layer development engineer at Qualcomm India Pvt. Ltd. His research interests include MIMO systems, smart repeaters, reconfigurable intelligent surfaces, integrated sensing and communications, etc.*

- ***Mr Jyotirmay Saini*** *is currently working as Senior Project Engineer in the 5G+/6G research and standardization project at IIT Kanpur. He is contributing to the positioning framework in 3GPP as a RAN delegate. He has contributed to the development of Indigenous 5G Testbed at IIT Kanpur. His research interests include localization and sensing, repeaters, reconfigurable intelligent surfaces.*

- ***Ms Ashna Kumari Banka*** *is currently working as Senior Project Engineer in the 5G+/6G research and standardization project at IIT Kanpur. Her research interests include MIMO evolution, and study of possible new waveforms for the next generation communication systems.*

- ***Mr Abhishek Kumar Singh*** *is working as Project Executive Officer in 5G+/6G research and standardization project group at IIT Kanpur and is a RAN1 delegate at 3GPP contributing towards AI/ML for NR Air Interface. His interests include AI/ML application for PHY layer enhancement, integrated sensing and communications, intelligent reflective surfaces, satellite assisted terrestrial Communication, and CSI enhancements.*

- ***Mr Guna B Shekar*** *is a Telecom, Storage & Networking professional with a VLSI design background. He has spent about 18 years at LSI Logic (now Broadcom) and about 5+ years at various Silicon Valley ASIC Startups at various senior management roles. He is currently consulting part time with TSDSI. He is also involved with many other startups working on solving interesting tech problems related to data centre infrastructure and telecom hardware in general.*

- ***Dr Samar Shailendra*** *is the Senior Standards Architect at Intel and the lead standards delegate at India and 3GPP SA6 (Application Enablement and Critical Communication Applications). He is also working as Visiting Professor at IIIT Bangalore. Currently, he is the Co-chair of TSDSI Roadmap Committee and Vice-Chair of TSDSI Study Group - Networks.*