

5G: Scenarios and Technology Solutions

Overview

Recent market studies indicate that mobile data traffic has doubled every year. Projecting this demand ten years ahead, we are faced with the so-called 1000x data challenge or capacity crunch, justified by several trends, such as increase in the number of mobile devices and increased penetration of IoT sensors and meters. Existing radio access solutions may not fulfil these demands, as ITU suggests.

The next generation mobile communication (5G) is currently at its formative years. The challenge that 5G poses is to create a technology solution that will meet the future demand of 1000 times the capacity of present networks and have end to end delay several times less than present network. There is also demand to support a wide variety of scenarios including machine type communication, high reliability links, tactile internet, high bit rate data pipes, flexible spectrum access, low out of band emission, low power consumption, etc. Towards this end, solutions are required in different dimensions. Developments in new radio access technology / waveforms, spatial dimension (massive multiple input multiple output (MIMO)), higher frequency band (mmWave), heterogeneous networks, extremely dense frequency reuse along with intelligent interference management and spectrum utilization methods and cloud services such as cloud based radio access network (RAN) are expected to be major contributors to the solution space.

Lectures will be delivered by internationally renowned faculties from India and abroad. The aim of this course is to provide a description of the requirements of 5G, cover fundamental aspects of evolution of RAN as well as the RAT towards 5G. This course is organized in four modules that should be taken together. The topics in Module 1 will expose the participants to the drivers and requirements of 5G. In Module 2, the PHY aspects of 5G will be discussed. The 5G envisioned topologies and related radio resource allocation aspects will be the subject of Module 3. New theoretical insights on communication networks coming from stochastic geometry, artificial intelligence and complex systems science will be discussed in Module 4.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants.

Modules	1: 5G Drivers and Requirements : June 21 – June 23 2: 5G PHY : June 24 – June 28 3: 5G Topology : June 29 – June 30 4: New Theoretical Insights : July 1 – July 5 Number of participants for the course will be limited to fifty.
You Should Attend If...	<ul style="list-style-type: none"> ▪ You are aB.E./ B.Tech / M.Tech / PhD student within the broad domain of Telecommunication Engineering, with a focus on Wireless Communications and Networking. ▪ You are a Researcher from both industry and academia involved in broadband and IoT wireless communications, particularly in signal processing/PHY, topology and their implications and interplay at system level resource allocation
Fees	The participation fees for taking the course is as follows: Participants from abroad : US \$500 Industry/ Research Organizations: Rs. 30000 Academic Institutions: Rs. 10000 The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Dr. Nicola Marchetti is Assistant Professor in Wireless Communications at Trinity College Dublin, Ireland, and is a senior researcher of CONNECT, the Irish National Centre for Future Networks and Communications. He received the Ph.D. in Wireless Communications from Aalborg University, Denmark, and holds two M.Sc. in Electronic Engineering and Mathematics. His research interests include: 5G Wireless Communication Systems, Dynamic Spectrum Access, Complex Systems Science. He authored in excess of 70 journals and conference papers.



Dr. Suvra Sekhar Das is Assistant Professor in the G. S. Sanyal School of Telecommunications, Indian Institute of Technology Kharagpur since 2008. He has received PhD in Wireless Communications from Aalborg University, Denmark. His research topics broadly covers Radio Access Networks and Radio Access Technology with a current focus on 5G. He holds several international patents, has co-authored two books on broadband wireless communication, and has authored more than 60 journal and conference papers.

Course Co-ordinator

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