

Evolution of Wireless Communication towards 5G

Overview

The 3rd Generation Partnership Project (3GPP) is now finalizing the requirement specifications of the 5th generation (5G) of mobile communication systems. The important technologies under consideration are; new waveforms, device-to-device (D2D), mm Wave communication, ultra-dense networks (UDN), massive MIMO, full duplexing, dynamic spectrum access and sharing. This course is very timely and relevant, as it comes at a crucial time of the 5G standardization process, and will discuss in detail the above-mentioned key 5G technology components. The need for 5G is mainly caused by the advent of the mobile Internet has led to phenomenal growth of the mobile data traffic over the past few years. As the features of the envisioned technologies and services of 5G mobile communication systems dictate, this trend is expected to continue for the years to come. Developments in new radio access technology / waveforms, spatial dimension (massive MIMO), higher frequency bands (mmWave), heterogeneous and extremely densely deployed networks, along with intelligent interference management and dynamic spectrum access and sharing methods and cloud services and architectures such as the cloud Radio Access Networks (RAN) are expected to be major contributors to the solution space

This course is organized in four modules that should be taken together. The topics in Module 1 will expose the participants to the 5G Component Technologies. In Module 2, Overview of 5G PHY and latest research trends like MIMO Technologies, Novel waveform engineering (GFDM, FBMC). In Module 3, Overview of 5G topology & RRM and latest research trends like HetNet and Small cell Networks, Cloud RAN, D2D, and Licensed Shared Access (LSA). In Module 4, New Theoretical Insights like Stochastic Geometry, Dense small cell networks, Complex systems science-based modeling and analysis of 5G networks, Complex systems science-based modeling and analysis of IoT networks, Game theoretical approach to Massive MIMO.

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: Introduction to 5G wireless systems : May 7 - May 8 2: Overview of 5G PHY and latest research trends : May 8 - May 11 3: Overview of 5G topology & RRM and latest research trends : May 12 - May 14 4: New Theoretical Insights : May 15 - May 17 Number of participants for the course will be limited to fifty.
You Should Attend If...	This course is designed for B.Tech / M.Tech / PhD students, researchers from both industry and academia involved in broadband and IoT wireless communication within the EE and telecommunication domain.
Fees	The participation fees for taking the course is as follows: <i>Participants from abroad:</i> <ul style="list-style-type: none"> • Any two modules : US \$500 • All modules : US \$750 <i>Industry/ Research Organizations:</i> <ul style="list-style-type: none"> • Any of two modules : Rs. 10000/- • All modules : Rs. 15000/- <i>Academic Institutions:</i> <ul style="list-style-type: none"> • Teachers: <ul style="list-style-type: none"> ○ Any Two modules : Rs 6000/-

- All modules : Rs. 10000/-
- Students:
 - All modules : Rs. 1000/-*

*** Only returnable DD to be sent but online payment for registration fees is not allowed for the Students.**

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 early registration and request.

The Faculty



Dr. Nicola Marchetti is Assistant Professor in Wireless Communications at Trinity College Dublin, Ireland, and is a senior researcher of the CONNECT National Centre for Future Networks and Communications. He has 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, Cognitive Radio and Dynamic Spectrum Access, Complex Systems Science, Integrated Optical-Wireless Networks, Massive MIMO Systems, Radio Resource Management, Ultra Dense Networks, and Waveforms. He authored in excess of 90 journals and conference papers.



Dr. Suvra Sekhar Das is an Associate Professor of G. S. Sanyal School of Telecommunications, IIT Kharagpur. He has received the B.E. degree in electronics and communication engineering from Birla Institute of Technology, Ranchi, India, in 2000 and the Ph.D. degree from Aalborg University, Aalborg, Denmark, in 2007. His research interest includes cross-layer

optimization of mobile broadband cellular networks. He holds several international patents, has co-authored three books on broadband wireless communication, and has authored more than 64 journal and conference papers.

Course Co-ordinator

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