

# Distinguished Lectures

## Spring 2024



### Dr. Monisha Ghosh

Professor of Electrical Engineering  
University of Notre Dame, and  
Policy Outreach Director for SpectrumX  
(NSF Center for Spectrum Innovation)

## Spectrum Challenges for the Next Generation of Wireless Systems: Sharing between Commercial, Federal and Scientific Users

**Monday, March 25, 2024**

**Reception with Refreshments: 10:30 a.m.**

**Lecture: 11:00 - 12:00 a.m.**

**LSC University Ballroom**

## Real-world Performance of 4G and 5G in mmWave, Mid-band and Shared Spectrum (CBRS)

**Tuesday, March 26, 2024**

**Lecture: 9:30-10:30 a.m.**

**LSC 376-8**

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**Colorado State University's Information Science  
and Technology Center (ISTeC)**

In conjunction with the Department of Computer Science and  
Department of Electrical and Computer Engineering Seminar Series

### Abstracts

#### *Spectrum Challenges for the Next Generation of Wireless Systems: Sharing between Commercial, Federal and Scientific Users*

The electromagnetic spectrum, from about 10 kHz to 1 THz, is used for a variety of services, of which commercial terrestrial wireless systems, primarily cellular and Wi-Fi, occupy only a small portion. Other uses of spectrum are less visible to consumers, but equally important, for example, scientific uses like radioastronomy and weather forecasting, and federal uses for safety and life-critical applications, including GPS. Each one of these services have increasing spectrum needs, which are becoming more difficult to manage using the traditional approaches of spectrum allocation, leading to spectrum conflicts such as the recent one between 5G and aircraft altimeters. This talk will provide an overview of the spectrum challenges faced by both regulators and technologists as the next generation of systems are being developed, along with potential solutions that harness technological advancements that permit spectrum sharing between different use-cases.

#### *Real-world performance of 4G and 5G in mmWave, mid-band and shared spectrum (CBRS)*

As 5G deployments increase in the newly allocated mid-band and mmWave spectrum, and discussions on 6G begin, it is important to characterize real-world performance of the enhancements made to 5G to determine how best to design the next generation of cellular networks. For example, how well does massive MIMO work in the real-world? How is sharing in CBRS performing? In this talk we will present recent results from detailed measurements of 4G and 5G in the various bands: mmWave (> 24 GHz), mid-band (2.5 - 3.98 GHz) and CBRS (3.55 - 3.7 GHz). Our studies demonstrate that mmWave 5G is severely limited in coverage, especially indoors, while performance of 5G in mid-band also depends on network densification, contrary to popularly held beliefs. Our studies in CBRS show that secondary co-channel sharing as well as adjacent channel interference from high power deployments pose fundamental challenges for cellular networks in shared spectrum. We conclude with some directions for future network design based on our research that will allow 6G to be "sharing native".

### Speaker Biography

Monisha Ghosh is a Professor of Electrical Engineering at the University of Notre Dame and a member of the Notre Dame Wireless Institute. She is also the Policy Outreach Director for SpectrumX, the first NSF Center for Spectrum Innovation and the co-chair of the FCC's Technological Advisory Council (TAC) Working Group on Advanced Spectrum Sharing. Her research interests are in the development of next generation wireless systems: cellular, Wi-Fi and IoT, with an emphasis on spectrum sharing and coexistence and applications of machine learning to improve network performance. Prior to joining the University of Notre Dame in 2022, she was the Chief Technology Officer at the Federal Communications Commission, a Program Director at the National Science Foundation, Research Professor at the University of Chicago and spent 24 years in industry research at Bell Labs, Philips Research and Interdigital working on a wide variety of wireless systems: HDTV, Wi-Fi, TV White Spaces and cellular. She obtained her B.Tech from IIT Kharagpur in 1986 and Ph.D. from USC in 1991. She is a Fellow of the IEEE.

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To arrange a meeting with the speaker, please contact Prof. Anura Jayasumana <[Anura.Jayasumana@colostate.edu](mailto:Anura.Jayasumana@colostate.edu)>.