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Massive MIMO systems for 5G and beyond networks

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With globalization, networks today are facing high traffic demands, cellular base stations and wireless LANs (Local Area Network) are available almost everywhere. To meet this rising global demand, higher area throughput is required. The wireless area throughput can be increased by improving spectral efficiency, cell density, or bandwidth. Starting from the development of the wireless network, either bandwidth or cell density has been increased to meet the increasing global demands. However, these resources (bandwidth and cell density) are reaching their saturation point. Furthermore, the increase in bandwidth and cell density makes the system more expensive, increases latency, and decreases the signal-to-noise ratio. However, with all these improvements, the third factor affecting area throughput, i.e., spectral efficiency has remained mostly untouched and unchanged. To achieve the goals of the 5G, B5G (Beyond 5G), and 6G network, it is highly desirable to improve the area throughput by increasing the spectral efficiency rather than by increasing bandwidth or cell density. Massive MIMO (Multiple Input Multiple Output) is a technique that increases the spectral efficiency of cellular networks by deploying hundreds or thousands of antennas at base stations and performing coherent transceiver processing. The massive MIMO system brings together antennas at both base stations and the user terminals to provide high spectral efficiency. It provides benefits such as low latency, high data rate, and improved array gain. Obtaining a better understating of the massive MIMO system to overcome the fundamental issues of this technology is vital for the successful deployment of 5G, B5G, and 6G networks. This poster will present a brief overview of the key enabling technologies required for future generation networks, highlighting the massive MIMO systems. It will also outline some new trends in massive MIMO systems such as ultra-massive MIMO (UM-MIMO), visible light communication (VLC), terahertz communication, 5G Artificial Intelligence, MIMO, machine learning, and deep learning for massive MIMO systems.

Biography

Robin Chataut is an assistant professor in the Department of Computer Science at Fitchburg State University, Massachusetts, USA. He obtained his undergraduate degree in Electronics and Communication Engineering from Pulchowk Campus, Tribhuvan University, Nepal in 2014, and his Ph.D. in Computer Science and Engineering from the University of North Texas, Texas, USA, in 2020. Prior to completing his Ph.D., he was a senior software developer for Jhilko Innovations, designing android apps for autistic children. His research interests are in the areas of wireless communication and networks, 5G, 6G, and beyond networks, vehicular communication, smart cities, Internet of Things, wireless sensor networks, and network security. He has designed, implemented, and optimized several algorithms and hardware architectures for preceding, detection, user scheduling, channel estimation, and pilot contamination mitigation for massive MIMO systems for 5G and beyond networks. He has authored and co-authored several research articles. He is an active reviewer in several international scientific journals and conferences.