

An Adaptive User Scheduling Algorithm for 6G Massive MIMO Systems

Robin Chataut*, Robert Akl**

*School of Computing and Engineering, Quinnipiac University, Hamden, CT, 06518, USA

**College of Engineering, University of North Texas, Denton, Texas, 76207, USA

robin.chataut@quinnipiac.edu, Robert.Akl@unt.edu

Abstract— Massive MIMO (Multiple-Input Multiple-Output) is a promising wireless access technology that has emerged as a solution to the ever-increasing demand for network capacity. Massive MIMO is expected to play a crucial role in the deployment of 5G and upcoming 6G networks, enabling the realization of their full potential capacity. Despite the numerous benefits, user scheduling during downlink communication in Massive MIMO systems is a challenging task due to the large number of antenna terminals. In this paper, we propose a novel scheduling algorithm aimed at improving the area throughput, sum capacity, error performance, and ensuring fairness among all users. The proposed algorithm uses the average channel rate as the scheduling criteria, which is calculated from the channel state information obtained from the users during uplink transmission. To evaluate the performance of our proposed algorithm, we conducted simulations using Matlab. Our results demonstrate that our proposed channel rate-based scheduling algorithm is superior to conventional scheduling algorithms in terms of sumrate, throughput, and bit error performance while also ensuring fairness among all users. The proposed algorithm can address the challenge of user scheduling in Massive

MIMO systems and contribute to the efficient deployment of 5G and 6G networks. The ability to improve system capacity, area throughput, and provide fairness in communication is of great importance in meeting the high demands of future wireless networks. Our approach could pave the way for further research in improving the performance of Massive MIMO systems, thereby advancing the potential of 5G and 6G networks.

Keywords—Massive MIMO, 5G, 6G, user scheduling, sumrate, fairness



Robin Chataut is an assistant professor in the School of Computing and Engineering at Quinnipiac University, 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 worked in software industry as senior software developer.

His research interests are in the areas of wireless communication and networks, cybersecurity, 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 precoding, 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.



Robert Akl received his B.S. in Computer Science and B.S. in Electrical Engineering in 1994, his M.S. in Electrical Engineering in 1996, and his D.Sc. in Electrical Engineering in 2000, all from Washington University in Saint Louis. He is currently a Tenured Associate Professor at the University of North Texas and a Senior Member of IEEE. He has designed, implemented, and optimized both hardware and software aspects of several wireless communication systems for cellular, Wi-Fi, and sensor networks.

Dr. Akl has broad expertise in wireless communication, Bluetooth, Cellular, Wi-Fi, VoIP, telephony, computer architecture, and computer networks. He has been awarded many research grants by leading companies in the industry and the National Science Foundation. He has developed and taught over 100 courses in his field. Dr. Akl has received several awards and commendation for his work, including the 2008 IEEE Professionalism Award and was the winner of the 2010 Tech Titan of the Future Award.