

An Adaptive User Scheduling Algorithm for 6G Massive MIMO Systems

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Abstract—Massive Multiple-input Multiple-output (MIMO) is a sub-6GHz wireless access technology and is one of the key enabling technology for current 5G and upcoming 6G networks. Massive MIMO technology is also considered crucial for realizing the potential capacity of upcoming 6G and beyond networks. However, with hundreds of antenna terminals, user scheduling during downlink communication is one of the major challenges in massive MIMO system deployment. In this paper, we propose a novel scheduling algorithm that improves the area throughput and error performance and ensures fairness among all users. Our scheduling method uses the average channel rate as the scheduling criteria, which is obtained from the channel state information provided by the users during the uplink communication. The results from the Matlab simulations convey that the proposed algorithm based on channel rate is fair and better than the conventional scheduling algorithms as it provides better sumrate, throughput, and bit error performance.

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



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 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.



Utpal Kumar Dey received his B.Sc. in Computer Science and Engineering from Khulna University of Engineering and Technology, Khulna, Bangladesh in 2014. In 2016 he started working in Bangladesh University, Dhaka, Bangladesh as a Lecturer until his journey towards PhD. He joined University of North Texas, Texas, USA as a PhD candidate in 2017.

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