Title：Orbital Angular Momentum for Wireless Communications: Theory，Challenge，and Future Trends

Abstract:

It is now very difficult to use the traditional plane-electromagnetic (PE) wave based wireless communications to satisfy the ever-lasting capacity demand growing. Fortunately, the electromagnetic (EM) wave possesses not only linear momentum, but also angular momentum, which includes the orbital angular momentum (OAM). The orbital angular momentum (OAM), which is a kind of wave front with helical phase and has not been well studied yet, is another important property of EM wave. The OAM-based vortex wave has different topological charges, which are independent and orthogonal to each other, bridging a new way to significantly increase the capacity of wireless communications. This proposal will be discussing the fundamental theory of using orbital angular momentum (OAM) for wireless communications. This proposal would start with the background introduction on what is OAM based wireless communication and how OAM is important in current and future wireless communications. Then, the fundamental theory of OAM will be elaborated on in details, including OAM versus MIMO, OAM signal generation/reception, and OAM beam converging. Moreover, we would also like to share our latest research progress regarding how to apply OAM into wireless communications, including mode modulations, OAM mode convergence, mode hopping, OAM based MIMO, orthogonal mode division multiplexing, concentric UCAs based low-order OAM transmission, degree of freedom in mode domain as well as orthogonally of OAM mode. Finally, the applications of OAM based wireless communication are also discussed.

Speaker's Biography:

Wenchi Cheng, Sate Key Laboratory of Integrated Service Networks, Xidian University, Xi'an, China

Wenchi Cheng (M'14) received B.S. degree and Ph.D. degree in Telecommunication Engineering from Xidian University, China, in 2008 and 2014, respectively, where he is an Associate Professor. He joined Department of Telecommunication Engineering, Xidian University, in 2013, as an Assistant Professor. He worked as a visiting scholar at Networking and Information Systems Laboratory, Department of Electrical and Computer Engineering, Texas A&M University, College Station, Texas, USA, from 2010 to 2011. His current research interests include 5G/B5G wireless networks and orbital-angular-momentum based wireless communications. He has published

more than 60 journal and conference papers in IEEE Journal on Selected Areas in Communications, IEEE Magazines, IEEE Transactions, IEEE INFOCOM, GLOBECOM, and ICC, etc. He received the Young Elite Scientist Award of CAST, the Best Dissertation (Rank 1) of China Institute of Communications, the Best Paper Nomination for IEEE GLOBECOM 2014, and the Outstanding Contribution Award for Xidian University. He has served or serving as the Associate Editor for IEEE Access, Mobile Information Systems, IEEE ICC 2019 Publicity Chair, IEEE ICCC 2017 IoT workshop co-chair, TPC member for IEEE INFOCOM, GLOBECOM, and ICC.