Abstract

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# Deep-Q network-aided adaptive mmwave multi-user noma user selection and symbol detection

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## Abstract

Given the benefit of massive connectivity, improved user fairness and spectral efficiency, non-orthogonal multiple access (NOMA) has become a promising candidate of multiple access (MA) technology for beyond 5G networks. By exploiting the channel disparities, NOMA is capable of serving multiple users sharing same time-frequency resources by exploiting superposition coding at the transmitter as well as successive interference cancellation (SIC) at the receiver. Furthermore, with the directional transmission employed for mmWave systems, it is highly likely that multiple users share the same spatial beam. In this scenario, the NOMA assisted transmission can be employed for MA by exploiting the power-domain, i.e. channel disparities, of the users sharing the specific beam.

In the state-of-the-art NOMA systems, SIC assisted detection is employed relying on the simplifying assumption of having perfect CSI at the receiver. However, in the face of channel impairments, the SIC assisted detection degrades the performance because of the error propagation nature observed in SIC, which is highly sensitive to the CSI imperfections.
Additionally, as the number of users in the cluster grow large, the co-channel interference further degrades the performance owing to both SIC complexity and error propagation. This degradation is even more pronounced if the non-linear components introduced by the hardware are considered. Owing to these reasons, it becomes crucial to employ machine learning techniques for jointly modeling the CSI impairments and SIC

## Biography

Dr. Satyanarayana (Satya) received the Bachelor's degree in electrical engineering from the Indian Institute of Technology (IIT) Madras, India, in 2014. He obtained his Ph.D. degree in wireless communications from the University of Southampton, UK, in liaison with InterDigital, London, in 2019. In his Ph.D. thesis, Satya fo- cused on developing PHY algorithms for mm Wave transceiver systems with fusion of arti_cial intelligence. He was a runner-up for the 3-minute thesis competition held at University of Southampton. During July 2014{August 2015, Satya worked as a research assistant at the In-dian Institute of Science (IISc), Bangalore. In the year 2018-2019, he participated in IRACON-COST workshops aimed at mmWave MIMO systems, where he was awarded several grants. Satya have had co-authored 18 publications in IEEE peer-reviewed journals and conferences. He is the co-inventor of 10 patent applications pivoted on both beyond 5G networks as well as IEEE 802.11 systems. Satya served as a technical program member for agship conferences, such as ICC'21 and Globecom'21.