Master Project 2020

SCEE Team, Centralesupélec (campus de Rennes)

Joint Resource/Power Allocation using deep learning for Multi Carrier-NOMA Systems

Non-Orthogonal Multiple Access (NOMA) has been recently proposed as a promising multiple access method for 5G to avert radio resource shortage due to a huge increase of the number of connected devices expected within the next few years. NOMA has attracted extensive attention in both academia and industry due to its capability to bring substantial spectral efficiency gains. Unlike traditional Orthogonal Multiple Access (OMA) techniques, deployed in the current LTE networks, with NOMA, many users can be served at different power levels while simultaneously reusing a given resource block in time, frequency and space. Successive interference cancellation (SIC) is then applied at the receiver(s) to decode the message signals.

As both dense deployment of small cells in 5G networks and the non-orthogonality in resource sharing bring severe interference, receivers may suffer from high complexity. Therefore, ***utilization of hybrid multiple access methods combining NOMA and Orthogonal Frequency Division Multiple Access (OFDMA) appear as a good compromise choice*** ensuring massive connectivity, and high spectral efficiency in presence of a negligible amount of interference.

The objective of the project is to solve a power minimization problem in the downlink of a power domain based multi-carrier NOMA system. For instance, we aim to develop a joint optimal solution of subcarrier assignment and power allocation. As this kind of joint resource allocation problems have very high computational complexity, deep learning methods have to be exploited in order to solve this particular fundamental highly complex problem.

Contacts

Haïfa Farès (SCEE team, IETR Lab, CentraleSupélec) : haifa.fares@centralesupelec.fr
(http://www.scee.rennes.supelec.fr/wp/)