Abstract:

A standard NCM (Network Coded Modulation) for WNC (Wireless Network Coding) with HDF (Hierarchical Decode & Forward) strategy requires that each node has full knowledge of the connectivity pattern to other nodes and this knowledge affects the design of NCM and HNC (Hierarchical Network Code) maps at each transmitting (source) and receiving (relay) node respectively. The final destination has to have full knowledge of all HNC maps used and the composite overall HNC map needs to be invertible to recover the source data. This approach collapses if nodes do not have a full knowledge of the connectivity pattern and thus cannot adjust their HNC maps properly. We design the NCM and HNC maps for WNC with HDF strategy that works regardless of this knowledge. It is based on a concept of a channel class which is a discrete (random) parameter describing the channel behavior and which becomes a part of HNC maps and the NCM hierarchical constellation. We analyze the rate regions for this design and compare it to the standard NCM and HNC map solution suffering from random channel outages.