

Wireless (Physical Layer) Network Coding in 5-node Butterfly Network: Superposition Coding Approach

Author(s) - Institution(s):

Tomas Uricar, CTU
Jan Sykora, CTU
Bin Qian, HKUST
Wai Ho Mow, HKUST

Corresponding author email: uricatom@fel.cvut.cz

Corresponding WG group: SWG2.1

Abstract:

The availability of some specific form of side information is a crucial assumption for an application of Wireless Network Coding (WNC)/Physical Layer Network Coding (PLNC) principles in any wireless network. This “Hierarchical” Side Information (HSI) is required to enable a successful decoding of the desired data from the received hierarchical (WNC-coded) data stream at the destination node. In some basic network topologies (e.g. 2-Way Relay Channel), the HSI is made naturally available by storing the data sent in the previous communication round in the node's buffer. Unfortunately, this is not always possible in more advanced wireless network scenarios, where the HSI can be obtained only by overhearing the wireless transmission(s) from the unintended source(s). In such cases the amount of HSI would be obviously limited by the quality of the corresponding (source-destination) wireless link(s), and hence any WNC-based processing must take this partial availability of HSI into account. In this paper we will demonstrate this phenomenon on an example of 2-source, 5-node wireless butterfly network, where a superposition coding scheme will be introduced as a viable approach for the WNC-based relaying with generally partially available HSI.