

Self-management for cooperative transmission

Michał Wódczak

Telcordia Poland Sp. z o.o.

ul. Umultowska 85

61-614 Poznań

Poland

mwodczak@telcordia.com

Cooperative transmission has been receiving a lot of interest recently [1]. It stems from the idea of extending the coverage of a base station or an access point with the use of relay nodes. Initially there were single relay nodes considered to be placed at fixed positions and these assisted the transmission between the base station or access point and the destination user terminal. This concept evolved and soon cooperative techniques were introduced where the direct transmission between the source and the destination node is additionally enhanced with the aid of an additional retransmission performed by the relay node. One can envisage a number of such relay nodes that can be grouped into tiers, also known as virtual antenna arrays (Fig. 1), so multi-hop setups can be analyzed [2].

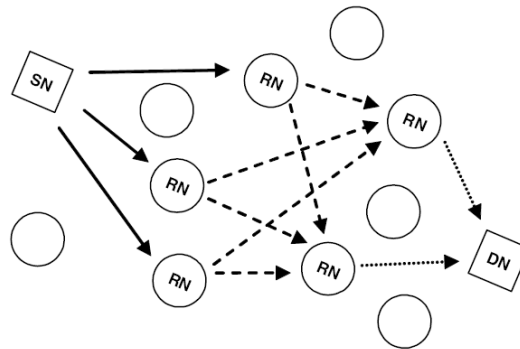


Fig. 1 Multi-tiered cooperative transmission system

A question arises which nodes to choose and how to perform the assignment to different virtual antenna arrays. Some efforts have been made to exploit additional information readily available at the network layer in order to facilitate the selection for one-tier systems [3], where the selection and assignment can be easily performed by the source node.

However, in the case of multi-tier set-ups it seems rather difficult for one node to take care of the overall control. What is more there would be an additional control overhead to be handled which could affect the system performance. The idea behind the concept of self-management for cooperative transmission would be then to make it feasible for the different groups of

nodes to employ some relevant self-management techniques. As a consequence each node would know which group to attach to, which resources to use and what transmission technique(s) to apply. For this reason the nodes would have to be aware of their context in the network and they would have to exchange all the relevant information.

[1] J. N. Laneman and G. W. Wornell, "Distributed space-time-coded protocols for exploiting cooperative diversity in wireless networks," *IEEE Transactions on Information Theory*, vol. 49, no. 10, pp. 2415–2425, Oct. 2003.

[2] M. Dohler, A. Gkelias, and H. Aghvami, "A resource allocation strategy for distributed MIMO multi-hop communication systems," *IEEE Communications Letters*, vol. 8, no. 2, pp. 99–101, Feb. 2004.

[3] M. Wodczak, „Extended REACT – Routing information Enhanced Algorithm for Cooperative Transmission”, IST Mobile and Wireless Communications Summit 2007