

## **Cooperative Relay with Interference Alignment for Video over Cognitive Radio Networks**

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### **Abstract**

Due to the drastic increase in wireless video traffic, the capacity of existing and future wireless networks will be greatly stressed, while interference will become the dominant capacity limiting factor. In this paper, we investigate cooperative relay in CR networks using video as a reference application. We incorporate interference alignment to allow transmitters collaboratively send encoded signals to all CR users, such that undesired signals will be canceled and the desired signal can be decoded at each CR user. We present a stochastic programming formulation, as well as a reformulation that greatly reduces computational complexity. In the cases of a single licensed channel and multiple licensed channels with channel bonding, we develop an optimal distributed algorithm with proven convergence and convergence speed. In the case of multiple channels without channel bonding, we develop a greedy algorithm with a proven performance bound. The algorithms are evaluated with simulations and are shown to achieve considerable gains over two heuristic schemes that do not consider interference alignment.

### **Bio**

Donglin Hu received his Ph.D. degree in Electrical and Computer Engineering and the M.S. degree in Probability and Statistics from Auburn University, Auburn, AL, in 2012 and 2011, respectively. He also received the M.S. degree from Tsinghua University, Beijing, China, in 2007 and the B.S. degree from Nanjing University of Posts and Telecommunications, Nanjing, China in 2004, respectively, all in electrical engineering. His research interests include cognitive radio networks, femtocell networks, network modeling, cross-layer design, performance analysis, and algorithm optimization for wireless networks and multimedia communications.

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