

论文与技术报告

放大转发协同OFDM系统中的时域信道估计算法

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摘要:

考虑到在复杂街区环境中由于距离太远或者障碍物阻挡等原因, 造成源节点和目的节点之间没有直接链路, 而是利用多个中继进行协同传输的情景, 该文针对放大转发协同OFDM系统, 提出了一种时域信道估计算法。不同于传统的频域信道估计, 该文利用一种特殊的梳状导频以及在中继节点上对导频做简单变换, 通过时域的相关处理估计源节点经每一个中继节点到目的节点之间的等效信道冲激响应。在此基础上, 为减小来自中继节点和目的节点的等效噪声对信道估计性能的影响, 提出了时域LMMSE (Linear Minimum Mean Square Error) 估计及其简化形式, 并推导了相应的Cramér-Rao界 (CRB)。仿真结果表明, 该文算法具有较好的均方误差性能; 与直接时域信道估计相比, 该文提出的简化时域LMMSE估计更接近于CRB。

关键词: 放大转发; 正交频分复用; 时域; 信道估计; Cramér-Rao界

Time Domain Channel Estimation for OFDM-Based Amplify-and-Forward Cooperative Networks

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Abstract:

Consider the scene that in a street environment, there is no direct channel between the source node and the destination node because of distance or obstacles, and it needs some relay nodes to do the cooperative communications. In this paper, we propose a time domain channel estimation method for an OFDM-based amplify-and-forward (AF) cooperative network. Different from the traditional frequency domain channel estimation, utilizing the special comb-type pilots and a simple transformation to the pilot subcarriers at each relay node, we do the time domain correlation processing to estimate the equivalent channel impulse response (CIR) from the source node to the destination node via each relay node. Based on this method, in order to reduce the effects of the equivalent noises from each relay node and the destination node, we propose two kinds of channel estimation methods, which are the time domain linear minimum mean square error (LMMSE) channel estimation and its simplified expression. Also, the corresponding Cramér-Rao bound (CRB) is derived. Simulation results show that our proposed methods have good MSE (Mean Square Error) performance. Compared with direct time domain channel estimation method, the simplified time domain LMMSE channel estimation is closer to the CRB.

Keywords: Amplify-and-forward OFDM Time domain Channel estimation; Cramér-Rao bound

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