

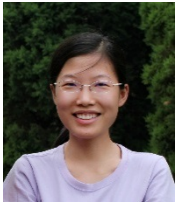
Superimposed Training and Channel Estimation for Two-Way Relay Networks

Xiaoyan Xu, Jianjun Wu, Jianbo Li, Shubo Ren and Haige Xiang

* *Institution of Advanced Communications, EECS, Peking University, Beijing, China*
g.ericaxu@gmail.com, xianghg@pku.edu.cn

Abstract—In this paper, the superimposed training strategy is introduced into the OFDM modulated amplify-and-forward (AF) two-way relay network (TWRN) to simplify the channel estimation at the destination, and the closed-form Bayesian Cramér-Rao lower bound (CRLB) is derived for the estimation of block-fading frequency-selective channels, which is used to guide the optimal training design. Through the superposition of an additional training vector at the relay under certain power allocation scheme, the separated channel information can be obtained directly at the destination. The Bayesian CRLB is derived for the random channel parameters, and orthogonal training vectors from the two source nodes are required to keep the Bayesian CRLB practical, due to the self-interference in the TWRN. A set of training vectors obtained from the minimization of the Bayesian CRLB are applied in a specific suboptimal channel estimation algorithm, and the mean-square error (MSE) performance is provided to verify the Bayesian CRLB results.

Keyword—Two-way relay, channel estimation, Bayesian Cramér-Rao lower bound(CRLB), training design, mean-square error.



Xu Xiaoyan, received her bachelor degree in electrical engineering from Peking University, Beijing, China, in 2008. Since 2008, she has been a PhD candidate in Institution of Advanced Communications, Peking University, China. Her research interests are in the area of satellite mobile communications and wireless communications, such as MSS based on LTE, compressive sensing, cooperative communications. Email: g.ericaxu@gmail.com.



Xiang Haige, received the bachelor of Engineering in Electronics from Peking University, Beijing, P. R. China, in 1964. Since 1964, he has been a professor at Electronics Department at Peking University. His research interests include information theory, wireless communications, channel coding, signal processing in communications and satellite communications. Professor Xiang is a member in IEEE. Email: xianghg@pku.edu.cn