Prediction of Optimal Power Allocation for Enhancing Security-Reliability Tradeoff with the Application of Artificial Neural Networks

Submitted by aekwall on Thu, 05/13/2021 - 11:33am

Title	Prediction of Optimal Power Allocation for Enhancing Security-Reliability Tradeoff with the Application of Artificial Neural Networks
Publication Type	Conference Paper
Year of Publication	2020
Authors	Wang, Xiaoyu, Gao, Yuanyuan, Zhang, Guangna, Guo, Mingxi
Conference Name	2020 2nd International Conference on Advances in Computer Technology, Information Science and Communications (CTISC)
Keywords	Artificial neural networks, cyber physical systems, Manganese, Metrics, physical layer security, policy-based governance, power allocation weight, power system reliability, probability, pubcrawl, Relays, reliability, Resiliency, security, security-reliability tradeoff, Signal to noise ratio, threshold-selection relay
Abstract	In this paper, we propose a power allocation scheme in order to improve both secure and reliable performance in the wireless two-hop threshold-selection decode-and-forward (DF) relaying networks, which is so crucial to set a threshold value related the signal-to-noise ratio (SNR) of the source signal at relay nodes for perfect decoding. We adapt the maximal-ratio combining (MRC) receiving SNR from the direct and relaying paths both at the destination and at the eavesdropper. Particularly worth mentioning is that the closed expression form of outage probability and intercept probability is driven, which can quantify the security and reliability, respectively. We also make endeavors to utilize a metric to tradeoff the security and the reliability (SRT) and find out the relevance between them in the balanced case. But beyond that, in the pursuit of tradeoff performance, power allocation tends to depend on the threshold value. In other words, it provides a new method optimizing total power to the source and the relay by the threshold value. The results are obtained from analysis, confirmed by simulation, and predicted by artificial neural networks (ANNs), which is trained with back propagation (BP) algorithm, and thus the feasibility of the proposed method is verified.
DOI	10.1109/CTISC49998.2020.00013
Citation Key	wang_prediction_2020

security Resiliency pubcrawl policy-based governance Metrics Reliability Signal to noise ratio Manganese power system reliability Artificial Neural Networks physical layer security Relays probability power allocation weight security-reliability tradeoff threshold-selection relay cyber physical systems