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应用

基于接收机人工噪声的物理层安全技术及保密区域分析

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摘要：

提出了一种实现无线通信物理层安全的新方法，并从信息论的角度进行了性能分析。此方法通过合法接收者发送人工噪声来干扰窃听者信道，同时通过抵消技术使得自身不受人工噪声的影响。此方法无需信道信息的反馈，能够对抗多天线的窃听者，具有强的鲁棒性。此外基于地理位置信息提出了一种“保密区域”的新概念，可以作为物理层安全的评价标准和设计准则。分析和仿真结果表明所提算法对安全性能的提升较为明显，所提“保密区域”概念能够较好的从地理位置的角度评估物理层安全性能。

关键词： 物理层安全；人工噪声；保密区域；地理位置

Secure Communications via sending artificial noise by the Receiver: Ergodic Secure Region analysis

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Abstract:

A novel approach for ensuring confidential wireless communication is proposed and analyzed from an information-theoretic standpoint. In this method, the legitimate receiver generates artificial noise (AN) to impair the intruder’s channel. This method is robust because it doesn’t need feedback of CSI and can withstand multi-antenna or colluding eavesdroppers. Furthermore, using the average signal-to-noise ratio, which is only a function of the path-loss, we determine the insecure regions, which is the geographical regions where Eve may decode the secret message. The secure region is the region where Eve cannot decode the message. To improve the probability of communicating securely, the target of our design can be the reduction of the insecure region. For each target value of the secrecy capacity, we derive the secure region for both SISO and MIMO systems when the channels are unknown to the transmitter. Analysis and simulation results in practical environments show that the proposed method has a good performance.

Keywords: Physical layer security Artificial noise Secrecy region;Geometric

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