Physical Layer Security for Visible Light Communication Systems Subject to Eavesdropper Location Uncertainty

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Abstract

Over the past decade, as the number of mobile devices connected to the Internet has increased, with primary user activities including data-intensive high-definition (HD) video streaming and cloud-based service access, the capacity demand on the wireless network has been steadily increasing. To satisfy this demand, visible light communication (VLC) systems have gained great popularity thanks to its inherent advantages, such as unlicensed wide bandwidth, high area spectral efficiency, and high security. However, even with the inherent wireless communication security of VLC systems, there is still a possibility that an eavesdropper can wiretap important/private information in large open spaces. Therefore, to secure the VLC indoor transmission, this research investigates physical layer security (PLS) in the presence of randomly located eavesdroppers. PLS is a set of techniques that enable a transmitter and a legitimate receiver to securely transmit and receive important data, eliminating the possibility of eavesdropping by utilizing the randomness of a channel between transmitter and receiver. Dealing with the random locations of eavesdroppers by using tools from stochastic geometry, various PLS transmission schemes and results, such as beamforming, light-emitting diode selection, jamming, etc., have been proposed and investigated.

Keywords: *visible light communications, physical layer security, stochastic geometry*

Biography

Sunghwan Cho received the B.S. degree (summa cum laude) in electrical engineering from the Korea Military Academy, South Korea, in 2007. He earned his M.S. degree in communications from the Georgia Institute of Technology, USA, in 2011. From 2016, he is a DPhil student in the Department of Engineering Science at the University of Oxford. From 2007, he has worked as an army officer of the Republic of Korea Army, currently holding the rank of a major.