

Nukoon Phimsen 2011: Design of Reconfigurable Random Interleavers with MAP Decoding for MPEG-4 Image Transmission System over Rician Block-Fading Channels. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Srijidtra Charoenlarnopparut, Ph.D. 86 pages.

Wireless communication is a technology in which, have been developed continuously. In particular, we are interested in the technology on the multimedia application in various aspect. This research is a part of MPEG-4 image transmission system over an indoor wireless channel, which is modeled as a Rician block fading channel. This work emphasizes on alleviating symbol burst error, as a result of the impact from fading. The problem was previously solved with random interleavers. However we found out that the system shows high complexity, and slowly. Therefore, we aim to improve random interleavers by designing a modified random interleaver, called as reconfigurable random interleaver.

We apply MPEG-4 EZW algorithm to decompose a still image into a LFS packet and the variable length 101 HFS packets. The longest packet length is 878 symbols, and the shortest packet one is 237 symbols. These packets are sent to the channel coding process and then are passed to the reconfigurable random interleaver. Instead of interleaving the whole packet, we assign a specific number of symbols to be interleaved. The results show the improvement of average PSNR around 14.5 dB compared to the results without reconfigurable random interleavers. For the longest packet, the interleaving time of the reconfigurable random interleaver is faster than that of the random interleaver more than 3 times. Consequently, the reconfiguration random interleavers not only reduce the effect of Rician block fading but also the system complexity.

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Thesis Advisor's signature