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授与した学位	博 士		
専攻分野の名称	工 学		
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学位論文の題目	A Study of Transmission Power Optimization Considering Channel Assignment for Access-Points in Wireless Local-Area Network (無線 LAN におけるチャンネル割当を考慮したアクセスポイントの送信電力最適化の研究)		
論文審査委員	教授 船 曳 信 生	教授 田 野 哲	教授 野 上 保 之
学位論文内容の要旨			
<p>This thesis presents the study of the <i>transmission power optimization method</i> considering the channel assignment for multiple <i>access-points</i> concurrent communications in <i>wireless local-area networks (WLAN)</i>.</p> <p>First, I survey the <i>IEEE 802.11</i> wireless network technologies related to this thesis, such as the <i>IEEE 802.11n</i> protocol, Linux tools for WLAN, and the software AP configuration using <i>Raspberry Pi</i>. Second, I review our previous studies related to this thesis, such as the <i>elastic WLAN system</i> and testbed implementation using <i>Raspberry Pi</i>. Third, I present experimental observations of throughput performances for various transmission powers. Fourth, I propose the <i>transmission power optimization method</i> for two concurrently communicating APs using <i>Channel bonding (CB)</i> at 2.4GHz in WLAN. It selects either the maximum or minimum power for each AP such that <i>signal-to-noise ratio (SNR)</i> is the highest. Fifth, I generalize the <i>transmission power optimization method</i> for concurrently communicating multiple APs in WLAN, with considering the channel assignment to them. To simplify the procedure, the channels of the APs are selected and fixed before optimizing the transmission powers. Finally, I implement the proposed method on the <i>elastic WLAN system testbed</i> and conduct experiments using up to four <i>Raspberry Pi APs</i> in two buildings at Okayama University. The results confirm the effectiveness of the proposal.</p> <p>This thesis is organized as follows: Chapter 1 introduces the background, motivation, and the contributions of the study in this thesis. Chapter 2 introduces <i>IEEE 802.11</i> wireless network technologies related to this thesis, including features of the <i>IEEE 802.11n</i> protocol, and software tools in the Linux operating system. Chapter 3 reviews previous related studies. Chapter 4 describes the experimental observations of throughput performance with different transmission powers. Chapter 5 presents the transmission power optimization method for two access-points concurrent communications and the evaluations. Chapter 6 presents the transmission power optimization method with channel assignment consideration for multiple access-points concurrent communications and the evaluations. Chapter 7 reviews relevant works in literature. Finally, Chapter 8 concludes this thesis with some future works.</p>			

論文審査結果の要旨

In this thesis, the applicant presented the study of the transmission power optimization method considering the channel assignment for concurrently communicating multiple access-points (APs) using Channel bonding (CB) at 2.4GHz in wireless local-area networks (WLAN).

First, he showed that either the maximum or minimum power of each AP gives the best performance of WLAN through extensive experiments of performance measurements using various transmission powers. Thus, the selection of them should be optimized for each AP with the consideration of the channel assignment,

Next, he proposed the transmission power optimization method for concurrently communicating two APs in WLAN. It selects either the maximum or minimum power for each AP such that signal-to-noise ratio (SNR) is the highest.

Then, he generalized the transmission power optimization method for concurrently communicating multiple APs in WLAN. Here, he considered the channel assignment to them.

He implemented the proposed methods on the elastic WLAN system testbed using Raspberry Pi for the AP, and conducted extensive experiments with up to four APs in two buildings at Okayama University. The results confirmed the effectiveness of the proposed methods.

The applicant has published two journal paper, two international conference papers, and four domestic conference papers to present the contributions.

From the overall evaluation of this thesis, the applicant has satisfied the qualification condition for the doctor degree in Engineering from the Graduate School of Natural Science and Technology at Okayama University.