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授与した学位	博 士		
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学位授与の要件	自然科学研究科 産業創成工学専攻 (学位規則第 4 条第 1 項該当)		
学位論文の題目	A Study of Throughput Drop Estimation Models for Concurrently Communicating Links in Wireless Local-Area Networks (無線 LAN の同時通信リンクのスループット低下推定モデルに関する研究)		
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学位論文内容の要旨			
<p>This thesis studies throughput drop estimation models for concurrently communicating links using channel bonding and non-channel bonding in wireless local-area networks.</p> <p>In this thesis, I study throughput drop estimation models for concurrently communicating multiple links using partially overlapping channels (POCs) in WLANs. Firstly, I propose the throughput drop estimation model under channel bonding (CB) links since they can offer higher throughputs in general. Secondly, I propose the throughput drop estimation model under non-channel bonding links. It has been known that CB links may reduce the transmission capacity when high interferences from other links appear due to the limited channels. Thirdly, I propose the throughput drop estimation model under coexistences of CB and non-CB links, where simultaneous use of CB and non-CB can improve the WLAN performance. Lastly, I propose the application of the throughput drop estimation model under coexistences of CB and non-CB links to the joint assignment optimization of the transmission power, the frequency channel, and the channel bonding by extending the active AP configuration algorithm. It is assumed that either the minimum or maximum transmission power is assigned to any AP.</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 reviews IEEE 802.11 wireless network technologies related to this thesis and software tools in the Linux operating system. Chapter 3 reviews our previous studies related to this thesis. Chapter 4 describes the throughput measurement method in general for concurrently communicating links adopted in this thesis. Chapter 5 describes the proposed throughput drop estimation model under channel bonding and its evaluations. Chapter 6 describes the proposed throughput drop estimation model under non-channel bonding and its evaluations. Chapter 7 describes the proposed throughput drop estimation model under coexistence of channel bonding and non-channel bonding with transmission power tuning and its evaluation. Chapter 8 describes the proposed application of throughput drop estimation model under coexistence of channel bonding and non-channel bonding to joint optimizations of transmission power, frequency channel, and channel bonding assignment in WLAN. Chapter 9 reviews relevant works in literature. Finally, Chapter 10 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 throughput drop estimation models for concurrently communicating multiple links using partially overlapping channels (POCs) in Wireless Local-Area Networks (WLANs). The use of POCs can improve the throughput performance by fully utilizing the available spectrums.

Firstly, he proposed the throughput drop estimation model for concurrently communicating multiple links under channel bonding (CB). The CB channels can provide high throughputs due to the wide channel width in general, where two adjacent channels are used together as one channel. He confirmed throughput improvements by adopting POCs from using OCs in simulations and experiments.

Secondly, he proposed the throughput drop estimation model under non-channel bonding links (non-CB). It has been observed that non-CB links provide higher throughputs than CB when several APs are co-located together. He confirmed the effectiveness of the POC assignment to the APs using the model through simulations and experiments, where POC assignment outperforms OC assignment.

Thirdly, he proposed the throughput drop estimation model under coexistences of CB and non-CB links. It has been observed that the simultaneous use of CB and non-CB can improve the WLAN performance. He confirmed the performance results are better than CB only and non-CB only, or at least similar.

Lastly, he proposed the application of the throughput drop estimation model under coexistences of CB and non-CB links to the joint assignment optimization of the transmission power, the frequency channel, and the channel bonding to each AP by extending the active AP configuration algorithm. He confirmed that the proposal can assign the proper transmission power and channels for high throughputs.

The applicant has published four journal paper, four international conference papers, and seven 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.