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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	Enhancements of Active Access-Point Configuration for IEEE 802.11n 2.4GHz Wireless Local-Area Network （IEEE 802.11n2.4GHz 無線 LAN における動作 AP 構成手法の高度化に関する研究）
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学位論文内容の要旨

In this thesis, the studies of enhancements of the active access-point configuration for 2.4GHz IEEE 802.11n wireless local-area networks (WLANs) are presented.

Firstly, I proposed the measurement results and the modifications of the throughput estimation model for concurrent communication of multiple links under various conditions with 11 and 13 POCs respectively for upto three APs. Then, I extend the model modification with 13 POCs considering the interference effects among APs under different numbers of wall obstacles in the presence of concurrent communications. Secondly, I proposed the network configuration optimization algorithm for IEEE 802.11n WLAN with three Raspberry Pi APs, by utilizing the modified throughput estimation model. Thirdly, I proposed the preprocessing stage for the active AP configuration algorithm to reduce the CPU time by confining the search space by selecting promising candidates for active APs. Both the exhaustive and heuristic approaches are presented for this stage. Lastly, I proposed the application of the preprocessing stage of the active AP configuration algorithm. Here, I proposed two extensions to the AP joint optimization algorithm to improve the performance of WLAN. In the first extension, I adopted the pre-processing stage of the active AP configuration algorithm in the AP joint optimization algorithm to select the promising candidate APs. And, in the second extension, I proposed the post-processing stage of the algorithm, which refines AP-host associations to further improve the overall network performance.

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, including the IEEE 802.11n protocols, features of IEEE 802.11n protocols, and software tools in the Linux operating system. Chapter 3 reviews our previous studies related to this thesis. Chapter 4 describes the throughput measurements and estimation model for up to three concurrently communicating Raspberry Pi APs links and their evaluations. Chapter 5 describes the proposed application of throughput estimation model to network configuration optimization algorithm of transmission power, frequency channel, and channel bonding assignment in WLAN. Chapter 6 describes the proposed preprocessing stage for active access-point configuration algorithm and its applications to joint optimization algorithm with a modification of active access-point configuration algorithm. Chapter 7 reviews relevant works in literature.

Finally, Chapter 8 concludes this thesis with some future works.

論文審査結果の要旨

In this thesis, the applicant presented the studies of enhancements of the active access-point configuration for IEEE 802.11n 2.4GHz wireless local-area networks (WLANs).

Firstly, she proposed the measurement results and the modifications of the throughput estimation model for concurrent communication of multiple links under various conditions with 11 and 13 POCs respectively for upto three APs. Then, she extended the model modification with 13 POCs considering the interference effects among APs under different numbers of wall obstacles in the presence of concurrent communications. Secondly, she proposed the network configuration optimization algorithm for IEEE 802.11n WLAN with three Raspberry Pi APs, by utilizing the modified throughput estimation model. Thirdly, she proposed the preprocessing stage for the active AP configuration algorithm to reduce the CPU time by confining the search space by selecting promising candidates for active APs. Both the exhaustive and heuristic approaches are presented for this stage. Lastly, she proposed the application of the preprocessing stage of the active AP configuration algorithm. Here, she proposed two extensions to the AP joint optimization algorithm to improve the performance of WLAN. In the first extension, she adopted the pre-processing stage of the active AP configuration algorithm in the AP joint optimization algorithm to select the promising candidate APs. In the second extension, she proposed the post-processing stage of the algorithm, which refines AP-host associations to further improve the overall network performance.

The applicant has published two journal papers, four international conference papers, and five national 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.