氏　　　　名	MD. MANOWARUL ISLAM
授与した学位	博　士
専攻分野の名称	工　学
学位授与番号	博甲第６０４９号
学位授与の日付	２０１９年　９月２５日
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 Dynamic Access-Point Configuration and Power Minimization in Elastic Wireless Local-Area Network System （エラスティック無線 LAN システムにおける動的アクセスポイント構成および送信パワー最小化に関する研究）
論文審査委員	教授　舩曳信生　　教授　　田野　哲　　教授　野上保之

学位論文内容の概要

In this thesis, the studies of enhancements of the *active AP configuration algorithm* and the *elastic WLAN system* are presented. First, the extension of the active AP configuration algorithm is proposed to deal with the dynamic nature of the WLAN network. Then, two security functions, namely, the *system software update function* and the *user authentication function*, are implemented in the elastic WLAN system testbed. Next, two *transmission power minimization* approaches are proposed to reduce the transmission power of the AP. The static approach finds the minimum power using the *throughput estimation model*. The dynamic approach optimizes the power dynamically using the *PI feedback control*. Finally, two *measurement host location minimization* methods are presented to minimize the labor cost in the parameter optimization of the throughput estimation model. The 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 related studies.

Chapter 4 describes the proposal of the dynamic extension of the active AP configuration algorithm, the implementation in the elastic WLAN system testbed, and the evaluation through simulations using the WIMNET simulator and experiments using the testbed.

Chapter 5 describes the implementation of the system software update and user authentication functions for system security of the elastic WLAN system.

Chapter 6 describes the proposal of the static AP transmission power minimization approach using the throughput estimation model and the evaluation of the proposal through simulations and testbed experiments.

Chapter 7 describes the proposal of the dynamic AP transmission power minimization approach using the PI feedback control, the implementation in the elastic WLAN system testbed, and the evaluation in various network fields.

Chapter 8 describes the proposal of two measurement location minimization methods for throughput estimation model.

Finally, Chapter 9 concludes this thesis with some future works.

In this thesis, the applicant studies several enhancements of the active AP configuration algorithm and the elastic WLAN system, including the extension of the active AP configuration algorithm to deal with the dynamic nature of the WLAN network, the implementation of two security functions in the elastic WLAN system testbed, two transmission power minimization approaches to reduce the transmission power of the AP, and two measurement host location minimization methods to minimize the labor cost in the parameter optimization of the throughput estimation model.

First, the applicant presents the dynamic extension of the active AP configuration algorithm, the implementation in the elastic WLAN system testbed, and the evaluation through simulations using the WIMNET simulator and experiments using the testbed.

Second, the applicant presents the implementation of the system software update and user authentication functions for system security of the elastic WLAN system.

Third, the applicant presents the static AP transmission power minimization approach using the throughput estimation model and the evaluation of the proposal through simulations and testbed experiments.

Fourth, the applicant presents the dynamic AP transmission power minimization approach using the PI feedback control, the implementation in the elastic WLAN system testbed, and the evaluation in various network fields.

Fifth, the applicant presents two measurement location minimization methods for throughput estimation model.

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