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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 Control Method for Concurrently Communicating Multiple Hosts in Wireless Local-Area Network (無線 LAN の同時通信中の複数ホストのためのスループット制御方法に関する研究)		
論文審査委員	教授 船曳 信生	教授 田野 哲	教授 野上 保之
<b>学位論文内容の要旨</b>			
<p>In this thesis, the study of <i>throughput control method</i> for concurrently communicating multiple hosts in <i>wireless local-area network (WLAN)</i> is presented.</p> <p>First, I survey the background technologies of IEEE 802.11 related to this thesis, including IEEE 802.11n protocol, Linux tools for WLAN, the software AP configuration using Raspberry Pi, and Jain's fairness index. Second, I review our previous studies related to this thesis, such as the <i>elastic WLAN system</i>, the Raspberry Pi testbed implementation, and the <i>TCF fairness control method</i>. Third, I present experimental observations for throughput unfairness for multiple hosts using single and multiple APs. Fourth, I propose the <i>fair throughput control method</i> for concurrently communicating multiple hosts in WLAN. Then, I also propose the <i>demanding throughput control method</i> to meet the request throughput for concurrently communicating multiple hosts in WLAN. These methods measure the single and concurrent throughput for each host, calculate the channel occupying time, derive the target throughput to satisfy the fair or demanded throughput request, and control the traffic at the AP to achieve the target throughput for each host. Finally, I implement the proposed method on the elastic WLAN system testbed. I first evaluated the proposal when multiple hosts concurrently communicate with a single AP by considering various throughput scenarios. Then, I evaluated the proposal by conducting extensive experiments with multiple hosts communicating with multiple APs at the same time in a scenario of equal throughput. The experiment results confirmed 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 reviews IEEE 802.11 wireless network technologies related to this thesis, including features of the IEEE 802.11n protocol, software tools for the Linux operating system, and Jain's fairness index. Chapter 3 reviews our previous related studies. Chapter 4 describes the experimental observations of throughput unfairness problem in WLAN. Chapter 5 describes the proposed fair throughput control method. Chapter 6 describes the proposed demanding throughput control method. Chapter 7 describes implementation and evaluation of throughput control method. Chapter 8 reviews relevant works in literature. Finally, Chapter 9 concludes this thesis with some future works.</p>			

## 論文審査結果の要旨

This thesis presented the study of the throughput control method for concurrently communicating multiple hosts in wireless local-area networks (WLAN). First, he surveyed the background technologies of IEEE 802.11 related to this thesis, including IEEE 802.11n protocol, Linux tools for WLAN, the software AP configuration using Raspberry Pi, and Jain's fairness index. Second, he reviewed previous studies related to this thesis, such as the elastic WLAN system, the Raspberry Pi testbed implementation, and the TCF fairness control method. Third, he presented experimental observations for throughput unfairness for multiple hosts using single and multiple APs. Fourth, he proposed the fair throughput control method for concurrently communicating multiple hosts in WLAN. Then, he also proposed the demanding throughput control method to meet the request throughput for concurrently communicating multiple hosts in WLAN. These methods measure the single and concurrent throughput for each host, calculate the channel occupying time, derive the target throughput to satisfy the fair or demanded throughput request, and control the traffic at the AP to achieve the target throughput for each host. Finally, he implemented the proposed method on the elastic WLAN system testbed. He first evaluated the proposal when multiple hosts concurrently communicate with a single AP by considering various throughput scenarios. Next, he evaluated the proposal by conducting extensive experiments with multiple hosts communicating with multiple APs at the same time in a scenario of equal throughput. The experiment results confirmed the effectiveness of the proposal.

The applicant has published one journal paper, one international conference paper, and one domestic conference paper 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.