

氏名	RAHARDHITA WIDYATRA SUDIBYO		
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 TCP Throughput Fairness Control Method for Multiple-Host Concurrent Communications in Wireless Local-Area Network (無線 LAN における複数ホスト同時通信時の TCP スループット公平性制御法に関する研究)		
論文審査委員	教授 船曳 信生	教授 田野 哲	教授 野上 保之
学位論文内容の概要			
<p>In this thesis, I propose the TCP throughput fairness control method for multiple-host concurrent communications to enhance the throughput performance of each host in WLAN. Firstly, I propose the TCP throughput fairness control method for two concurrently communicating hosts in the elastic WLAN system, to overcome the TCP throughput unfairness problem among two hosts. The delay is implemented at the AP in the packet transmission to the nearer host. After that, it can be predicted that the nearer host will decrease the throughput, and the farther host will enhance it by obtaining more transmission opportunities.</p> <p>Secondly, I generalize the TCP throughput fairness control method to deal with any number of concurrently communicating hosts with the same AP. The target throughput is introduced as the equal target throughput among the hosts. This target throughput is dynamically updated by the measured throughputs of the hosts, since the throughput is varied in each network field and topology.</p> <p>Finally, for performance evaluations, I implement the proposal in the elastic WLAN system testbed using Raspberry Pi AP and carry out extensive throughput measurements in indoor fields up to four hosts. The experiment results confirm the effectiveness of the proposals. The remaining part of this thesis is organized as follows.</p> <p>In Chapter 1, I introduce the background, motivation and the contributions of the study in this thesis.</p> <p>In Chapter 2, I introduce IEEE 802.11 wireless network technologies related to this thesis, including features of the IEEE 802.11n protocol, software tools in the Linux operating system, and the fairness index.</p> <p>In Chapter 3, I review our previous related studies.</p> <p>In Chapter 4, I describe the TCP unfairness problem of multiple-host concurrent communications.</p> <p>In Chapter 5, I present the <i>TCP throughput fairness control method</i> for two-host concurrent communications, the implementation in the elastic WLAN system testbed, and the evaluations.</p> <p>In Chapter 6, I present the <i>TCP throughput fairness control method</i> for multiple-host concurrent communications and the evaluations.</p> <p>In Chapter 7, I review relevant works in literature.</p> <p>Finally, in Chapter 8, I conclude this thesis with some future works.</p>			

論文審査結果の要旨

In this thesis, the applicant proposed the TCP throughput fairness control method for multiple-host concurrent communications to enhance the throughput performance of each host in WLAN.

Firstly, the applicant proposed the TCP throughput fairness control method for two concurrently communicating hosts in the elastic WLAN system, to overcome the TCP throughput unfairness problem among two hosts. The delay is implemented at the AP in the packet transmission to the nearer host. After that, it can be predicted that the nearer host will decrease the throughput, and the farther host will enhance it by obtaining more transmission opportunities.

Secondly, the applicant generalized the TCP throughput fairness control method to deal with any number of concurrently communicating hosts with the same AP. The target throughput is introduced as the equal target throughput among the hosts. This target throughput is dynamically updated by the measured throughputs of the hosts, since the throughput is varied in each network field and topology.

Finally, the applicant implemented the proposal in the elastic WLAN system testbed using Raspberry Pi AP, and carried out extensive throughput measurements in indoor fields up to four hosts for performance evaluations. The experiment results confirm the effectiveness of the proposals. The remaining part of this thesis is organized as follows.

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