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論 文 題 目	Efficient Congestion Management Framework using Compression Techniques (圧縮技術を用いた効率的な輻輳管理フレームワーク)		
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論文の内容の要旨

In this dissertation, congestion control management mechanisms are investigated to introduce a new direction for aiding in solving network congestion. Existing mechanisms that directly or indirectly help to eliminate the congestion problem were being investigated.

The well-known empirical model of TCP connection throughput model has been extended in this thesis to include the effect of compression of part of the traffic throughput. The derived model can help to estimate the performance of congested networks when compression is applied.

The proposed generic ECM framework can be applied to minimize the impact of network congestion by orchestrating different existing congestion management mechanism with the newly introduced compressed MPLS mechanism. The ECM framework presented in this research offers an overall idea on how to help in improving congested networks throughput by reducing the impact of network congestion. In other words, ECM framework can indirectly help congestion points or links of the entire network (Internet). ECM framework can be re-engineered to cooperate with other possible mechanisms (i.e., network coding) for further reduction of network congestion.

The ECM/C model is presented in this research which offers an overall idea on how to utilize compression in the networking model to help in improving congested networks throughput for limited resource devices.

Keywords: MPLS-TE, compression, congestion avoidance, CBR networks, traffic flow control

論文審査の結果の要旨

The Evaluation Committee recognizes that the research work presented in the dissertation is network congestion management, in the exploration of efficient and generic framework to help in improving networks throughput by reducing the impact of network congestion. The framework, called efficient congestion management (ECM), which can be re-engineered to incorporate with other possible mechanisms (e.g., TCP congestion control, MPLS-TE, network coding, and so on). Kho Lee Chin focuses on the compression technique and has reached a very good competence with clear vision and objectives of her research work.

The dissertation divides into three main parts: empirical model derivation, ECM design, and new compression idea. In the first part, the empirical model of TCP throughput with compression is derived and further analyzed with comprehensive results and discussions. In the second part, design and architecture of ECM is drawn and operation of newly compressed MPLS-TE mechanism is resolved. In the final part, new dictionary based compression scheme with lightweight decompression (LDC) is proposed to integrate with ECM with compression (ECM/C) for small devices. The Evaluation Committee identifies that the dissertation contains the appropriateness of the given literature backgrounds, the complete related research works, and the research methodologies for the simulation studies. Besides that, the simulation results are validated and extensively well-discussed to justify the appropriateness of the proposed ECM framework with compression techniques. Moreover, the dissertation includes clear and specific conclusions and recommendations for future works. In addition, the references are appropriately presented in the dissertation.

The Evaluation Committee validates and confirms that the research works in each chapter of the dissertation have been disseminated to the four international conferences and one journal. In summary, the Evaluation Committee agrees that Kho Lee Chin did make very good achievements and momentous contributions to the domain of communication networks, in particular the research topics of congestion management framework with compression technique. Moreover, the Evaluation Committee observe that she does not encounter any problem in explaining her research work because she speaks frequently in English and her ability in oral presentation is excellent. She can provide a comprehensive answer clearly to the questions as well. In addition, this research work is an essential step toward the unending congestion problems that occurs in our Internet today. Hereby, the Evaluation Committee concludes that she with no doubts deserves to obtain the doctoral degree (Information Science).