

Munin Eamopas 2011: Linear Network Coding for the Multiple Source-Sink Pair Communication Problem. Master of Engineering (Computer Engineering), Major Field: Computer Engineering, Department of Computer Engineering. Thesis Advisor: Assistant Professor Jittat Fakcharoenphol, Ph.D. 28 pages.

Network coding is an another technique to improve efficiency of the network. This thesis has the objectives to study and to improve the network coding, and focus on the multiple source-sink pair communication problem

Recently, Iwama *et al.* present an algorithm for k source-sink pair network coding, when k is some fixed constant. The running time of the algorithm depends on the upper bound on number of vertices performing encoding operations. Iwama et al prove that $|\mathcal{F}|^{3k}$ encoding vertices are sufficient to obtain the network coding whose operated on field \mathcal{F} . In this work, we improve the bound to $k^2|\mathcal{F}|^{2k}$ and this tighter bound, in turns, improves the running time of the algorithm proposed by Iwama *et al.* The techniques used are elementary linear algebra and Dilworth's theorem.

Student's signature

Thesis Advisor's signature