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# An Extended Contract Net Protocol for Distributed Decision Mechanism in Collaborative Networks

I Yilmaz and SW Yoon

Department of Systems Science and Industrial Engineering,  
State University of New York at Binghamton,  
Binghamton, NY 13902, USA

Corresponding author's e-mail: [iyilmaz1@binghamton.edu](mailto:iyilmaz1@binghamton.edu)

**Abstract:** This paper addresses enhanced Contract Net Protocol (CNP) by assigning priorities to a collaborative network of enterprises (CNEs) based on their recorded violations on the fairness in resource allocation. CNE is an effective strategy to overcome arbitrary nature of demand and capacity patterns. The success of enterprise collaboration in terms of efficiency and fairness depends on coordination mechanism. In CNEs, coordination mechanisms control all actions of autonomous enterprises to achieve the mutual benefits. CNP is a widely used and powerful coordination mechanism in networked systems. However, the performance of coordination mechanism and fairness in resource allocation can decrease when the number of enterprises in a CN increases due to the task announcement (i.e., sharing proposals) reach high frequency. Therefore, CNE has a problem of applicability to large-scale network sizes. In order to overcome this problem, CNP is extended by adding an optimization model to assign priorities to members of CNEs before task announcement. Experimental results show that fairness in resource allocation is increased, while the cost of communication in a networked system is reduced by extended CNP.

*Keywords:* Distributed decision making, Collaborative network, Contract net protocol