

A Heuristic Algorithm for Solving Network Expanded Problem on Wireless ATM Environment

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Abstract

In this paper, the network expanded problem (NEP) which optimally assigns new adding and splitting cells in PCS (Personal Communication Service) network to switches in an ATM (Asynchronous Transfer Mode) network is studied. In NEP, the locations of all cells (or Base Station, BS) in PCS network are fixed and known, but new switches should be installed to ATM network and the topology of the backbone network may be changed. Given some potential sites of new switches, the problem is to determine how many switches should be added to the backbone network, the locations of new switches, the topology of the new backbone network, and the assignments of new adding and splitting cells in the PCS to switches on the new ATM backbone network in an optimum manner. The goal is to do the expansion in as attempt to minimize the total communication cost under budget and capacity constraints. The NEP is modeled as a complex integer programming problem and finding an optimal solution to this problem is NP-hard. A heuristic algorithm is proposed to solve this problem. The proposed heuristic algorithm consists of four phases: Remaining Capacities Pre-assigning Phase (RCPP), Cell Clustering Phase (CCP), Switch Selection Phase (SSP), and Backbone Design Phase (BDP). Experimental results indicate that the proposed algorithm can find good solution.

Key words : Heuristic algorithm; Wireless ATM; Network expanded problem; Cell assignment problem; Cell splitting