

# Wavelength Routing and Assignment in WDM Ring Networks

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## Abstract

An all-optical network based on wavelength division multiplexing(WDM) using wavelength routing technique is considered as a very promising approach for the realization of future large bandwidth networks. When the physical network and required connections are given, the routing and wavelength assignment(RWA) problem is to select a suitable route and wavelength among the many possible choices for establishing connections such that no two routes of the same wavelength pass through the same link.

In this paper, we consider the RWA in a ring network. We formulate the problem as a general integer programming and propose an algorithm to solve the formulation. Though the formulation has exponentially many variables, we solve the LP relaxation by using column generation technique. We solve the column generation problem efficiently by decomposing the problem into several sub-problems. After solving the LP relaxation, we apply the branch-and-price procedure to get an optimal solution to RWA. Branch-and-price procedure is the same as the branch-and-bound procedure except that we generate additional columns by solving the column generation problem at each node in the branch-and-bound tree. We show that the column generation problem at a node in the tree can be solved in polynomial time. We test the proposed algorithm on some randomly generated data. The results show that the algorithm gives very good solutions.