

A Dynamic RWA Algorithm for Photonic Networks which Takes Account of Future Demand

Takehiko MATSUMOTO and Toyofumi TAKENAKA

Department of Computer Science, Graduate School of Engineering, Nihon University
Aza-Nakagawara, Tokusada, Tamura-machi, Koriyama-shi, Fukushima 963, Japan
e-mail Address {g16632, takenaka }@cc.ce.nihon-u.ac.jp

Abstract: A new adaptive RWA (Routing and Wavelength Assignment) algorithm is proposed, which may be used in photonic networks with no wavelength conversion. The problem we address is how to increase the utilization of WDM network resources by taking account of future demand efficiently. In the proposed method, blocking probability is minimized by taking account of future path establishment, using a method for which the computational load is reasonable. Using simulations, we compare the performance of the proposed RWA algorithm with existing methods including fixed-alternate routing and adaptive routing. The results demonstrate that the proposed algorithm can achieve much better blocking performance and the most efficient use network resources.

Keywords: Optical, photonic, WDM, routing, wavelength assignment, RWA, future demand

1. INTRODUCTION

The penetration of broadband access services such as FTTH, xDSL, cable Internet and FWA (Fixed Wireless Access) has been causing a dramatic increase in Internet backbone traffic. Photonic WDM (wavelength division multiplexing) network technology is expected to provide the infrastructure for the backbone network of the next generation Internet, to allow it to cope with such a huge increase in traffic.

A lot of works have been done on using photonic network resources efficiently. One of the hot research topics is the issues of the control scheme and how to set up lightpaths for each connection request in an efficient manner. The authors believe that to minimize blocking probability it is important to consider future demand when establishing lightpaths. Our study is inspired by the recently proposed MIRA (Minimum Interference Routing Algorithm) [1], PBR (Profile-Based Routing) [2], [3] and MOCA (Maximum Open Capacity Routing) [4]. The authors propose a novel RWA algorithm for use in WDM optical networks to achieve efficient network usage. The proposed method takes account of future demand, and achieves this by the very simple method known as the “shortest path” problem, as in Dijkstra’s algorithm of BFS (Breadth First Search). The method allows for future path establishment, at a reasonable computational cost, based on knowledge of the potential ingress-egress node pairs.

