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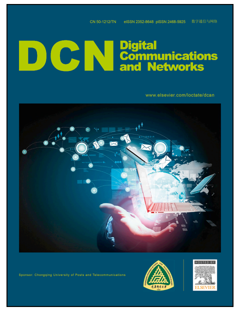

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QoS Aware Routing and Wavelength Allocation in Optical Burst Switching Networks using Differential Evolution Optimization

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Abstract: The issue of burst losses imposes a constraint on the development of optical burst switching (OBS) networks. Heavy burst losses drastically affect the quality of service (QoS) intended by the end users. This article presents a QoS aware routing and wavelength allocation (RWA) technique for burst switching in OBS networks. The RWA problem is modeled as a bi-objective integer linear programming (ILP) problem where the objective functions are based on minimizing both the number of wavelengths used, and the number of hops traversed to fulfill the burst transmission requests for a given set of node pairs. The ILP model is solved by a novel approach based on a differential evolution (DE) algorithm. Analytical results show that DE algorithm provides a better performance when compared against shortest path (SP) routing, a widely accepted routing strategy for OBS networks.
Index Terms: burst loss; optical burst switching; quality of service; routing and wavelength assignment; integer linear programming; differential evolution.

1 Introduction

OBS [1] paradigm offers a standardized backbone to transmit IP traffic in a successful yet realistic manner. OBS isolates the control plane activities from the data plane in order to exploit their distinct advantages in electronic and optical domains respectively. Control messages (or Burst Header Packets (BHPs)) are processed electronically at every node en routed, while the data bursts are transmitted optically from end to end [2]. In brief, OBS paradigm maintains a trade off between Optical Circuit Switching (OCS) and Optical Packet Switching (OPS).
In OBS paradigm, the transmission of any data burst is always preceded by its BHP to reserve wavelength resources along the path for the upcoming burst. The source node does not wait for any acknowledgment that an end-to-end connection is established; instead it transmits the burst after an *offset time* [3]. The *offset time*, T, is bounded by the sum of the BHP processing

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