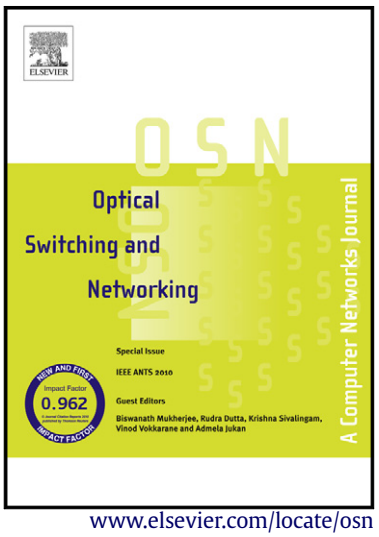

www.elsevier.com/locate/osn

Contention avoidance in bufferless slotted optical packet switched Networks with egress switch coordination

Masoud Asghari, Akbar Ghaffar Pour Rahbar

PII: S1573-4277(15)00037-5
DOI: http://dx.doi.org/10.1016/j.osn.2015.05.001
Reference: OSN355

To appear in: *Optical Switching and Networking*

Received date: 22 June 2014
Revised date: 14 May 2015
Accepted date: 15 May 2015

Cite this article as: Masoud Asghari, Akbar Ghaffar Pour Rahbar, Contention avoidance in bufferless slotted optical packet switched Networks with egress switch coordination, *Optical Switching and Networking*, http://dx.doi.org/10.1016/j.osn.2015.05.001

Contention Avoidance in Bufferless Slotted Optical Packet Switched Networks with Egress Switch Coordination

Masoud Asghari [a] and Akbar Ghaffar Pour Rahbar [a,*]

[a] *Computer Networks Research Lab, Sahand University of Technology, Sahand New Town, Tabriz, Iran*

***Abstract*:** Optical packets contention in optical packet switched (OPS) networks can lead to Optical packet loss which will reduce network performance. In this paper, a new contention avoidance technique is proposed which utilizes the combination of traffic shaping at ingress switches and a time slot reservation technique using the coordination of egress switches. This novel protocol is called egress coordination OPS (EGCOPS) suitable for buffer-less slotted-OPS networks. Simulation results show that the EGCOPS outperforms the original slotted-OPS protocol in terms of optical packet loss rate (PLR), with or without using wavelength conversion. However, the packet shaping feature of EGCOPS can increase the delay of users' packets at the queues of ingress switches. There is a trade-off between the PLR improvement and the additional delay applied to the users' packets. Still, EGCOPS parameters can be selected in such a way that additional delay can be tolerable by users' applications.

***Keywords*:** Buffer-less OPS; Contention avoidance; Egress switch coordination; Slot reservation; Slotted-OPS network.

1. Introduction

Optical Packet Switched (OPS) network is a promising technique for future high-speed backbone networks [1,2]. In addition, OPS is a highly encouraging solution for ultra-high-bandwidth inter data-center interconnections [3]. The special feature of the OPS is that at an OPS core switch, only the header of optical packets is converted to electrical form, but the payloads is switched optically. The header can be updated and rewritten back to the optical packets at the output interface of the OPS core switches [4].

OPS is implemented in two major forms including slotted-OPS with fixed length time-slots and unslotted-OPS. Slotted-OPS has optical packet alignment and synchronization at the entrance of OPS core switches [5]. We use slotted-OPS since it is easier for scheduling and experiences smaller optical packets contention than unslotted-OPS.

[*] Corresponding author. Tel.: +98 41 3 3459367; fax: +98 41 33444322.
E-mail addresses: masoudir@gmail.com (M. Asghari), akbar_rahbar92@yahoo.com, ghaffarpour@sut.ac.ir (A.G. Pour Rahbar).