International Journal of Interdisciplinary Telecommunications and Networking
Volume 12 • Issue 1 • January-March 2020

Optical Wireless Channel Data Scheduling Using TLBO and Wavelength Division Multiplexing

Anjana Shukla, RGPV, Bhopal, India
Vineeta Saxena and Nigam, RGPV, Bhopal, India

ABSTRACT

Channel utilization in today's environment for handling multimedia data plays an important role. The steps of allotting resources to process can be done by taking data which helps to analyze and make important decisions at runtime. This research paper focuses on allocation of optical wireless channels using wavelength division multiplexing where two models were developed, first was channel data pre-processing as per transmission packet size while second was TLBO (Teacher Learning Based Optimization) genetic algorithm which find the correct channel with position for the input data to communicate. Here some information used for analysis was total number of channels, data size, available wavelength, etc. So, output of the TLBO process sequence was used for passing data in selected channels. Results show that proposed model OWDS (optical wireless data scheduling) has overcome various evaluation parameters on different scales as compared to previous approaches adopted by researchers.

KEYWORDS

Channel Utilization, Genetic Algorithm, Load Balancing, Optical Data Computing, WDM

INTRODUCTION

Due to the high date rate capability of optical transmitters and the advances in laser and optical components technology, free-space optical (FSO) systems for wireless communication channels have attracted considerable attention recently for many different applications, such as ground-ground, ground-to-satellite and inter-satellite links. The advantages of an optical communication system compared with an RF counterpart are (a) greater bandwidth, (b) smaller size and weight, (c) less power consumption (Garcia-Talavera, 2002; Yuang, Tien, & Lin, 2009). Optical wavelength division multiplexing (WDM) has been shown to be successful in providing virtually unlimited bandwidth to support an ever-increasing amount of traffic for future optical networks. Future optical networks, especially the metro and local networks, are expected to flexibly and cost effectively

DOI: 10.4018/IJITN.2020010104

satisfy a wide range of applications having time-varying and high bandwidth demands and stringent delay requirements.

A WDM technology has the enormous amount of bandwidth available in fiber cable. In WDM system, each carries multiple communication channels and each channel operating on different wavelength. Such an optical transmission system has a potential capacity to provide Tera bytes of bandwidth on a single fiber. WDM technology has the capability to provide the bandwidth for the increase in the huge on traffic demand of various applications like audio, video and multimedia, which needs the QoS over the network (Garcia-Talavera et al., 2002).

Scheduling is the basic function which is implemented in Operating system. Operating system give assistance to wireless communication and it is used in variety of applications like laptop's and mobiles where each device is connected to each other with a single access node (Khan et al., 2007; Ahsen, Hussain, Khadam, Sharif, & Zaman, 2007). Today scheduling is based on parallel and distributed computing methods (Sharif & Khan, 2007). More flexibility is there in wireless network as compared to wired network (Sharif, Azeem, & Haider, 2012; Sharif, Murtaza, Haider, & Raza, 2011). Several researches have been done on hardware and software part of computer (Irum et al., 2012). As advancement is increased in operating system which enhanced its multitasking capability, this increase further by an efficient scheduling algorithm like a round robin. Scheduling is the process of assigning data or process so as to increase channel utilization, throughput and also reduces its delay and response time as explained in Mohanty et al. (2010). Scheduling can be used in real world, like in applications of networking, traffic management systems of air, road and railway. As scheduling algorithm is the strategy for insertion of data in transmitter so that system efficiently manages load and achieve required Quality of Service (QoS) (Mostafa, Rida, & Hamad, 2010).

To have better scheduling, an algorithm must have maximum channel utilization, throughput and efficiency. Scheduling algorithms are classified as preemptive and non-preemptive algorithm. Preemptive scheduling is when high priority data arrive, it aborts all its transmission and take care of high priority, whereas in non-preemptive algorithm it works on First come first serve [FCFS] i.e. even if high priority arrive it continue its transmission. For improving channel utilization, CPU runs several processes at all times. Before transmission all the resources of CPU are scheduled before as in Raijkamal and Vigneshwaran (2010).

The rest of this paper are organized as follows: in the second section, elaborate various techniques proposed to handle this problem by different researchers of this field of scheduling balancing. While third section provide proposed model OWDS explanation, which is a combination of genetic algorithm and optical network. Here genetic algorithm increases the dynamic situation of the scheduling. Finally, fourth section provide different outcomes after performing experiment on different size data. Here comparison of OWDS with previous approaches and analysis was done. The conclusion of the whole paper is made in the fifth section.

RELATED WORK

In Mehri and Rahbar (2016), the paper presents two efficient scheduling algorithms called discretionary iterative matching (DIM) and adaptive DIM. These schedulers find maximum matching in a small number of iterations and provide high throughput and incur low delay. The number of arbiters in these schedulers and the number of messages exchanged between inputs and outputs of a core node are reduced. This paper show that DIM and adaptive DIM can provide better performance in comparison with iterative round robin matching with SLIP (iSLIP). SLIP means the act of sliding for a short distance to select one of the requested connections based on the scheduling algorithm.

Luo et al. (2007) follows up the investigation of hybrid optical wireless networks. In particular, this paper explores the scheduling of traffic transmission in such heterogeneous environment. Targeting to improve the hybrid network performance as well as guarantee the QoS requirement of diverse applications, this paper focus on the network throughput and transmission delay.