ISSN : 2278 – 1021

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 1, Issue 4, June 2012

Throughput Improvement in Coarse wavelength division Multiplexing Optical Networks

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ABSTRACT- When the information is transmitted over the network there are various reasons due to them there is loss of information such as packet loss, delay, and reduced in the throughput. Some time due to congested networks these reasons affects more to the network. As a result we need any intellectual algorithm or process which is applied the network so that the network could overcome the congestion. In this paper, the proposed work is overcome the solution of congested network so as the network can achieve the better solution of transmission. The proposed approach is applied to the CWDM optical network on ring topology with bypass links. In this paper the reliability of the network is presented in the term of reduced packet loss, average delay rate, packet loss rate of the proposed system where intellectual process is applied to reduced congestion. In first process the network will transmit the information, there will be more information will lost but after applying the intellectual approach to the same network there will be improvement in the networks performance as it is the main requirement in the information transmission.

Keywords - Packet loss, Coarse Wavelength Division Multiplexing (CWDM), RWA, OXADM, Packet delay.

I. INTRODUCTION

The optical networks using wavelength division multiplexing (WDM) could provide huge bandwidth capacity for next-generation Internet. These networks are promising candidate to meet the bandwidth demands from various emerging multimedia applications such that web applications, video on demand, multimedia conference, image access and distribution, home broadband services etc. Optical wavelength division multiplexing (WDM) networking technology has been identified as a suitable candidate for future wide area network (WAN) environments, due to its potential ability to meet rising demands of high bandwidth and low latency communication. Networking protocols and algorithms are being developed to meet the changing operational requirements in future optical networks. Simulation is used in the study and evaluation of such new protocols, and is considered a critical component of protocol design. Our goal in this paper is to incorporate the key characteristics of CWDM networks in the simulator, such as optical switching nodes, multi-wavelength links, virtual topology constructions, related switching schemes and routing algorithms. This paper presents the simulation model for the architecture and design of CWDM and a representative performance analyzer to demonstrate how the simulator can be used.

This paper is structured as follows. In the section 2 we define the concept of traffic grooming, in section 3, we define the review related work on the analysis of CWDM network. In section 4, we define the methodology of the proposed work; result & discussion of the proposed work is presented in section 5.

II. CONCEPT OF TRAFFIC GROOMING

Given a set of connection requests, the problem of setting up light paths by routing and assigning a wavelength to each connection is called routing and wavelength assignment (RWA) problem. This problem is also defined as the traffic grooming. If we cannot setup a light path for a connection request, then it is blocked. A well designed RWA algorithm is critically important to improve the performance of CWDM networks. RWA problem can be classified into static and dynamic problems. In the static problem, the connection requests are given in advance. The objective is to minimize the total blocking probability or to have the maximum number of setting up connections.

In contrast, the dynamic RWA considers the case where connection requests arrive dynamically. The dynamic RWA is performed online, it is much more challenging; therefore, heuristic algorithms are usually employed in resolving this problem.

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III. RELATED WORKS

In this paper we are trying to reduce the congestion problem in the Coarse Wavelength Division Multiplexing (CWDM). CWDM is one of the widely used optical networks used for the Metropolitan Area Network (MAN).With the tremendous growth in traffic in Ethernet, internet there is the congestion takes place in the network. This traffic arrives randomly, so it is very necessary to tolerate otherwise the throughput of the network reduced. So any intellectual approach is necessarily to apply on the network which can overcome the problem of traffic grooming. Keyao Zhu et al. [1] proposed efficient grooming low speed connections onto high capacity light paths to improve throughput and reduction congestion. R.LO et al. [2] proposed traffic grooming in IP-over CWDM and proposed coupling between optical and IP layer and proposed that how traffic elasticity impacts on grooming. Vinh Trong et al. [3] proposed a Generic Algorithm based survivable routing algorithm simulation model allow to minimize the blocking probability.

Mohammad Syuhaimi et al. [4] proposed an approach for advanced optical layer network through the development of optical cross add and drop multiplexing (OXADM). OXADM is applicable to those networks that have to be migrating from ring to mesh and vice versa The Stackable ROADM module with an optical amplifier is proposed by Md. Nooruzzaman et al. [5] to remove congestion over IP networks. Sogo Kawai et al. [6] proposed a congestion removing module in IP-over CWDM with service level agreement (SLA).

The proposed work shows that static bypass node and multi light path approach enable the network administrator to remove congestion in all optical networks. Y. Okada et al. [7] proposed a bi-directional amplification module in IP-over-CWDM network. The work proposed in [7] used an Er+3 doper fiber. The proposed work showed that using bi-directional approach the loss of the transmission fiber in network should be compensated in this paper we analyze the throughput improvement in CWDM network in ring topology simulation mode using the Network Somulator-2.

IV. RESEARCH METHODOLOGY

To represent the complete CWDM system, ring based architecture with a number of nodes is taken. All Nodes are identical and placed at some distance in a ring from. Now as the communication begins, selected a source and the receiver node dynamically.Each nodes act as the transmitter and receiver. Two Scenarios are proposed in the given work. In both the scenarios the CWDM network is generated using the simulation tool (Network Simulator-2) and various nodes are connected with the neighboring nodes using the Full–Duplex. In the scenero-1, the transmission protocols i.e. transmission control protocol (TCP), constant bit rate (CBR), user data protocol (UDP), file transmission protocol (FTP), null agent, are used to transmit the information packets over the network. In the optical network each node acts as the transmitter and receiver, so they are connected with the source and sink agents.

The information is sent in the form of packet, is sent to the receiving node. Each node can send the information in different size of packet. Because of the traffic congestion and the inefficient bandwidth there is reduced in the throughput of the network, there are many types of the problems occurs in the networks.

They are basically due to: 1) link failure 2) node failure.

1) Node Failure: There is drop of the information packets at the failed node and no information is received to the destination.

2) Link failure: If the link between the any two nodes fails the information is lost at the link during transmission.

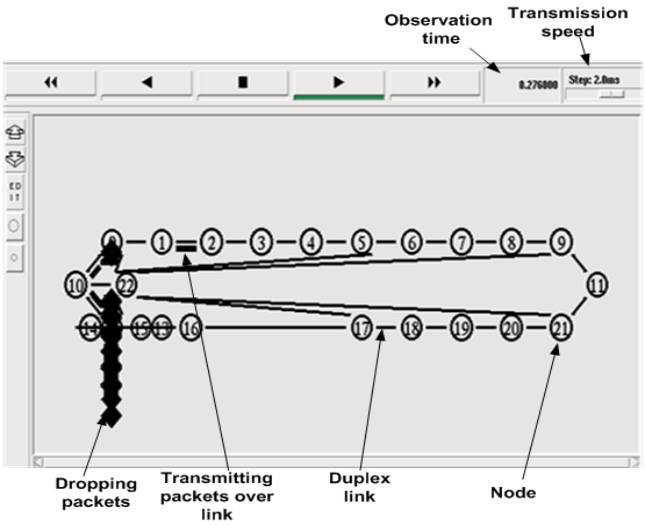

Fig.1: Topology of CWDM network used for simulation

Scenario-1. Existing Approach (0.27 ms)

ISSN : 2278 – 1021

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 1, Issue 4, June 2012

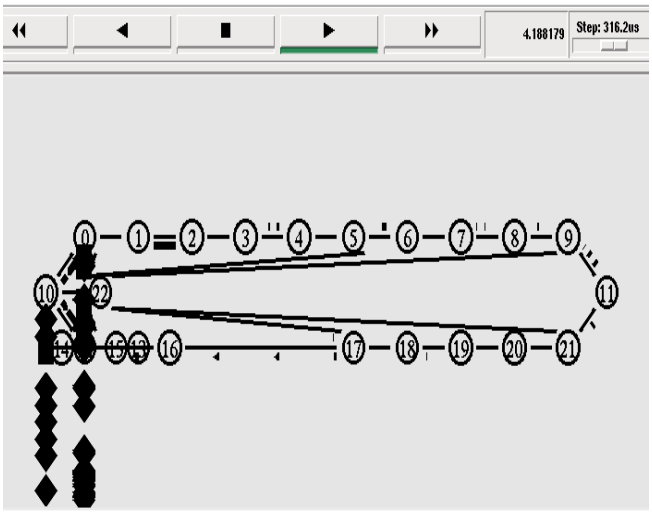

Fig. 2: Existing Approach (4.18 ms)

From the Figure [1-2] it is seen that during the existing approach there is continuous packet loss during transmission due to congestion on the path. Due to this more packets lost and throughput reduced. In the scenero-2, an intellectual approach is applied to each node in the same network, so that each node can detect the congestion in the neighboring node in the forward and backward direction and check the threshold value. If the congestion is found in any direction then re-routing is applied. The array of the routers is connected to the links. If the value is greater than threshold is found then the link is transfer to the router in any direction where there is congestion is less than threshold.

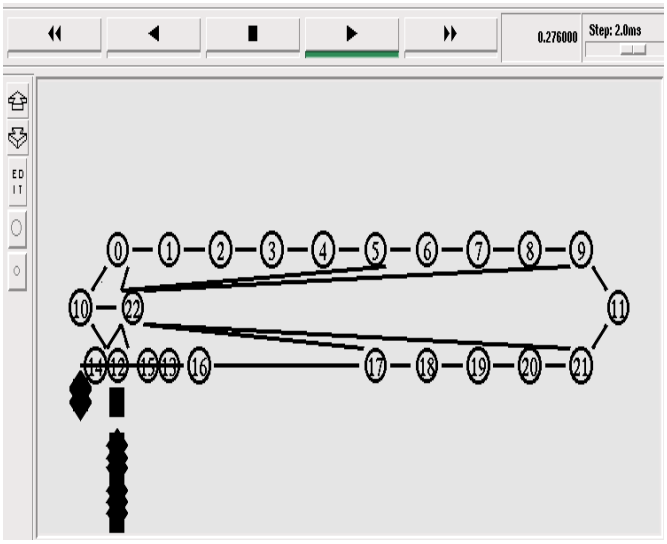

Fig.3: Proposed Approach (0.27 ms)

Scenario-2

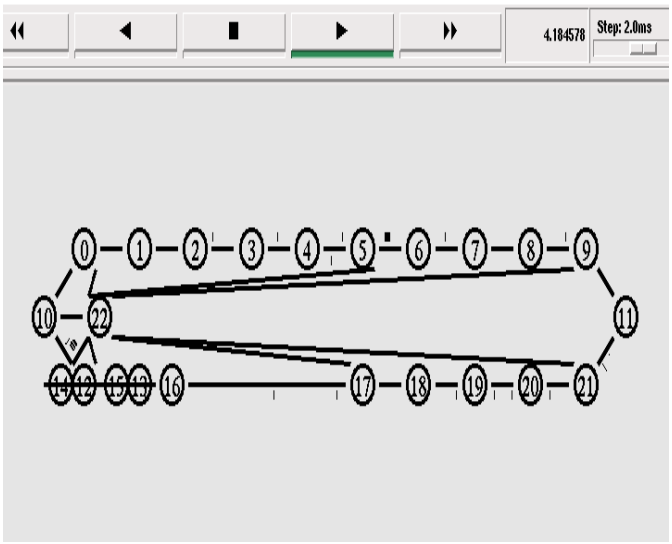

Fig.4: Proposed Approach (4.18 ms)

Figure [3-4] show that during the same transmission time the packets loss decrease and due to this latency decrease .This increase in the throughput of the transmission.

V. SIMULATION RESULTS AND DISCUSSION

The proposed analysis is showing the comparison of existing and proposed approach as the parameters of packets delay, average delay rate, average packet loss, throughput.

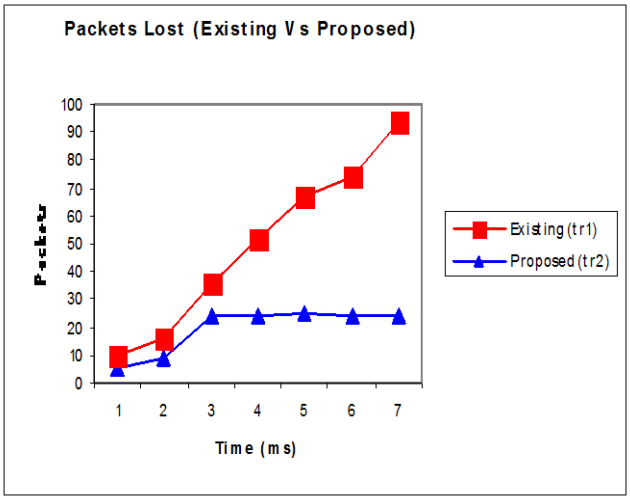

Fig.5: Packets lost (Existing vs. Proposed)

ISSN : 2278 – 1021

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 1, Issue 4, June 2012

Fig .5 shows that fewer packets are lost in the proposed approach then the existing approach.

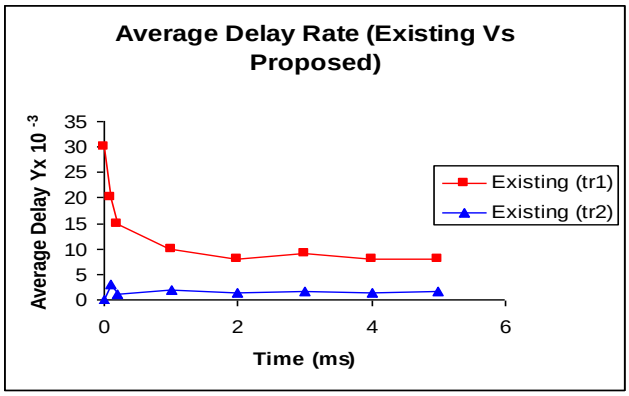

Fig. 6: Average Delay Rate (Existing vs. Proposed)

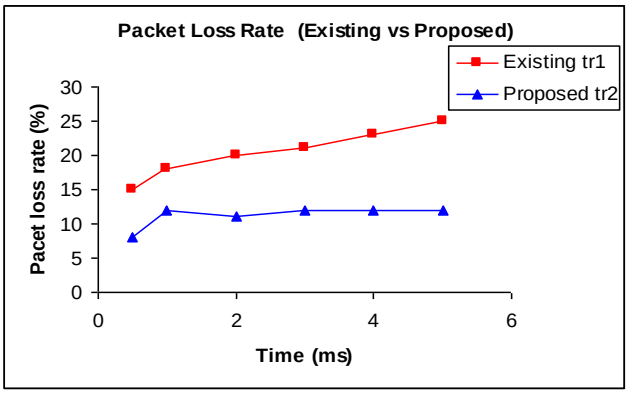

Fig.7: Packets Loss Rate (Existing vs. Proposed)

As a results from the above parameters the throughput of the proposed network increase and shown as given below,

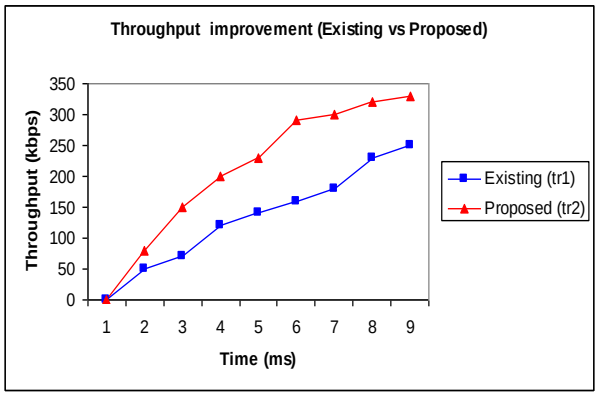

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Fig 8: Throughput (Existing vs. Proposed)

VI. CONCLUSION

We have proposed a comprehensive approach to reduce packets loss, packets delay rate for the CWDM networks. The proposed approach improves the network throughput and gives the network reliability for further future works.

REFERENCES

[1]. Keyao zhu, Tiongue zhu, Biswanath mukherye, "*Traffic Engineering in multi granularity, the heterogeneous, WDM optical mush Networks through Dynamic traffic Grooming*" National Fiber optics Engineering conference, Deltas, 2006.

[2]. R.Lo Cigna, E.Salvadori, "*Elastic Traffic Effect of WDM Dynamic Grooming Algorithm*" IEEE conference Society, pp.1963-1967, April 2006.

[3]. Vinh T. Le, "*GA- based dynamic survivable routing in WDM optical networks with shared backup path*", VNU Journal of science, pp.122-130, 2007

[4]. Mohammad Syuhaimi, Ab-Rahman, Hayati Husin and Sahbudin Shaari, "*Ring to Mesh migration in CWDM Metropolitan Network Using OXADM*", 4th International Conference on Electrical and Computer Engineering ICECE, pp.299-303. 2008.

[6]. Shogo Kawai, Shun Okimitsu, Kazuto Nakai, Md. Nooruzzaman,Osanori Koyam and Yutaka Katsuyama, "*Recovery Time of Degraded Throughput in Best Effort CWDM Networks with ROADMs*"16th Asia Pacific Conference on Communication (APCC),pp.165- 170, 2010

[7]. Y.Kada, Keisuke Matsuyama, Osanori.K, MakotoY, Yukata.K, "*Bi-directional amplification Module for IP- over-CWDM-Ring network*", pp.180-181, IEEE.2010