Investigation on Analysis of Different WDM Optical Network Topology

Shabana Khan[1], Dr. Priti Maheshwari[2], Dr. Manish Shrivastava[3]
[1,2]AISECT University, Bhopal (M.P.) India.
[3]LNCT College, Bhopal (M.P.) India.

ABSTRACT
This work presents a novel approach for topology analysis in Optical WDM Network. The idea is to make a system in which different topologies can be analyzed. The need for this type of approach is to improve the performances of the Optical WDM Networks, as time goes performance of these networks degrades, due to arrival of new applications.

I INTRODUCTION

A wavelength-routed WDM network can provide end-to-end optical communication channels (lightpaths) through optical fibers and intermediate nodes with optical cross-connects. These optical channels eliminate extra signal processing at network intermediate nodes along the physical path through which the lightpath is routed. However, it may not be possible to establish a lightpath between every node, because of scalability and economic concerns. Hence, some traffic may need to be routed electronically from one lightpath to another at network intermediate nodes until it reaches to destination, this approach is called multi-hopping.due to limits of electronic processing speed ,it is not possible to utilize all bandwidth of an optical fiber using a single high capability channel.

II WAVELENGTH DIVISION MULTIPLEXING

WDM is an approach that can exploit the huge opto-electrical bandwidth mismatch by requiring that each end-user's device operate only at electrical rate, but several WDM channels from dissimilar end-users may be multiplexed on the same fiber [3]. With WDM, a number of distinct wavelengths or frequencies are used to implement separate channels. An optical fiber can carry several channels in parallel, each on a particular frequency. The number of wavelengths that each fiber can carry concurrently is limited by the physical characteristics of the fiber and the state of the optical technology used to combine these wavelengths onto the fiber and isolate them off the fiber. With currently available trade technology, a few tens of wavelengths can be supported within the low-loss window at 1550 nm, but this number is expected to grow rapidly in the next few years. Therefore, optical fiber links employing WDM technology have the potential of delivering a collective throughput in the order of Terabits per second (Tb/s), enough to satisfy the user growing demand on a sustained, long-term basis [4].

III DESIGNING OF THE OPTICAL WDM NETWORK

We have designed four various network topologies having 9 nodes. We have designed an .xml code file to design each network. The .xml contains the list of nodes and fiber links in the network. Per node information is composed by the X and Y coordinates of the node measured in kilometres over a Euclidean plane, number of E/O transmitters, O/E receivers, node population, node type (or node level), number of nodes and the name of each node. Per link information is the maximum number of wavelengths per link and the number of optical fibers.

Table 1
9-Node Bus topology

Number of nodes	9
Total links	8
Lightpath Capacity	60 gbps
No of Wavelengths	40
Number of traffic level	1
Type of connection	Bidirectional

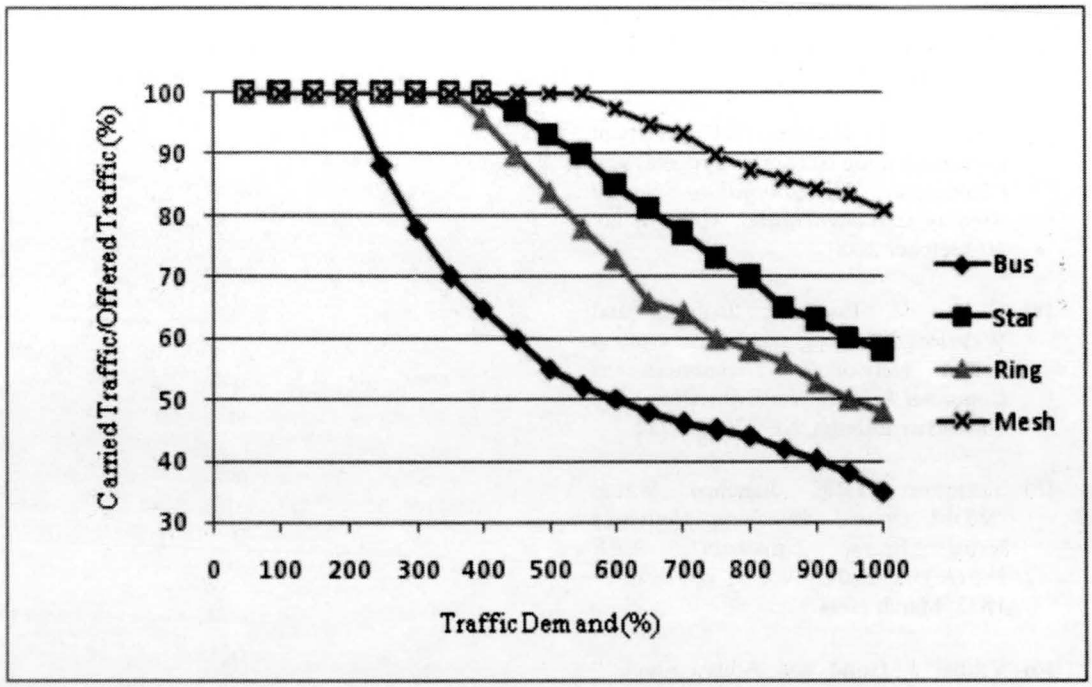

Fig. 1 Carried Traffic/ Offered Traffic Vs Traffic Demand

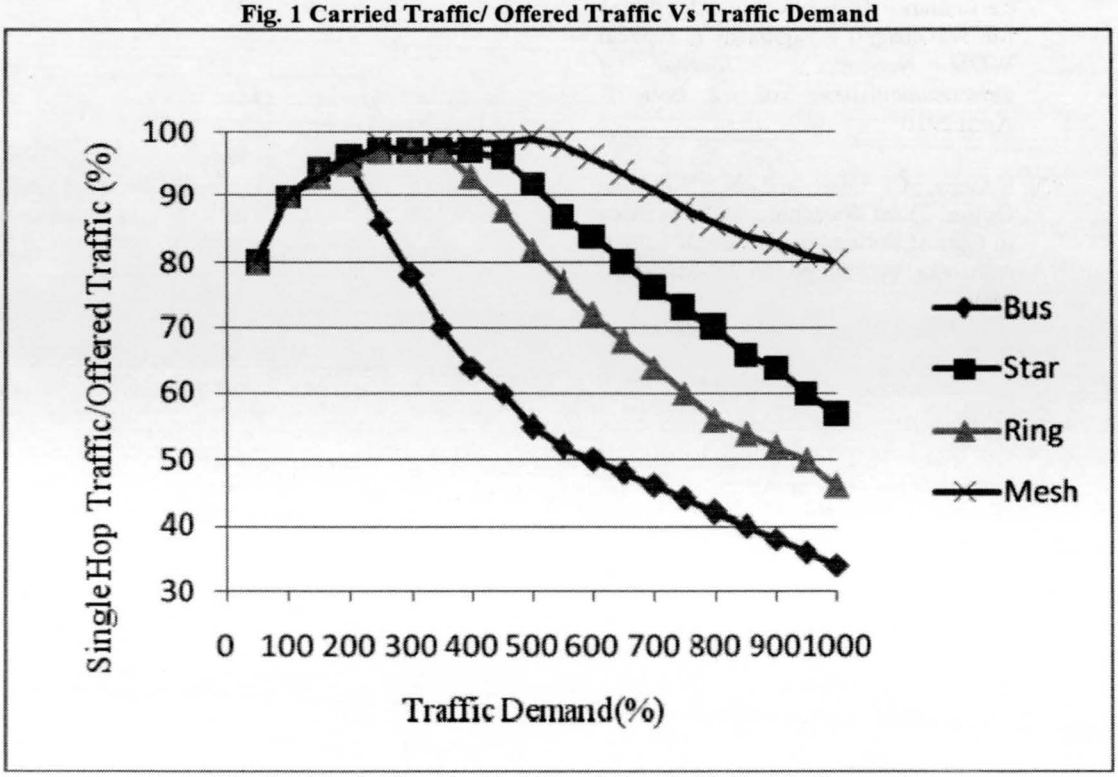

Fig. 2 Single Hop Traffic/Offered Traffic Vs Traffic Demand

IV CONCLUSION

In this work we introduced the concept of Optical WDM Networks used in analysis of traffic & topology in 9-Node WDM Optical Networks. We presented required criteria for a Optical WDM Network. We also identified components can be applied in Networks as well as other areas also.

REFERENCES

[1] B. Mukherjee, Optical Communication Networks. New York: McGraw-Hill, 1997.

[2] P. Cochrane, "Foreword in Optical Network Technology" London: Chapman & Hall, 1995.

[3] Biswanath Mukherjee, "WDM Optical Communication Networks: Progress and Challenges", *IEEE Journal on Selected Area in Communications*, vol. 18, no. 10, October 2000.

[4] George N. Rouskas, "Routing and Wavelength Assignment in Optical WDM Networks", Department of Computer Science North Carolina State University Raleigh, NC 27695-7534

[5] Yuanyuan Yang, Jianchao Wang, "WDM Optical Switching Networks Using Sparse Crossbars", *IEEE INFOCOM 2004*, vol 3, pp. 1841 – 1852, March 2004

[6] Vitthal J. Gond and Aditya Goel, " Performance Evaluation of Algorithms for Wavelength Assignment in Optical WDM Networks", *Journal Of Telecommunication*, vol. 2, Issue 1, April 2010

[7] Y.Chen, C. Qiao and X. Yu, "An Optical Burst Switching: A New Area in Optical Networking Research", *IEEE Networks*, vol. 18, pp. 16-23, May-June 2004