CHAPTER 7

CONCLUSIONS

7.1 SUMMARY OF THE THESIS

The solution for the hypothesis had been approached with a strategy to have an extensive simulation study. This work employed fast and effective fault management algorithm which detects the failures and guarantees proactive fast re-routing. After the detection and localization of faults, a hybrid adaptive load shifting algorithm was deployed for network survivability. An efficient flooding algorithm was successfully developed to reduce the overhead and prevention of blocking calls caused by flooding messages. Unbalanced wavelength utilization for any session request was overcome by developing a novel wavelength assignment algorithm. Evaluation of this work was based on theoretical and performance analysis. The assumed parameters and the impact on the assumed parameters have also been carefully evaluated. On the whole, the efficiency of the suggested technique has been found to be very impressive and the solution for the formulated problem has been arrived successfully. Performance analysis on the existing techniques is also studied.

A fast and effective fault management algorithm is presented in order to detect and locate the failures in a network. Performance analysis has been carried out with different metrics viz., detection accuracy, miss-detection ratio, throughput and end-to-end delay. From the analysis, it is found that ANN based algorithm excels over others with a better detection accuracy of
74%. It is also proved that the recovery time is reduced considerably in ANN based method than the existing scheme. Also, the suggested fault detection and localization algorithm achieves less end-to-end delay and miss-detection ratio. The miss-detection ratio yield by the algorithm is two folds less than the existing scheme. Hence, the suggested ANN algorithm considered to be the accurate method than the existing algorithm.

To have robust and reliable network, a hybrid adaptive load shifting algorithm was implemented to recover the network from failures. The performance of the suggested algorithm has been compared with the existing fault management algorithms for various network parameters. The result obtained under simulated environment proves that the hybrid algorithm performance is better in terms of blocking probability, throughput, end-to-end delay and channel utilization when compared to static and dynamic algorithms under different load conditions.

The issues relating to the flooding are successfully addressed. Flooding issues have been successfully investigated and observed that the suggested threshold flooding method reduces the flooding overhead by minimizing the flooding messages for the topology information update. From the simulation results, it is proved that the existing “All-flooding” method receives almost double the number of flooding messages than the suggested threshold flooding method which significantly cut down the network traffic caused by the flooding messages. It is revealed that the suggested threshold method achieves better throughput i.e., four times higher than the existing all-flooding method. Also it is proved that suggested algorithm improves the network performance in terms of network blocking probability and flooding frequency than the existing all-flooding method.

In order to have an optimum, uniform and balanced utilization of wavelength, MFWA algorithm was developed and experimented in
simulation. It is evidently proved that the suggested MFWA algorithm minimized the connection drop rate. Presented simulation results shows that the suggested MFWA algorithm excels when compared with the existing FF, RF and RR wavelength algorithms. Traffic load of the network is compared with various performance metric viz., connection drop rate, packets received, average queuing delay and channel utilization. Simulation results revealed that suggested MFWA algorithm achieves comparatively better channel utilization than the existing algorithms, since all the available wavelengths are utilized uniformly i.e., two times higher than the FF and RF algorithm. Also, it is proved that the MFWA algorithm achieves reduced connection drop rate and delay with increased throughput.

Thus the reported research work focusing on the identification and localization of fault with an effective fast and effective fault management algorithm was successfully implemented. Further, a hybrid load shifting technique for fault recovery was also presented and is proved that it reduces the blocking probability and minimizes the end-to-end delay towards the ultimate aim of increased channel utilization and throughput. The work also addresses the message flooding problems. The results revealed that the issues relating to the excessive flooding of messages and thereby causing the occurrence of contention are reduced to a larger extent. Finally, it also provides solution to the uniform and balanced utilization of wavelength with reported multilevel wavelength assignment algorithm that is proved to have less connection drop rate for any session request.

7.2 FUTURE WORK

The presented research work recorded the fault detection accuracy level of 74% and this can further be increased beyond the reported value with suitable modification in the techniques. The work has been carried out in simulated environment with limited number of nodes. More number of nodes
may be added to simulate the real time environment and the deployment of this algorithm in real time system may be considered in future. A much more customized algorithm suiting to different application can be proposed to address the problems of blocking probability, wavelength assignment and flooding issues are also possible in future as this work paves way for the common solution.

Delay is the key QoS parameter in enhancing the scalability of the network and hence the end-to-end delay involved in fault diagnosis may also be reduced to minimum level. Further techniques are to be identified to reduce the flooding frequency in the network. For making the correct light-path decisions and re-routing the traffic streams, set of lazy flooding algorithms can be analyzed using Particle Swarm Optimization (PSO) technique, and then an optimized lazy flooding algorithm can be proposed.

The scalability of the reported technique with respect to the topologies other than mesh network may also be experimented.