Chapter 7
Conclusion

7.1 Resume of the work

Our attempt in this dissertation is aimed at

1 Comparing the most popular TCP variants viz. Tahoe, Reno, NewReno, SACK and verify the results reported in the literature.

2 Implement TCP’s congestion control at the router by employing active network technique to respond to congestion

3 Explore the possibility of using Performance Enhancing Proxy (PEP) which is normally used in satellite network/wireless environment in wired network and see its effect on TCP throughput improvement by varying critical parameters.

4 Explore by making transport available as one of the pre-deployed service viz Proxy Transport Service (PTS) in the active node and verify its response for controlling congestion and ultimately on improvement on TCP throughput under the variation of key parameters.

All above work has been carried out with different cases, scenarios and simulated by using ns2 simulator providing proof of principle.

In the following paragraph, a brief review is taken of the work reported in this dissertation.

A comparison of most popular TCP variants viz. Tahoe, Reno, NewReno, SACK is been compared. The results are comparable with that of results reported in the literature.

The conventional congestion control is employed at end hosts and hence has limited effect on congestion control and ultimately on TCP throughput. In Chapter 4 Active node based congestion Control, we take the congestion control to the router by employing active network concept to respond to congestion. The implementation show positive results. ACC system shows improved throughput in networks of bustry traffic sources of high bandwidth delay products.

Performance Enhancing Proxy (PEP) traditionally deployed in wireless, heterogeneous environment at the edge of the network router. PEP optimizes the end-to-end performance by isolating different physical medium. In this dissertation we
have attempted to employ PEP in wired environment. The results obtained on the considered network shows the improvement in throughput for optimized parameter of the order of 13 to 50 percent.

Proxy Transport Service: PTS is active network based service deployed at intermediate node in the network. It is a host aware, non transparent service. PTS node reduces the rtt by dividing TCP connections in two parts. Once active node is acquired it processes only active packets. It is demonstrated that PTS improves throughput up to 50% for both standard TCP and VegasTCP.

The central trust in this dissertation is therefore departure from end-to-end argument of system design principle. We try to implement by exploring the potential advantages offered by active networking in improving the TCP throughput by controlling congestion in high delay bandwidth network.

7.2 Suggestion for further Research

In the ACC system of chapter 4, dynamic time window and other TCP variants can be adopted. One of the challenging task for the future would be to implement some form of ACC system on physical active network to see if today’s system can support it.

PEP implementation in wired network has shown some promise. Its application to real world network need to be investigated.

Chapter 6 has provided proof of principle of PTS design. Discovery of PTS node is required to be investigated. With PTS, routers are acting as active node and therefore they must have environment for program execution and sufficient storage. In order to deploy PTS in present network infrastructure many more PTS nodes (ideally all) are expected to be present. It is impractical to change the present network totally; therefore the process of deployment of PTS will take its own time.

One of the key issues in today’s network is security. In this dissertation security related issues are not considered. It would be challenging to deploy active network with security aspect.