1. Introduction

The internet is growing tremendously day to day. The most common example of internet is simply Internet. With the change in demand and revolution in technology, network has grown up and it has taken a new formation and hence came into existence: the heterogeneous networks, where reliability of data is an important issue. This leads to the continuous revision of protocols used in implementation of internet. TCP at transport layer takes care of reliability issues very accurately and delivers stream of data to the application in sequence without errors. So, baseline TCP has also undergone numbers of revisions to improve its performance over heterogeneous networks.

➢ Background

Heterogeneous networks are made up of mixed mode networks consisting numbers of wired and wireless links with several numbers of hops. When Basic TCP came into an existence, majority of the network was composed and consisting of wired media. In wired network, links are less prone to environmental issues and hence channel errors as they are shielded and coated. Congestion was considered to be the only factor causing packet loss which causes performance degradation. So, the probability of loss due to any other reason than congestion, i.e. loss due to BERs, was very negligible. As wireless links came into existence, the severe problems with the wireless links i.e. random Bit Error Rates (BERs) have also started to affect the data bits and consequently the data rates abruptly.

The measure of performance of wireless links is usually a bit error rates. BER quantifies the reliability of the entire radio system from “bits in” to “bits out,” including the electronics,
antennas and signal path in between. It is defined as the rate at which errors occur in a transmission system. Problem arises when packet is lost due to arbitrary bit error rate instead of congestion [1].

Due to performance issues discussed above, the researchers had shown an immense interest in this area of research. Thus, the baseline TCP had gone through number of revisions like TCP Tahoe, Reno, New Reno and several others in order to improve performance on mixed mode networks. Amongst all of them, TCP SACK (Selective ACKnowledgement) is found to be the largely competent and efficient scheme because of its capability to avoid needless retransmissions based on SACK information made available. After a research of around 30 years, TCP is still unable to differentiate between causes of a packet loss. This thesis work focuses on discriminating corruption based losses which occurs due to random errors on wireless links from congestion loss to enhance the performance of TCP SACK on wireless erroneous links for heterogeneous networks [2].

Section 2 covers literature survey of base line TCP and generation of TCP versions for wireless networks and wireless links. It also covers major portion of TCP SACK which is a protocol under test. Section 3 discusses the challenges, issues and solutions of TCP on wireless links. Section 4 discusses objective and scope of research in detail. Section 5 covers research methodology, line of action and work plan in detail. Section 6 discusses simulation and emulation based comparative analysis of major TCP variants used on wireless links. Section 7 covers the major contents of base algorithm considered for modification. Section 8 describes modified algorithm with necessary flowchart. Section 9 explores details of simulation topology used and parameters considered for simulation of protocol under test.
Section 10 discusses in detail analysis of simulation outcomes and plots. Section 11 concludes the work. Section 12 highlights scope of additional work in the work presented. Section 13 list outs all the references used. Section 14 highlights number of publications undergone throughout the research span. Finally, section 15 discusses the activity done in background for installation, configuration, testing, simulator and emulator setup, troubleshooting, data acquisition and scripting which worked as a backbone for the research.