Asynchronous Transfer Mode (ATM) has been known as a very high speed network that is designed for supporting a variety of applications with diverse requirements. The introduction of ATM technology has raised many questions regarding the effectiveness of using TCP over ATM networks. Strictly speaking, there is no need to have TCP if the entire network is an ATM network. In the case of data transfer over ABR service, there is the TCP window-based flow control running on the ABR rate-based congestion control. Those control mechanisms are working independently, thus making susceptible to serious performance limitations (from either window-limited or rate-limited). Therefore, various techniques to adapt TCP to ATM network environments are proposed. They are categorized into 2 groups: i.e. Acknowledgement-bucket (ACK-bucket) technique and ER-to-Window translation technique. The eminent advantage of ACK-bucket technique is minimizing the network-interface buffer requirement but it doesn't improve the quantity of throughput (the window-limited still exists) In the case of ER-to-Window technique, it can improve many aspects of performance. However, there are some drawbacks when variable rate traffic shares in the network.

The thesis proposes a new technique for TCP flow control over ABR service named Cell-to-Frame rate conversion technique. This technique requires a module called Acknowledgement manager, which controls the TCP transmission rate by mapping from the rate that used in ATM layer. Like ACK-bucket technique, the network-interface buffer requirement is minimized. In addition, this technique can suppress both window-limited and rate-limited effects. Conclusively, this technique can improve transmission performance efficiently, although it needs complexity process in the system.