

Problems and Solutions to Improve TCP Performance over Wireless Networks

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ABSTRACT

Transmission Control Protocol (TCP) is the most commonly used transport protocol on the Internet. Unfortunately, TCP performance in wireless environments suffers from severe degradation. Because TCP was originally designed for wired networks. In recent years, many schemes have been proposed to resolve the problems of TCP in wireless environments. In this article we have tried to consider all the problems that have negative impact on the performance of wireless networks. We classify this problems into two categories: Problems arising from the structure of TCP's algorithm and Problems caused by the characteristics of the wireless environment. Also Commensurate with the problems and base on two pion of view, we classify the proposed solutions into two categories: TCP for different wireless applications and implementation of wireless TCP. From the application point of view, the most common wireless networks include satellite networks, ad hoc networks, and general wireless platforms such as wireless LANs and cellular systems. Also the second category is divided into the five following categories: split connection, reactive congestion control, proactive congestion control, link layer and cooperation between the layers. We discuss the intuition behind each solution and present example protocols of each category. We discuss the protocols functionality, their strengths and weaknesses. Finally we compare these methods. In additional we propose a new end-to-end congestion control algorithm named VECU that is effective and efficient for dealing with random bit error. VECU monitors the network congestion level and use from this to Detects whether packet loss is due to congestion or link error (losses due to the characteristics of the wireless environment). We use a function of degree three as window growth function. Due to this, when the current size of the window is far from the available capacity of the path, the window size grows fast and increases slowly otherwise. VECU is fair and allocates bandwidth fairly among flows with different RTTs. VECU can be very scalable and stable and fair with standard TCP flows. Also flows fully utilize the link. VECU is end to end and only need to change the sender side without any change in the receiver or in the network.

Keywords: Problems of TCP Protocol, Improving TCP Performance, VECU, Wireless Environment.