Improvement of TCP Performance over Mobile Internet

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ABSTRACT

Advance in wireless network technologies including IEEE 802.11, GRPS, and 3G systems have provided users with an “ any time ”, “ any where ”, and “ always on ” environment to access network resources. Among these technologies, IEEE 802.11 networks are widely used in campus, airport, and coffee shops, etc…, and act as gateways to access to the versatile Internet services. Internet services such as web browsing, file transfer, and e-mail are based on Transmission Control Protocol (TCP). TCP is a reliable, bi-directional, and connection oriented transport protocol originally proposed for wired network. Packet losses reveal to TCP will be recognized as network congestion, and will result in the reduction of transmission rate to ease the congestion. However, while it is valid to interpret packet losses as congestion for a stable and reliable wire-only connection, it is often wrong for a TCP connection with wireless links. In a wireless link, diverse channel conditions and handover may also cause packet losses. Throttling transmission rate according to the TCP congestion control mechanism in these cases will severely degrade the TCP performance in terms of network utilization. Therefore, a number of feasible approaches have been proposed to alleviate the effect of diverse channel condition on performance of the TCP connections including wireless links. There are also few approaches proposed in an attempt to deal with the disconnection caused by handover. However, these schemes all require the modification of the TCP congestion control mechanism in mobile hosts. In this paper, we propose to cope with the handover induced disconnection through the link-layer solution. By providing an effective buffer management mechanism in APs (access point) based on the link layer protocol, we expect that the probability of disconnection caused by handover can be reduced significantly. As a result, without the modification of the congestion control mechanism, the expressive TCP performance improvement can be achieved in mobile Internet. Keywords: IEEE 802.11. Wireless Networks, Internet, TCP, Transport Layer Protocol, Congestion Control, Access Point, Buffer Management, Mobile Internet

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