A Survey Paper on Enhancing Functioning of Wireless TCP in Cellular Network

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Abstract - Performance of the TCP (Transmission Control Protocol) has been promising in wired networks. In wired network the packet loss is due to congestion. But the performance of TCP has degraded in wireless network where packet loss is not only due to congestion but also due to high bit error rates and handoffs. In this paper we review four methods to improve TCP performance taking mobile handoff into consideration. The method like Improved Snoop (IS), I-TCP, M-TCP and have proved to be satisfactory solution to improve performance of TCP.

I. INTRODUCTION

TCP is basically designed for wired network and is reliable. In wired network packet loss are mostly due to congestion and the congestion window size is reduced to resolve the packet loss. However wireless links experience packet losses due to fading, high bit error rate, shadowing, handoff which are non-congestion losses. The snoop protocol improves performance by hiding the packet loss due to handoff which degrade the performance in this paper we review some methods like Snoop protocol [1], Improved snoop (IS) [2], I-TCP [3], M-TCP [3] to improve performance of TCP.

II. METHODS

A. SNOOP Protocol

The following Figure (a) shows the handoff between two BS. In this network model, the mobile host will directly link to the base station through the wireless link. Base station will act as the gateway between the wired and wireless network. This is a basic architecture that is suitable for current wireless cellular network and future wireless networks. It is simple but grasps most factors that should be taken into account in the protocol design. A TCP connection is established between the fixed host and mobile host through the wired network and the single hop wireless link.

![Figure(a)](image-url)
packets according to the Snoop protocol. When the handoff occurs, the new path will be established via the new base station. Now the mobile host would receive packets from the new base station.

Let’s assume to employ the TCP Reno at hosts and Snoop agent at the base station. During the period of the packets transferring, the Snoop agent can correctly recover packet loss over the wireless link.

However Snoop agent cannot correctly deal with the packet loss from the handoffs due to the user mobility. When the mobile host moves from one cell to another one, the new path will be established through the new base station. At this time, lots of packets, which are cached in the old base station, are not available to the mobile receiver. The only way to recover these lost packets is to trigger the time out mechanism at TCP sender, and subsequently, after a period of idle time, the TCP sender will retransmit the lost packets to the mobile host through the new path. Thus we can find there will be an idle time once the handoff happens. [1]

Problems with snoop protocol

1. The congestion control policy in the Snoop works well for one connection but becomes inefficient for multiple connections, resulting in degradation in significant throughput.
2. When a burst of packets arrive at the BS during congestion, multiple packets dropping due to buffer overflow will frequently occur.

B. IMPROVED SNOOP

The IS redirects the packet from current BS to neighbouring BS before mobile handoff to new BS. Existing snoop protocol has been Improved by adding a pre-redirection module which include two mechanisms namely packet relocation and suppress-ACK control.

In cellular network each cell has six neighbouring cells. The six cells are classified into donor cell and common cell. The mobile terminal receives the strongest signal from donor cell in all of neighbouring cells when it is ready for handoff with neighbouring donor cells 100% pre-redirection is done and with common cells partial pre-redirection is done. When packet arrives at current base station, IS select adjacent BS of donor cell where 100% packets will be relocated. Along with other BS of donor cells will get only back-up and cached packets from current BS as it is assumed that mobile host will enter one of the six neighbouring BS. [2]

C. I-TCP

Another solution to the problem caused by high BER is the I-TCP protocol (Indirect-TCP). In the I-TCP protocol a TCP connection between a fixed host and a Mobile Host (MH) is split in two at the Mobile Support Station (MSS) or base station. Data sent to the MH is received and acknowledged by the MSS before being delivered to the MH. Note that on the connection between the MSS and MH it is not necessary to use TCP, rather some protocol optimized for the wireless link could be used. The M-TCP protocol is very similar to I-TCP. It also splits a TCP connection in two-one from the MH to MSS and another from the MSS to the FH (i.e., the Fixed Host or sender). The MH to MSS connection passes through MHP, a session layer protocol. [3]

III. CONCLUSION

We conclude that a new method Improved Snoop (IS) Protocol will improve the poor performance of Snoop protocol in the scenarios of frequent handoffs in wireless cellular networks. The system performance improvements of this solution are achieved by relocating the unacknowledged packets, which may be lost due to handoff, from the current base station to the target base station in advance. Also I-TCP will be very useful in the case of packet loss due to high BER.

IV. REFERENCES

