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Performance Analysis of TCP in Wireless Networks using ATCP

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ABSTRACT

Transmission control protocol (TCP) well known protocol in communication of wireless network and it is also known to endure from dilapidation in performance in mobile wireless environment. The ii is that the uses of slow start under the wrong assumption. Error rates on wireless networks are orders of magnitude higher compared to fixed fiber or copper links. Packet loss is much more common and cannot always compensate foray layer 2 retransmission (ARQ) or error correction FEC). Mobility itself can cause packet loss. There are many situations where a soft handover from one point to another is not possible for a mobile end system. While there are a few proposition to streamline TCP within the sight a high piece mistake rate and versatility, however principally they focus on situations where the TCP sender is a fixed expense. In this paper, we are concentrating discontinuous detachment issues, the same number of methodologies have been proposed which are affecting in relieving the antagonistic impact of poor remote channel attributes. We analyze the performance of TCP using a scheme called ATCP, adopted version of TCP at mobile host. ATCP is designed for improving data transfer performance in 9th direction i.e. from fixed hosts (FH) to mobile host (NIH) and from MI! to Fit It requires feedback from network layer about the status of ongoing mobility in terms of connection signal and disconnection signal. Using these signals, it modifies the action taken when retransmission time expires.

Keywords: Transmission control protocol (TCP), mobile hosts (MH),fixed hosts (FH).

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Introduction

Transport layer protocol such as TCP has been designed for fixed networks with fixed systems. Data transmission takes place using network adaptors, fiber optics, copper wires, special hardware for routers etc. this hardware works without introducing transmission errors. On the off chance that the product is full-grown enough, it won't drop packets. On the off chance that a packet is en route from a sender to a beneficiary is lost in a system, it isn't a direct result of equipment or programming mistakes. The plausible purpose behind a packet misfortune in a system is an impermanent over-burdensome point in the transmission way for example condition of clog at a hub. Congestion by appears from time to. time even in carefully designed networks. TCP's flow and congestion control mechanisms are based upon the assumption that packet loss is an indication of congestion. While this assumption holds in wired network. it does not hold in the case of mobile wireless network. A typical wireless mobile network which has mobile hosts (MH) connected to base stations. (BS) overwireless link using Urn interface in Radio subsystems. The base stations are interconnected via wired network. Other fixed hosts (FH) may also be part of the wired network. In such networks, packet losses also occur due to poor wireless communication channel conditions and intermittent disconnection introduced by the mobility of the mobile hosts.

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TCP congestion control response is inappropriate and also undesirable as it decreases the packet deliver per unit time, and resulting in an underutilization of the network. Different number of approaches have been proposed for extenuating the effect of adverse channel conditions. There are few approaches which tackle mobility induced disconnection. In this paper we analyze the effect on a) after using the concept of ATCP, an adaption of TCP. ATCP is designed improving TCP performance in both directions i.e. from mobile host to fixed host and from fixed host to mobile host. We have analyzed the result by using the network simulator 2with comparing the ATCP with 3- dupacks, freeze TCP and TCP Reno.

II. RELATED WORK

ATCP is a way to deal with improve information move execution in portable remote systems within the sight of transitory disengagements brought about by portability. It is intended to improve exaction from FH to MH just as MH to FH yet includes changes to the system stack just at the MH. ATCP requires system layer input in regards to the status of availability with the system as association ad separation signals. The system layer sends an association signal when the pH gets associated with the system and a disengagement signal when the MH gets detached freak system. For WI to FT-I data transfer. ATCP uses these signals to freeze or unfreeze data transmission and changes the action taken at RTO (retransmission timer out) event. ATCP assumes that if a disconnection has occurred, acknowledgements may be lost during the disconnection. With this assumption, ATCP modifies the action taken by TCP at occurrence of RTO event. At RTO event it checks whether a has disconnection occurred, so then instead of reducing ss thresh, ATCP increases the ss thresh to the value of cwnd at the time of disconnection. This action helps ATCP °regaining earlier achieved window in slow start phase itself, thus reducing under-utilization of the fable link capacity. For FH to MH data transfer, ATCP uses connection signal to first freezing and then unfreezing the. FH sender. It freezes the sender with zero window advertisement (ZWA) and unfreeze it with full window advertisement (FWA). Solidifying causes FH to solidify its retransmission clock, without decreasing its clog window. Unfreezing results in FH sending all unacknowledged packet with no decrease in blockage window. In this manlier, ATCP diminishes inert time after reconnection without lessening the blockage window, in contrast to the methodology.

Data Transfer from MR to FH

The actions taken by ATCP in various scenarios are described below.

Disconnection event:

If the MH's transmission was instructed and its sending window was open the MH does not wait for acknowledgements of packets sent before disconnection, therefore cancels the retransmission timer (RTX). If MH's sending window is closed and it was waiting for acknowledgements to arrive, it does not cancel the retransmission timer. ATCP assumes that the acknowledgements might have been lost during a disconnection event and behaves accordingly on the occurrence of an RTO event. RTO event:

If MH is disconnected from the network ATCP increase the ss thresh to the window size reached before disconnection and sets the cwnd to one.

If MH is connected to the network retransmits the lost packet without modifying the ss thresh and cwnd parameters. This is done when a disconnection has occurred while waiting for acknowledgement to come. Otherwise normal TCP actions are taken. Connection event:

if send window is open, MH sends new data as permitted by the open window and sets a new retransmission timer. As acknowledgements are cumulative, De new acknowledgement will acknowledge the data sent before disconnection.

if send window is closed o If RTO event has happened while MI-1 was disconnected, ATCP starts sending new data and quickly reaches the previous window size since ss thresh is set to the earlier full window value. The low value of cwnd at reconnection will reduce the probability of congestion in the network. o Else ATCP waits for RTO event.

Data Transfer from PH to MH

Data Rcvd: ATCP acknowledges all the bytes received so far except the last two bytes during active data transfer from FR to MH. The acknowledgement for these two bytes will be delayed at most by dmsec, so that FH does not have to wait until it times out. This action of delaying the acknowledgement for the last two bytes increases the probability that in case of a disconnection event, ATCP has the last two bytes unacknowledged.

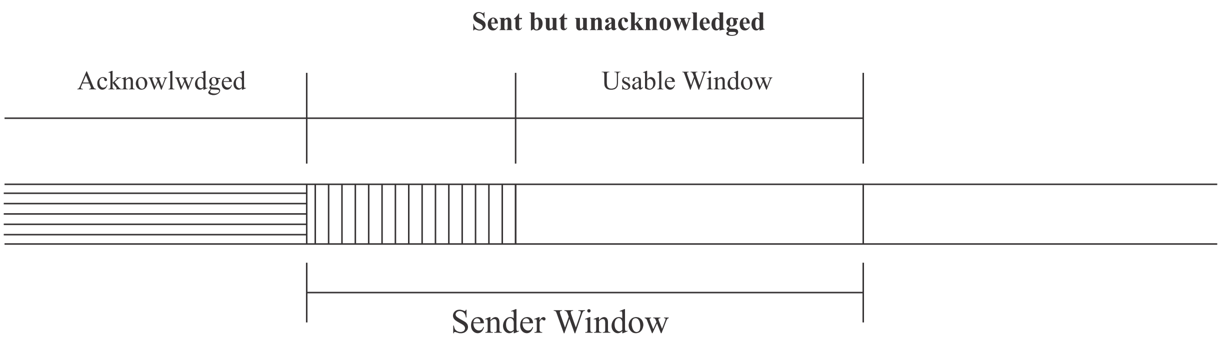
Connection: At reconnection, ATCP utilizes these two unacknowledged bytes to send ZWA (zero window notice) and FWA (full window commercial) affirmations. The Fri will process these affirmations as they have a higher arrangement number than all affirmations seen up Until this point. The main affirmation is with a Zero Window Advertisement (ZWA) and the second with a Full Window Advertisement (FWA) to open the window. The ZWA makes the FH expect that all the unacknowledged bundles are dropped by the MH as it won't have space in its cushion. Consequently, FH stops sending the information and furthermore solidifies the retransmission clock. When a FH receives a ZWA, its sending window will shrink from the right as shown in Fig. 1. Although a receiver is discouraged from such an action since the usable window becomes negative, the sender must recover from this. The FWA causes PH to resume sending the unacknowledged data as FWA opens up the sender's window. This action ensures that F1-I will not take congestion control action when packets are lost while MH was disconnected. Thus ATCP causes FH to retransmit the packets lost during disconnection without any invocation of congestion control mechanisms.

DupAkwd: This event allows ATCP to send duplicate acknowledgement. Transmission of duplicate acknowledgement is disabled after reconnection for a time period of one WIT. This is done with considering the case when PH might have sent data packets before receiving the ZWA and FWA acknowledgements. These packets may cause the MH to generate duplicate acknowledgements instead of dropping these packets as these packets will be retransmitted by FH after receiving FWA. The duplicate acknowledgements subsequently may cause the FH to unnecessarily enter the fast recovery phase, reducing its congestion window. Therefore, after sending the ZWA and FWA acknowledgements, ATCP suppresses duplicate acknowledgements for one round trip time.

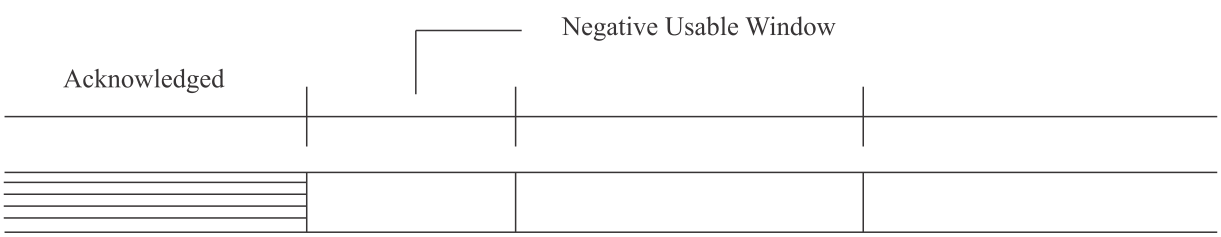
For MH to PH data transfer. ATCP is designed to behave like new connection after long disconnection, as the characteristics of the connection may have changed due to the MH entering a new network or due to different load conditions prevailing in the same network. Therefore, the cwnd is set to one and ssthresh to window value reached when disconnection event occurred. This design ensures that ATCP will quickly achieve full window while Fig.1 Zero Window Environment.

Experimental Setup And Simulation

To compare various approaches, we have implemented these in network simulator ns-2. This simulator is widely used in research community for simulations of protocol used in internet like TCP.



FH's sending window space before ZWA received



FH's sending window space after ZWA received

Fig. 1 Zero Window Environment

Therefore, we are using this for comparison of various modifications to TCP. This results in a meaningful comparison of various schemes. Therefore, to compare 3DA. Freeze TCP and ATCP, we have implemented these in ns-2.

We also modified ns for simulating the actions taken by TCP at toil when zero window advertisement packets are received. Mobility of the MH is simulated by maintaining a variable, Network Status, in TCP Agent whose value changes from Connected or Disconnected as determined by a handoff timer handler. The handoff timer can be configured to alternately connect and disconnected to simulate handoff. We have also modified Mobile IP ns for providing mobility information to the TCP Agent. but in this case granularity of disconnection period was in order of seconds. Therefore, we chose to simulate mobility internally that allows granularity level in the order of milli seconds. Following is the listing of file names which are modified and the purpose of modifications.

ten, tep.cc: These files are modified for implementing zero window advertisement processing (for the case of FH to MH data transfer) and to process connection & disconnection signals given by lower layers (for the case of MH to FH data transfer).

tep-sink.cc: These are modified to simulate temporary disconnection of mobile host and action taken at connection & disconnection events as per 3DA, Freeze TCP and ATCP algorithms.

mip4ec, mip-reg.cc: This is modified to give feedback about network connectivity to upper layer TCP.

Various other files are also modified for small changes which are required to Rani above purposes.

iv. Performance Analysis

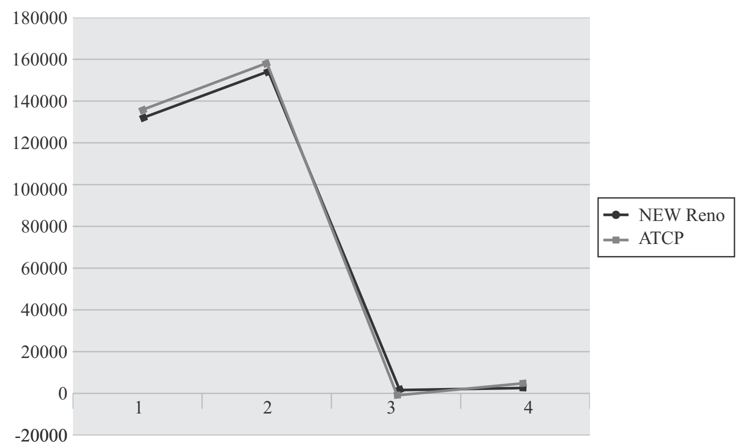


Fig. 2 Throughput for TCP NEW Reno and ATCP

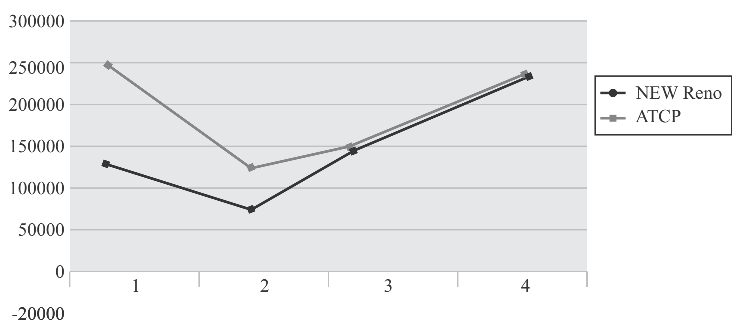


Fig. 3 Delay for TCP NEW Reno and ATCP

TCP-Reno over a small RTT connection is able to quickly reach its full window size. Therefore. percentage improvement is observed over TCP-Reno for long disconnection period. This is accomplished principally by taking out the inactive period after reconnection. Huge RTT associations endure because of the huge inactive period after separation and the huge time taken to arrive at the full window sin. ATCP accomplishes an expansion in throughput for a disengagement time of 3000ms. For FH to MH information move, it has been seen that on account of different parcel misfortunes in a solitary window. here and there SDA can't lessen inert time and at times it additionally diminishes the throughput in contrast with TCP-Reno. ATCP is to perform equivalently to Freeze TCP in a remote LAN condition. ATCP is additionally ready to give equivalent throughput as Freeze TCP for short detachment period in the remote WAN condition. ATCP does not require disengagement expectation as by Freezer TCP, which is a noteworthy downside of Freeze TCP. For MH to FH data transfer, ATCP is compared with TCP-Reno only, as 3DA and Freeze TCP has not considered this direction of data communication.

Conclusions

We investigated the issue of the lackluster showing of TO, over versatile Adhoc systems. The high mistake rate and discontinuous separations incited by versatility are observed to be the essential components which corrupt the exhibition of TCP. We saw that while a few methodologies have been advanced by the examination network for lightening the inconvenient impact of poor attributes of the remote channel, just a couple of methodologies are introduced for fathoming the portability related issues. Indeed, even in these few endeavors, for the most part, requires support from base-station like some state per TCP association, a few changes in the convention stack, and so on. This prerequisite of these methodologies make them unfortunate as these plans couldn't support scrambled traffic, diverse affirmation way, likewise they presented adaptability issue and impede the interoperability of the versatile host with various systems.

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