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Congestion Control and Avoidance Using TCP-VEGAS in Adhoc Social Network

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Abstract:

Ad-hoc Social Network (ASN) is a mix of social network and ad-hoc network. Today most of mobile phones are provided with Bluetooth, Wi-Fi, and Cellular radio and able to support ad-hoc communication mode. Communications between nodes in Ad-hoc Social Networks (ASNETs) based on the nodes' social features like social graph, human mobility pattern, similarity, centrality, community, and their strength. However, with increasing growth of social networks, reliable and congestion-free communication becomes difficult due to its complexity and dynamic nature of user movement. The existing system control overhead and provide reliable transmission for popular packets in ad-Hoc social networks. However, this solution is not suitable for ASNETs where the allocation of bandwidth is based on social popularity of nodes. In order to make efficient use of bandwidth, a newest version of TCP named TCP Vegas is used to estimate the available bandwidth using bandwidth estimation scheme. This scheme improves transmission reliability by assigning bandwidth to users based on their popularity levels.

Keywords—**Mobile node, Ad-hoc network, availability, mobile nodes, round trip time, degree centrality, collision avoidance, TCP Vegas**

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I. INTRODUCTION

An ad-hoc network is an infrastructure less network. Instead of relying on a base station to correlative the flow of messages to each node in the network, the personalized network nodes forward packets to and from each other communication between nodes in Ad-hoc Social Networks (ASNETs) based on the nodes' social features like social graph, human mobility pattern, similarity, centrality, community, and its strength. However, with developing growth of social networks reliable and congestion-free communications become tough due to their involvement and dynamic nature of user movement. To provide reliable transmission a Transmission control protocol is used the wireless communication Transmission Control Protocol (TCP) plays an important role which gives better and reliable communication capabilities in all varieties of networking environment. . It control overhead with reliable transmission of popular packets in ad-Hoc social networks. However this solution is not suitable for ASNETs where the position of bandwidth is based on social popularity of nodes provides high delay for acknowledgement transmission thus increases buffer size. In order to make efficient use of bandwidth, a newest version of TCP named TCP Vegas is used Vegas is much superior in performance as compare to other TCP version like TCP Reno and new Reno because of its packet delivery ratio and full use of packet transmission bandwidth. Some parameters like throughput and communication delay plays a vital role in Vegas performance to estimate the available bandwidth using bandwidth estimation scheme. This scheme improves transmission reliability by assigning bandwidth to users based on their popularity levels.

II. RELATED WORKS

In [3]. R. T. Al-Zubi, M. Krunz, G. Al-Sukkar, M. Hawa, and K. A. Darabkh, discussed"Packet recycling and delayed ACK for bettering the performance of TCP over MANETs this algorithm used two techniques for developing the performance of TCP over MANETs. The first one, called TCP with packet recycling (TCP-PR), grant the nodes to recycle the packets instead of dropping them after reaching the retransmission limit at the MAC layer. In the second technique, which is called TCP with adaptive delay window (TCP-ADW), the receiver delays sending TCP ACK for a certain time that is dynamically changed according to the congestion window and the trip time of the received packet and it is Easy to implement Do not require network feedback, compatible with the standard TCP .Extra overhead issues are occurred due to collision between data and ack packets transmission using the same path.

In [2]. A. M. Al-Jubari, M. Othman, B. M. Ali, and N. A. W. A. Hamid, introduce an adaptive delayed acknowledgment strategy to improve TCP performance in multi-hop wireless networks using
TCP receiver with an adaptive delayed ACK strategy is proposed to develop TCP performance in multi-hop wireless networks it can achieves the best TCP performance this scheme must be extend their work to cover different network architectures such as wired, wireless sensor and wireless mesh networks.

In[1].F. R. Armaghani, S. S. Jamuar, S. Khatun, and M.F.A.Rasid,discussedPerformance analysis of TCP with delayed acknowledgments in multi-hop ad-hoc networks This uses a dynamic TCP-MAC interaction strategy which tries to reduce the number of induced ACKs by monitoring the channel condition and it provides Less collision probability and Higher bit error rates in a lossy channel leading to very complex conditions.

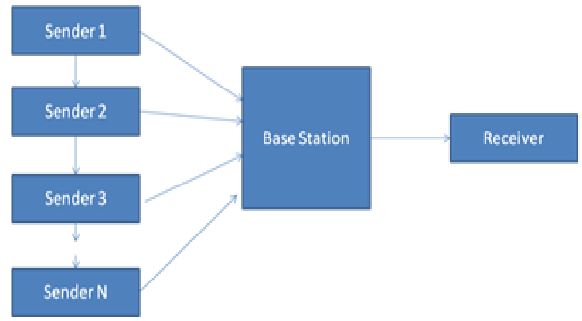
In [4] .F. Xia, L. Liu, J. Li, A. M. Ahmed, L. T. Yang, and J. Ma, discussed about BEEINFOAn interest-based forwarding scheme using artificial bee colony for socially-aware networking, BEEINFO(BEE Colony inspired INterest-based FOrwarding), a set of interest-based forwarding schemes are proposed for socially-aware networking, which consists of BEEINFO-D, BEEINFO-S and BEEINFO-D&S. And it provide higher delivery ratio and Lower overhead

In [5]. Feng Xia, Hannan Bin Liaqat, Jing Deng, , Jiafu Wan, Sajal K. Das, Fellow discuss about overhead control with reliable transmission of popular packets in adhoc social network .The reliability of sender data packet transmissions is affected by two main aspects:when multiple senders are sending data on multihop ad-hoc networks and only a single receiver is receiving data packets , some of these packets are dropped close to the receiver. The acknowledgment packets may be missed when data and acknowledgment packets uses the same path (the sender of the acknowledgment packets).

III. PROPOSED SYSTEM

TCP Vegas is a congestion avoidance algorithm that delays Packet to some extent than packet loss. It detects congestion at initial stage based on increasing Round (RTT) values of the packets. The algorithm depends only on accurate calculation of the Base RTT value. If Base RTT Value is too small then throughput of the connection of the network will be less than the available bandwidth while if the Base RTT value is too large then it will overrun the connection.

A. System design



The reliability of sender data packet transmissions is affected by two main reasons:

1) when multiple senders are posting data on multihop ad-hoc networks and only a single receiver is receiving data, some of these packets are dropped close to the receiver
2) The acknowledgment packets might be lost when data and acknowledgment packets use the same path (the sender of the enlargement packets).
TCP Vegas is used to estimate the available bandwidth using bandwidth estimation scheme.
This scheme improves transmission reliability by assigning bandwidth to users based on their popularity levels.

B.Adhoc Network Deployment

- A network without any fixed base stations or multi-hop is called as adhoc networks.
- Here homogeneous adhoc network is formed.
- It is a Self-organizing and adaptive networks that allows spontaneous formation and deformation of mobile networks
- Each mobile host node acts as a router
- It can supports peer-to-peer communications and peer-to-remote communications

C.Data Transmission

- Here the data packets from multiple sender nodes will transfer the packets to single receiver.
- Therefore, the receiver node cannot share the bandwidth efficiently with all sender nodes.
- To solve this problem by using the TCPVegas scheme at the sender side, which is to share bandwidth among users according to the Base Round Trip Time (BRTT) mechanism

D.Base Rtt Mechanism

- Base Round-trip time (RTT), also called round-trip delay, is the time required for a signal pulse or packet to travel from unique source to a unique destination and back again.
- In this context, the source is the computer initiating the signal and the destination is a remote computer or system that gets the signal and retransmits it.

- Vegas read and records the system clock each time a segment is sent.
- When an ACK appears, Vegas read the clock again and does the base RTT calculation using this time and the timestamp recorded the important segment.
- The proposed extension to TCP includes a Timestamp option that could be used to achieve the same effect, although our approach obviously needs no cooperation from the receiver.
- Using an accurate base RTT estimate serves two purposes.
- First, it leads to a more accurate time calculation.
- Second, it is used in conjunction with the mechanism described in the next subsection to decide to retransmit a dropped segment in a more timely fashion.

E. Congestion Avoidance And Detection Using TCP Vegas:

- The congestion window should only be degenerate due to losses that happened at the current sending rate, and not due to losses that happened at an earlier, higher sending rate.
- In Reno, it is possible to decrease the congestion window more than once for losses that acquired during one RTT interval.

- In contrast, Vegas only decrease the congestion window if the retransmitted segment was already sent after the last decrease. Any losses that happened before the last window decrease do not suggest that the network is congested for the present congestion window size, and therefore do not imply that it should be decreased again.

IV.PERFORMANCE ANLAYSIS:

Throughput:

It measures the total rate of data sent over the network, including the rate of data sent from CHs to the sink and the rate of data sent from the nodes to their CHs.

Packet Drop Ratio:

It measures the robustness of protocol and is calculated by dividing the total number of dropped packets by the total number of transmitted packets.

Delay:

The delay of a network specifies how long it takes for a bit of data to travel across the network from one node or endpoint to another. It is typically measured in multiples or fractions of seconds.

Overhead:

Overhead is any combination of excess or indirect computation time, memory, bandwidth, or other resources that are required to attain a particular goal.

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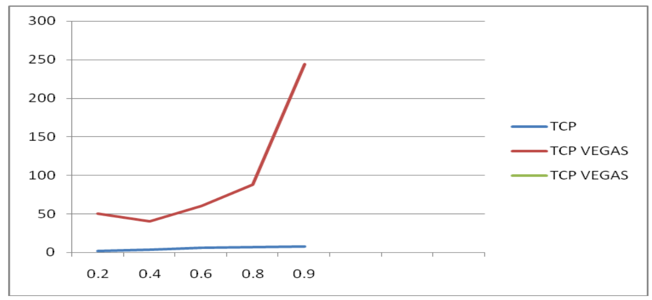

Fig: 2: congestion avoidance using TCP Vegas

TCP Vegas successfully bring out between 40% and 70% better throughput and one-fifth to one half the losses. The Time(s) is plotted along x-axis and Throughput is plotted along y-axis.

V. CONCLUSION AND FUTURE WORK

Vegas are much better in detecting losses and it provides a reliable transmission among users. TCP VEGAS Provides high throughput with minimum packet loss.it control conjesion before collision in Ad-hoc networks.

TCP Vegas is a source algorithm that provides rich performance in the Internet congestion control. But Vegas have some complications which have serious impact on its performance. Rerouting is one of these problems. When route of a connection differs and round trip time increases, Vegas misinterprets it as the result of the network congestion and consequently decreases its own sending rate. So propose a novel algorithm, named Pegas, in which particle swarm optimization technique is used to dynamic estimation of Base RTT. Pegas solves the rerouting and unfairness problems and remarkably increase Vegas performance such as dropped packets, bottleneck utilization, and fairness.

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