Congestion Control and Avoidance using Dynamic TCP Vegas in Ad-Hoc Social Network

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ABSTRACT

Ad-Hoc Social Networks is distributing type of wireless networks and mix of social networking sites. Recently various types of phones are provided with Wireless fidelity and other mechanisms like exchange of information between nodes in Ad-Hoc Social Networks depends on node's social features like their human mobility pattern, social graph. And also centrality, tie and community strength. The rising expansion of the Social network, steadiness 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 main packets uses in an Ad-Hoc social network and it packet loss is controls by delaying acknowledgement thus increases buffer size. In order to make efficient use of bandwidth, a newest version of Transmission Control Protocol named Dynamic TCP-Vegas is used. It dynamically chooses very late beginning algorithm which adjust decrease/increase rate in congestion avoidance phase according to specific network environment. It estimates the bandwidth by using a method called bandwidth estimation scheme. This method is mainly used for identifying the bandwidth of the both senders and receivers which depends on their popularity level that improves transmission accessibility.

KEY WORDS: Collision Avoidance, Dynamic TCP-Vegas, Congestion Control, Mobile Node, Availability, Mobile Nodes and Priority Based Scheduling Algorithm.

1. INTRODUCTION

An Ad-Hoc network is puts trial less network instead of relying on a base station to correlative the flow of messages to all nodes present in the network. The personalized network nodes forward packet from one node communicate between others nodes in Ad-Hoc social network which is depend upon node special features like mobility pattern and its reliability.The accessibility of packet transmission of sender mainly depends on two factors. They are when many senders send data to one receiver and the receiver lose some data. The acknowledgment packets might be lost when data and acknowledgment packets use the same path (the sender of the acknowledgment packets)It increases level of the buffering by avoiding duplicate acknowledgement.In this networking paradigm, transmission unreliability could be caused by numerous social applications running on a single node. The main advantage is that, this method control contention between nodes and along their communication path. And many senders send messages to the receiver's side and expecting for a positive report. Also the Dynamic TCP-Vegas to solve this problem.

Related Works: In (Al-Jubari, 2013), introduced Transmission control protocol achievement in wireless Ad-Hoc networks: The characteristics of multi-hop wireless networks, such as data transmission rate, rerouting, data link layer, mobility, and centrality routing.

In Al-Zubi (2014), discussed about how to recycle the packet for increasing the completion rate of TCP over Mobile Ad-Hoc Network. Two techniques are used. The first one called packet recycling. It grant the nodes to recycle the packets rather of dropping them. The second technique called TCP with adaptive delay window the receiver lag the sending acknowledgement for a particular time that is dynamically changed according to the congestion window size and the trip.

In Armaghani (2011), analyzed the capability of protocol with Delayed Acknowledgments in Multi-hop Ad-Hoc Networks, The interaction strategy which tries to decrease the number of convinced Acknowledgement by controlling the channel condition conditions and acknowledgements in low traffic situations.

In Chen (2003), introduced on providing congestion window limit in mobile wireless Ad-Hoc networks. The basic idea of congestion control of transmission control protocol is that senders probe the network for available information, and develops the transmission rates until packet losses are detected. TCP takes packet loss as the indication of network congestion, and it triggers a series of congestion control process. It depend upon the detection of congestion. That are employed social networks makes it worth further exploration in this direction. In TCP, the congestion window size is maintained by the sender. TCP window rate which is maintained by the receiver. The congestion window is a link between the sender and the receiver between each node in the network. And the protocol movement is analytically traceable It achieves better output in terms of control overhead, total overhead, average throughput, packet loss rate, packet delivery rate and average delay.

In Feng Xia (2015), introduced the Overhead Control and Reliable Transmission in Ad-Hoc Social Networks which increases transmission reliability among user based on their popularity level.

2. PROPOSED DETECTION SCHEME

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

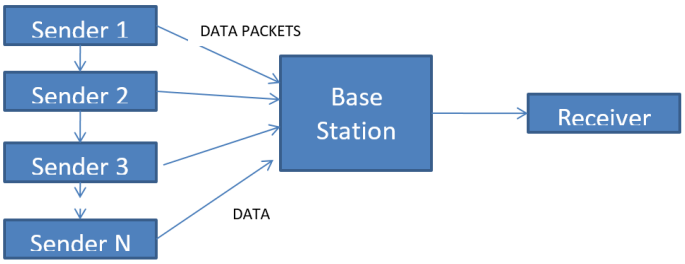

Figure.1. System Design

(Congestion Avoidance Using Dynamic TCP Vegas)

The accessing of both senders' side data transformation is sometimes difficult due to some factors they are: When some senders send messages to the same receiver at a time and the sender doesn't get positive ACK because some message get dropped or missed. The acknowledgment packets might be dropped when data and acknowledgment packets use the same path (the sender of the acknowledgment packets). It reduces the level of buffering while avoiding duplicate acknowledgement.

The main objective of this Dynamic TCP-Vegas process is to figure out Actual and Expected Throughput. It shows the total available bandwidth in the network, and control the exchange of information relied on this value avoid congestion.

TCP-Vegas adjust its cwnd by following equations.

Cwnd + 1 diff<α

Cwnd= cwnd - 1 diff>β

Cwnd otherwise (1)

Diff = Expected Rate – Actual Rate (2)

Expected Rate = cwnd (t) / BaseRTT (3)

Actual Rate = cnd(t) /RTT (4)

This algorithm consider the base mode of RTT which have minimum RTT Connection report Cwnd(t) and it is used to know the congestion window size and actual Round Trip Time value, α and β are parameters whose values are typically initialized to 1 and 3 respectively.

Dynamic TCP-Vegas are also used to understand, identify or preserve continous packet loss in a TCP Reno. This is possible when Dif < α; Throughput is less.

Hence the source side's bandwidth and increased window size become unutilized.

When diff > β in case Vegas will reduce window linearly between α and β congestion window remain unchanged.

Ad-Hoc Network Deployment: The networks without any base stations "infrastructure-less" or multi-hopes known to as Ad-Hoc Networks. Here homogeneous Ad-Hoc network is formed. This method is self-organized and having reliable network which help to form sudden networks and mobile Ad-Hoc network. All host act like routers. It can support peer-to-peer communications and peer-to-remote communications

Data Transmission: In Data transmission the information contained packets send from multiple sender nodes will transfer the packets to single receiver. Therefore, the receiver node cannot exchange their BW reliably and fairly with all sender nodes. To solve this problem by using the TCP Vegas scheme at the sender side, this is to divide bandwidth among users according to BRTT mechanism. Then it considers congestion which is dropped in timely manner.

Base RTT Mechanism: BRTT also called RTD that is Round Trip Delay. The methods identifies and initializes the computer signal for proper network connection and collects the data and re-transmit the message. Vegas calculate the read time and record time by using an inbuilt clock inside the method. If the message is properly sensed then an Ack get in to the Sender's side. Afterwards the RTT and timestamp are being calculated. Also proposed a scheme that reduces timestamp which improve the whole process. Using an accurate base RTT estimate serves two purposes. First, it leads to a more accurate timeout calculation. Then it considers congestion which is dropped in timely manner.

Congestion Avoidance and Detection Using Dynamic TCP Vegas: The losses are possible while the particular sending rate get reduced in a congestion window. And doesn't due to losses that happened at an earlier, higher sending rate. The Reno reduce the actual congestion window size while loss of information along RTT Interval. Vegas has a contrast approach, the window size get reduce when the re-transition part is late. The previous window decreases don't implied on the current process. So that the decreasing details also don't shown.

Algorithm:

Priority based scheduling algorithm: The method of scheduling the process based on priority is known as Priority Scheduling. This technique work based on priority that is scheduler chooses process with respect to priority. Also it consists priority assigning for every process and process with higher priorities are carried out first and whereas task with equal priorities are carried out in FCFS or Round robin basis. Priority is divided into two types. They are either static or dynamic. Static priority is assigns while creating the priority, likewise dynamic priority is assigns while behavior of the processes depends on system.

Performance Analysis:

Throughput: It measures the total rate of data sent over the network, including the rate of data sent from source to router and data sent from sender's side to receiver's node.

Congestion control: In stack data Structure every element has a priority associated with it an element with high priority is served before an element with low priority hence it reduce traffic congestion.

Delay: The network which identifies how much time taken to travel from source to destination is called delay. Delay is calculated in multiples or fractions of seconds.

Overhead: The mix of direct or indirect computation, bandwidth or memory which are needed to achieve some aim is known as overhead.

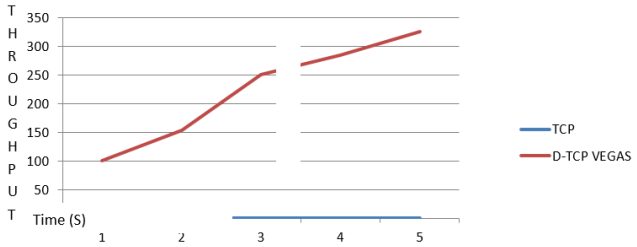

Figure.2. Congestion avoidance using dynamic TCP Vegas

Dynamic TCP Vegas successfully bring out 40% to 70% better throughput and one fifth to one half the losses The Time (S) is plotted in X-axis and Throughput is plotted in Y-axis.

3. EXPERIMENTAL RESULT

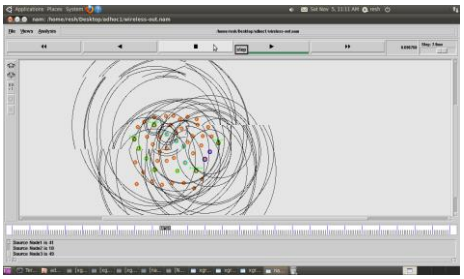

Figure.3. Selection of source node based on priority

Fig.3, priority level is used to select the source node selection process. Bandwidth assigned to each node depending on its priority level. It involved in priority level assigning of every process and process with higher priorities are carried out first and whereas task with equal priorities are carried out on a FCFS or Round robin basis here depended on their priority level 41 is the first source node, 18 is the second source node, 49 is the third source node. The sender send a Hello message to their nearest node and don't forwarded to any other nodes.

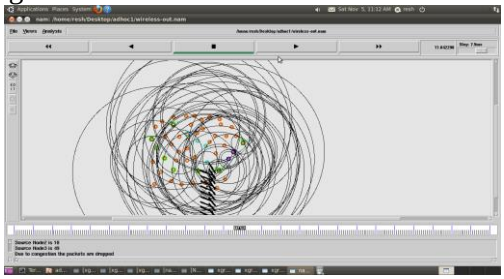

Figure.4. Packet dropping due to Congestion

Fig.4, illustrates packet dropping while congestion. The information gets lose when more than one sender are sending the information to a single receiver. The acknowledgment packets might be lost when data and acknowledgment packets use the same path (the sender of the acknowledgment packets).

The message sends in a periodic manner to the routing table for the neighbors to select route to reach destination. When the route request is reached to destination it selects the route as best to communication. And it maintains the route for source to destination communication.

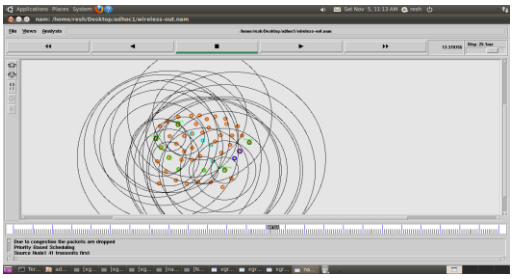

Figure.5. Packet transmission based on priority

Fig.5, illustrates priority based scheduling of the data transmission. The bandwidth estimation method in the TCP-Vegas is used for estimating the given bandwidth. This method improvises the transmission reliability that assigns bandwidth to senders based on its popularity levels. TCP-Vegas calculate both the time difference and RTT in the receiver's side. The last packet time is larger when it re-transmitted their packet by avoiding duplicate ACK information is transmitted to their appropriate destination depend on its priorities to avoid congestion source node 41 transmitted its information first then source node 39 transmit their data.

4. CONCLUSION

An algorithm called Dynamic TCP-Vegas is used to improve the performance of the internet congestion control. Vegas are much better in detecting losses and it provides a reliable transmission among user. And it control congestion before collision in Ad-Hoc social networks and it provide high throughput with low packet loss.

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