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Traffic Management Using Fuzzy Control System in Network

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Abstract. Traffic Management using Fuzzy Control System Propose a distributed traffic management, in this project Network simulators are used to reduce the traffic in networks. Traffic congestion control is one of the effective approaches to manage the network traffic. In this traffic management IntelRate Controller has been used to manage the Internet congestion.. It avoids various potential performance problems arising from parameter estimations while reducing much consumption of computation and memory resources in routers. As a network parameter, the queue size can be accurately monitored and used to proactively decide if action should be taken to regulate the source sending rate, thus increasing the resilience of the network to traffic congestion. Existing system have more problems in the data losses. In this proposed system it must be reduced to achieve the better performance.

Keywords: Congestion control, fuzzy control system, robustness, traffic management, Intelrate Controller

INTRODUCTION

Congestion Control[1] [2] M.welgi and R.jain are used for high bandwidth delay product networks paper have different disadvantages those are TCP[3] is not good, prone is also not stable and high bandwidth allocation. In this case Internet speed is reduced because delay satellite links. Based on this problem we develop a single approach Internet Congestion Control. Modify those problems D.Katabi, M.Handley, and C. Rohrs are developed XCP [4]. It is used for enough bandwidth allocation and queue size is also reduced.

Dynamics of TCP/AQM [5][6] and a scalable control paper implemented by S. H. Low, F. Paganini, J.Wang. This paper has main drawback is traffic and accepted only single link sources. Overcome this problem we developed TCP/RED algorithm. It is useful for traffic effectively and accepted for multi link-multi sources

Transmission Control Protocol (TCP)[7] is a widely deployed end-to-end transport protocol across the Internet. Due to unawareness of network conditions, regular TCP is not able to fully control the limited resources and distinguish packet loss from congestion loss and random loss. In an ad hoc network, nodes play both roles of end system as well as IP router. In this paper, we take this advantage to propose a new TCP congestion control mechanism by router-assisted approach. Based on the information feedback from routers, sender is able to adjust the sending speed dynamically in order to avoid overshooting problem. Our proposed protocol has 5-10% higher throughput than TCP NewReno and much less number of retransmission. The fairness requirement is also achieved while our proposed protocol coexists with other major TCP variants.

Explicit congestion control (XCC) is emerging as one potential solution for overcoming limitations inherent to the current TCP algorithm, characterized by unstable throughput, high queuing delay, RTT-limited fairness and a static dynamic range that does not scale well to high bandwidth delay product networks. In XCC routers provide multi-bit feedback to sources, which in turn adapt throughput more accurately to the path bandwidth with potentially faster convergence times. Such systems however require precise knowledge of link capacity for efficient operation. In the presence of variable capacity media, e.g 802.11, such information is not entirely obvious or may be difficult to extract. We explore three possible algorithms for XCC which retain efficiency under such conditions by inferring available bandwidth from queue dynamics and test them through simulations with two relevant XCC[9] protocols: XCP and RCP. In this paper we explored the problem of operating XCC mechanisms in transmission media with variable or unknown capacity. We have proposed three alternative control algorithms: Blind, ErrorS and MAC.

XCC, XCP and RCP[11]uses in the previous paper in that case efficiency are increased but packet losses and Traffic Management are the drawbacks in the paper overcome those drawbacks we can give this paper. This paper is using Fuzzy Control System (if-else condition). In this paper link restriction process are added using this we can reduce the packet losses and time also reduced

TRAFFIC MANAGEMENT PRINCIPLES

Traffic Management process

Traffic management means find the shortest path and minimum edge weights and data transfer without any packet loss. Traffic Management can reduce throughput delay. Traffic congestion control is managing the network traffic.

We consider a network means interconnected by a number of nodes, in which each node act as router, source and destination. Every host is attached to the access routers which cooperate with the core routers to enable end-to-end communications.

Congestion occurs means different flows traverse in a router in this case Queue size exceed, thus making it a problem in the Internet. Since any router may have any problem along an end-to-end data path, we would like every router to be able to manage its traffic. Using new traffic management/control algorithm we can manage the traffic.

Every router has data rate regulators by measuring and monitoring the IQSize. Every source request have its own sending rate, it is called Req Rate. It is updated for every router in route. Each router computes the source transmission rate according to IQSize in the path. Then compare with old Req Rate field. The Packet reaches at the destination, the Req Rate value is affected the old data rate from congested router in the data path higher than old rate of the source

The receiver then sends response to the source via an ACK (Acknowledgment) packet, and the source would update its current sending rate accordingly. If no router modifies *Req Rate* field, it means that all routers in route allow the source to send its data with the requested desired rate.

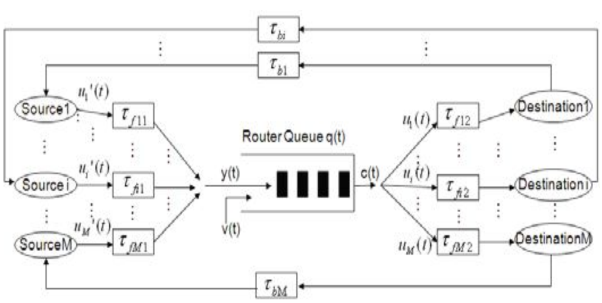


Fig: 1 System model of an AQM router(taken from paper1)

Fig: 1 shows different sources and destinations are connected with AQM router, source sends the Req through AQM router to the Destination [1].

ℓbi – feedback delay

v(t) – Traffic rate(un controlled)

y(t) – Traffic rate(controlled)

Tfi1 - Time delay source to router

Tfi2 - Time delay router to destination

μpi - Input fuzzy set

μuj - Output fuzzy set

We are implementing our new controller in every router, Fig. 1 with *M* sources sending its traffic to their respective destinations. For i =1, 2, . . .,M. Sources(1,2,…M) send different data packets to the destination using router, so every time data is passing through the router. In my proposed system Every node act as router so always router passing is not necessary

Proposed Algorithm

Algorithm: Traffic Management/Control Algorithm
Inputs: Data Packet
Outputs: Packet of Data without any losses

1 Start the Server
2 Browse the Data Packet
3 Then click Send Button
4 Find the Path
5 Calculate Throughput //Total weight
Assume=1
If (Throughput > 0.5)
Then choose another shortest path
Else
Transmit the data
6 Reach the destination
7 Destination send response to the source
8 END

SYSTEM ARCHITECTURE

System Architecture means given network construction, this network have geographically connected with different nodes. Network building is used by Network Simulators and socket communication is created by Awt and Swings. In this network every node act as router.

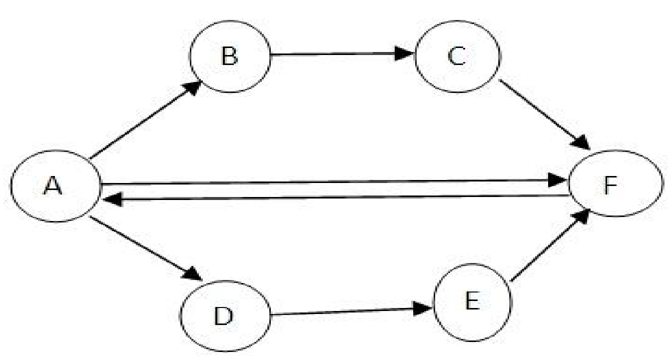


Fig: 2 System Architecture

Fig: 2 shows the simulation network.Network has connected of different geographical nodes. In this network every node act as source, destination and router

The contributions of our work lie in:

1) Using fuzzy control system to design an traffic management scheme called the fuzzy controller

2) The fuzzy logic controller using less performance parameters while providing high performances compare to the existing traffic control protocols

3) The design of a Fuzzy control mechanism that can generate relatively low throughput

4) The capability of our algorithm to provide better IQSize and improve efficiency.

Fuzzy Control System

Fuzzy Control System implementation is based on three phases those are

i. Calculate the membership value (also called as fuzzy sets)

ii. Create the Rule table

iii. Defuzzifying the result

Fuzzy Logic Control Implementation

Fuzzy Logic Control has been considered for Intelligence Control. It is technique for design a robust systems that can contained with the common factors such as nonlinear parameters, uncertain measurements. Fuzzy logic Controller has human decision making. Fuzzy logic control has been widely used in industrial process control and control performance in accuracy, good response, robustness and stability.

FLC has found its applications to network congestion control since 1990. In early stage, it was used to do rate control in ATM network, e.g., [15], [16], to guarantee the QoS. FLC was used in RED (Random Early Detection) algorithm in TCP/IP networks to reduce packet loss rate and improve utilization. However, they are still providing implicit or imprecise congestion signaling, and therefore cannot overcome the throughput fluctuations and conservative behavior of TCP sources.

PERFORMANCE EVALUATION

Performance Evaluation Means distribution of data is done in minimum time between the source and destination. Find out the time (which time that file received to the destination).

Received Time = End Time-Start Time

The capability of the Fuzzy controller is demonstrated by performance evaluations through a series of experiments.

The controller is evaluated by the following performance measures.

1) Source throughput is defined to be the average number of bits successfully sent out by a source per second, i.e.Bits/second.

2) IQSize is the length of the bottleneck buffer queue (measured in packets) seen by a departing packet.

3) Queuing delay is the waiting time of a packet in the router queue before its service. Measurements are taken from the time the first bit of a packet is received at the queue until the time the first bit of the packet is transmitted.

4) Queuing jitter is the variation of queuing delay due to the queue length dynamics, and is defined as the variance of the queuing delay.

5) Link utilization is the ratio between the current actual throughput in the bottleneck and the maximum data rate of the bottleneck. It is expressed as a fraction less than one or as a percentage.

6) Packet loss rate is the ratio between the number of packet dropped and the number of total packets received per second by the bottleneck.

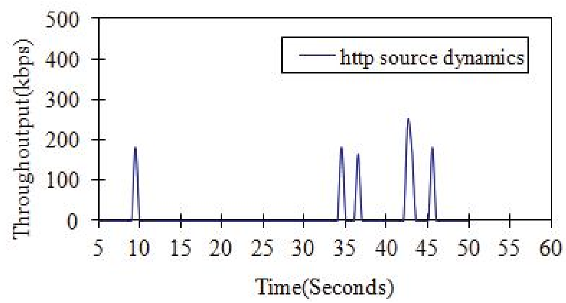


Fig: 3 Time variant Graph

Fig 3 (taken from paper1 written by Liu and yang) represent graphical information between time and throughout put.

Table 1 Comparison between Intelrate controller and Fuzzy controller

	Packet Size(Kbps)	Using Intelrate Controller(Time/Sec)	Using Fuzzy Controller (Time/Sec)
1	10 t0 30	5	2.3
2	30 to 60	5.7	3
3	60 to 90	6.3	3.5
4	90 to 120	7.2	4
5	120 to 150	8.3	4.5

Table 1 shows Comparison between Intelrate controller and Fuzzy controller

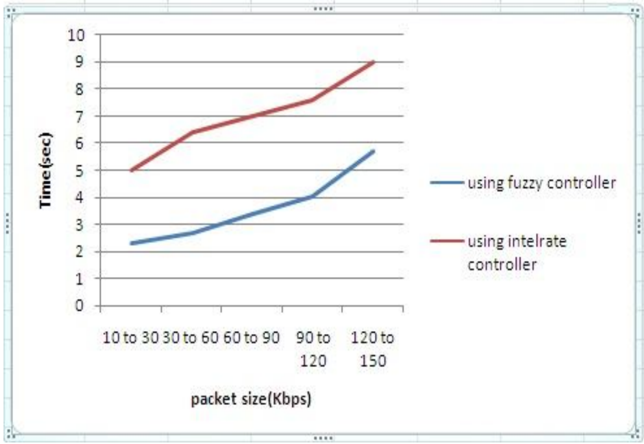
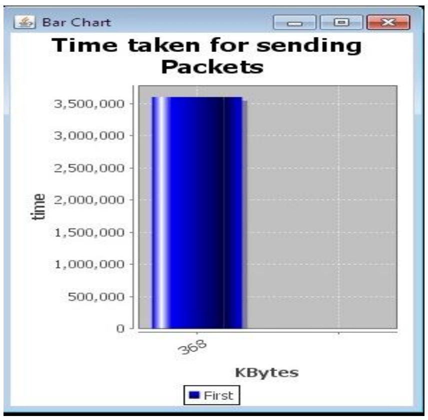


Fig: 4 Time Variant graph

Fig 4 shows the relation between time and packet size.



This graph represent 368kbps of data is received to destination in 3.8sec

CONCLUSIONS AND FUTURE WORK

In this paper fuzzy control system was studied for traffic management in networks. Traffic management can reduce throughput delay. Traffic congestion control is managing the network traffic. A novel traffic management scheme called the IntelRate controller has been proposed to manage the internet congestion in order to assure the quality of service for different service applications. As a distributed operation in networks, the fuzzy control system uses the increase the queue size. Unlike the existing explicit traffic control protocols that potentially suffer from performance problems or high router resource consumption due to the estimation of the network parameters, the Fuzzy Control System can overcome those fundamental deficiencies.

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