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A Stateless Active Queue Management Scheme for Fair Bandwidth Allocation

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ABSTRACT: In heterogeneous systems, for example, today's Internet, the separated administrations design guarantees to give QoS ensures through adaptable administration.So that Active queue management disciplines such as RED and its extensions have been widely studied as mechanisms for providing congestion avoidance, differentiated services and fairness between different traffic classes. With the emergence of new applications with diverse Quality-of-Service requirements over the Internet, the need for mechanisms that provide differentiated services has become increasingly important.In this paper, we propose two new total markers that are stateless, adaptable and reasonable data transfer capacity Sharing. We influence stateless Active Queue Management (AQM) calculations to empower reasonable and proficient token circulation among individual streams of a total. Giving rough max-min reasonable transmission capacity designation among streams inside a system or at a solitary switch has been a critical research issue. In this paper, we concentrate on the space calculation of the queue and the correspondence intricacy of upstream and downstream calculations. We demonstrate that keeping in mind the end goal to uphold max-min reasonableness with limited blunders, a switch must keep up per-stream state. At that point we introduce a down to earth edge-stamping based engineering to exhibit the requirement of surmised worldwide max-min decency for delegate situations with different bottlenecks and non-responsive activity. We approve our design utilizing bundle level recreations.

KEYWORDS: AQM, congestion Control, Fair Bandwidth Sharing.

I. INTRODUCTION

The Internet gives a connectionless, best exertion, end-to-end parcel benefit utilizing the IP convention. It relies on upon clog evasion instruments executed in the vehicle layer conventions, similar to TCP, to give great administration under overwhelming burden. In any case, a great deal of TCP usage does exclude the blockage shirking system either intentionally or unintentionally. Besides, there are a developing number of UDP-based applications running in the Internet, for example, bundle voice and parcel video. The streams of these applications don't back off appropriately when they get clog signs. Thus, they forcefully go through more transmission capacity than other TCP good streams. This could in the long run cause "Web Meltdown". Consequently, it is important to have switch systems to shield responsive streams from inert or forceful streams and to give a decent nature of administration (QoS) to all clients. The essential thought behind CHOKe is that the substance of the FIFO cushion shape an "adequate measurement" about the approaching movement and can be utilized as a part of a basic form to punish making trouble streams. At the point when a bundle lands at a congested switch, CHOKe draws a parcel aimlessly from the FIFO support and contrasts it and the arriving parcel. In the event that they both have a place with similar stream, then they are both dropped, else the haphazardly picked parcel is left in place and the arriving bundle is conceded into the support with a likelihood that relies on upon the level of blockage (this likelihood is registered precisely as in RED). The explanation behind doing this is the FIFO support will probably have parcels having a place with an acting up stream and subsequently these bundles will probably be decided for correlation. Facilitate, parcels having a place with an acting up stream arrive all the more variously and will probably trigger correlations. The crossing point of these two high likelihood occasions is

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correctly the occasion that bundles having a place with getting out of hand streams are dropped. In this manner, bundles of acting mischievously streams are dropped more regularly than parcels of all around acted streams.

II. PROBLEM STATEMENT

We investigate the problem of providing a fair bandwidth allocation to each of flows that share the outgoing link of a congested router. The buffer at the outgoing link is a simple FIFO, shared by packets belonging to the flows. We devise a simple packet dropping scheme, called CHOKe-FS that discriminates against the flows which submit more packets/sec than is allowed by their fair share. By doing this, the scheme aims to approximate the fair queueing policy

III. MOTIVATION

The past decade has seen considerable change in the role of the Internet. Its design as a best-effort transport medium is showing signs of stress as it is used to support new applications and servicesOur work is motivated by the need for a simple, stateless algorithm that can achieve flow isolation and/or approximate fair bandwidth allocation.

IV. LITERATURE SURVEY

In Literature, the problem of Congestion has been studied widely in the context of high speed network, wireless network, satellite network, ad-hoc network etc. Substantial survey works have been reported regarding Congestion control. Some significant survey works related to the topic are as follows

1) C. Yang and A. Reddy, "A Taxonomy for Congestion Control Algorithms in Packet Switching Networks," IEEE Network Magazine, vol. 9, no. 4, pp. 34–45,1995.

Have first proposed a taxonomy of Congestion control approaches in packet switched network, based on control theory. This taxonomy contributes a framework which helps in comparative study of the existing approaches and set a path toward the development of new congestion control approaches

2) Labrador et al and S. Banerjee, "Packet dropping policies for ATM and IP networks," Communications Surveys & Tutorials, IEEE, vol. 2, no. 3,pp. 2–14, 1999.

have given a comprehensive survey of selective packet dropping policies for the best-effort service of ATM and IP networks. They discussed three router based congestion control schemes for IP networks, namely RED, RED In/Out (RIO) and Flow RED (FRED). They compared RED and RIO in terms of fairness.

3) Ryu et al C. Rump, and C. Qiao, "Advances in Internet congestion control," Communications Surveys & Tutorials, IEEE, vol. 5, no. 1, pp. 28–39, 2003

have presented a review of AQM algorithms for congestion control. They also done a survey of controltheoretic analysis and design of end-to-end congestion control with a router based scheme. As alternatives to AQM algorithms, they also surveyed architectural approaches such as modification of source or network algorithms, and economic approaches including pricing or optimization of allocated resources.

4) Chatranon et al , M. A. Labrador, and S. Banerjee, "A survey of TCP friendly router-based AQM schemes," Computer Communications, vol. 27, no. 15, pp. 1424–1440, 2004

have discussed the state-of-the-art in router-based mechanisms to address the TCP-friendliness problem and presents a description of the most important algorithms, design issues, advantages and disadvantages in their survey. They have done a qualitative comparison of all the existing AQM schemes and a quantitative performance evaluation is performed to show the advantages and disadvantages of only those schemes that don"t require full per-flow state information since they are more likely to be implemented in practice

5) Ryu et al C. Rump, and C. Qiao, "Advances in active queue management (AQM) based TCP congestion control," Telecommunication Systems - Modeling, Analysis, Design and management, vol. 25, no. 3-4, pp.317–51, 2004

have presented a review of recently proposed active queue management (AQM) algorithms for supporting end-to-end transmission control protocol (TCP) congestion control with a focus on recently developed control theoretic design and analysis method for the AQM based TCP congestion control dynamics. Finally, they surveyed two adaptive and proactive AQM algorithms, PID-controller and Pro-Active Queue Management (PAQM), designed using classical proportional-integral–derivative (PID) feedback control to overcome the reactive congestion control dynamics of

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existing AQM algorithms. A comparative study of these AQM algorithms with existing AQM algorithms is also given by them.

6) Thiruchelvi et J. Raja, “A survey on active queue management mechanisms,” International Journal of Computer Science and Network Security, VOL.8 No.12, pp. 130–145, 2008

on the recent advances in the area of AQM techniques. Further they classified the AQM mechanisms according to the type of metrics they used as congestion measure. From the survey they found that the performances of rate based AQM schemes are better than that of queue based schemes and existing rate based schemes such as AVQ, EAVQ may result in better performance in terms of, throughput, packet loss, link utilization by the inclusion of more number of congestion measures.

V. EXISTING SYSTEM

The importance of TCP protection has been discussed by various authors. The problem of TCP Protection originates from TCP flows competing with unresponsive UDP flows in order to occupy scarce bandwidth. After the TCP flows reduce sending rates, the unresponsive UDP flows can seize the available bandwidth and cause starvation of TCP flows. This results in unfairness to large volume TCP flows. Conventional AQM algorithms such as Random Early Detection (RED) and BLUE cannot protect TCP flows. Per-flow schemes such as RED with preferential dropping (RED-PD) can punish non-TCP-friendly flows, but it requires reserved parameters for each flow, which significantly increases the memory requirement. CHOKe proposed by Pan et al. is simple and does not require per-flow state maintenance. However, CHOKe only serves as an enhancement filter for RED in which a buffered packet is drawn at random and compared with an arriving packet. If both packets come from the same flow, they are dropped as a pair (matched drops); otherwise, the arriving packet is delivered to RED. The validity of CHOKe has been explained using an analytical model by Tang et al.

DISADVANTAGES:
Early AQM disciplines require careful tuning of their parameters in order to provide good performance. Modern AQM disciplines are self-tuning, and can be run with their default parameters in most circumstances. For AQM systems that drop, the result seems counter-intuitive to many network engineers

VI. PROPOSED SYSTEM

The proposed system introduces a cost effective AQM scheme. The framework uses multistep increase and single-step decrease to update the drawing factor (Upstream and Downstream) such that large-scale and burst data can be processed fast, and congestion can be avoided. When the number of flows increase abruptly, the framework’s proportional bandwidth allocation with multiple priority is able to guarantee TCP protection. Both the analytical model and simulation results is expected to demonstrate that the framework achieved proportional bandwidth allocation for flows in different priorities, and fairness for flows in the same priority. With the increase of audio and video flows, framework reduces the UDP flows to protect TCP flows, and allocate a fair share of bandwidth to UDP flows.
Systems introduce a novel topology of wireless network that assumes that nodes moves around and relay each other packet in a circular environment. This circle is divided into equal sectors and cylinders. Each area has a unique id. It is assume that a central point in each area. Nearest nodes to this central points in each area are selected as local server. Each local server is responsible for response to location queries for all owner member nodes. Location update packages move a cylinder and location query packages move along the sector. These update and query propagation method decrease system response time, because the query packet traversed only one sector. Moreover impact of mobility will be studied considering multiple case scenario for much practical outcomes.

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VII. SYSTEM ARCHITECTURE

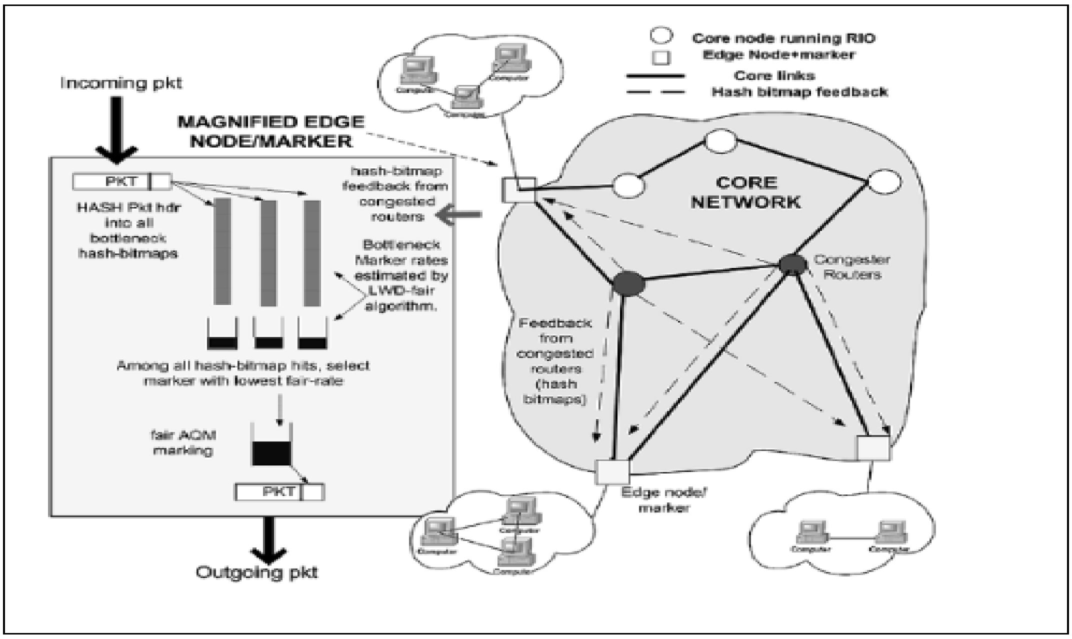

Fig: System Architecture

Core components of our architecture (see Fig. 1) include a set of traffic markers at the network edges and simple RIO queueing at the core. These traffic markers, as described in our previous work, are based on low state or stateless AQMs, and can classify packets into two classes, IN and OUT. The markers are configured by a novel distributed marking algorithm using low-state feedback from congested routers (using summary data structures such as bit vectors or sketches) to approximate network-wide (globally) max–min fair IN token allocations. During congestion, a congested router uses RIO as the AQM policy and preferentially drops OUT packets.

To design efficient traffic markers which mark flows fairly using little or no state, we leverage queueing and dropping policies of existing stateless AQM algorithms. we view a token bucket specification at a marker as a queue, the marking policy as a queue dropping policy and marking

packets as IN/OUT as queueing/dropping packets respectively. This novel analogy makes it easy to adapt well-studied lowstate AQM schemes like CHOK e to design our markers which provide approximate fair IN token allocation among incoming flows at the network edges. We term these markers as AQMbased markers.

To approximate network-wide (globally) fair token-allocation among all flows, we make use of limited feedback from congested core routers to configure the target token rates for the markers using a light weight distributed fair (LWD-fair) algorithm described as follows. When a router is close to being congested, it starts hashing the flow ID of all the packets it sees into a summary data structure, described later. On congestion, the congested router sends its summary data structure to all the ingress nodes in the network

IX. CONTRIBUTION

Weadditionally propose a harvest-then-cooperate (HTC) protocol, in which the source and relay harvest energy from the AP (Access Point) in the downlink and work cooperatively in the uplink for the source’s information transmission.

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