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Congestion Control For Web Real Time Communication

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Abstract:

In real time communication, resource management is very much important to control the congestion of the network. Here we are going to propose an algorithm to allocate resource dynamically at the streaming time. Also we are trying to control the bit rate of data packets to overcome the congestion and maintain the QoS of the video at the receiver end. Also we have to maintain the scalability of the network and minimal number of packet loss and low delay. When continuously data streaming is going on, the network may jammed. At that moment we have to control the data transmission speed so that we can prevent the data packet loss. Here we are going to use variable bit rate (VBR) [2] concept to control the data transmission speed over the network. We also try to reduce the resources wastage at streaming time.

Keywords: Qos, VBR, Network.

1. INTRODUCTION

To prevent the resource wastage at the network, we are going to use dynamic resource reservation at the network. User sends request to server to access the data content. Data packets are divided and distributed over the network. Depending upon the threshold bandwidth, data packets chose the available routers and create path. There is an init () message, which initiate the transmission. Another is feedback () message by which we can know about the traffic of the network. If some network domain is congested, we send a feedback () message to the previous domain to control the data transmission speed. Resources are reserve for a flow according to the threshold bandwidth.

In real time communication system we can reserve resources in two ways. We can reserve some certain amount of resources previously that is statically or we can reserve resources dynamically at run time. Here we are discussing about the dynamic resource reservation technique to maintain the QoS of the network. Dynamic reservation is based on online network traffic prediction . This is called predictive dynamic bandwidth allocation. Predictive dynamic bandwidth allocation is two types, like direct and indirect. There are some problem in direct predictive bandwidth allocation method, like signal, time prediction problem. In our proposed algorithm we dynamically reserve resources based on the feedback () and init () message. We uses DiffServ domain to implement our method. In DiffServ domain there is two boundary routers and some core routers in between them.

2. RELATED WORK

In a packet switching network, packets are introduced in the nodes and the nodes in-turn forwards the packets into the network. When the “offered load” crosses certain limit, then there is a sharp fall in the

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throughput. This phenomenon is known as congestion. It affects queuing delay, packet loss or the blocking of new connections and also affects Quality of Service (QoS). QOS refers to the capability of network to provide better service to selected network traffic over various technologies. Networks use congestion control and congestion avoidance techniques to try to avoid collapse. The process of managing the traffic flow inorder to control congestion is called congestion control. The two classes of congestion control are closed-loop control and open-loop control. A closed-loop system is also referred as a feedback control system. These systems record the output instead of input and modify it according to the need. It generates preferred condition of the output as compared to the original one. It doesn't encounter any external or internal disturbances. This mechanism tries to remove the congestion after it happens. A closed loop system has got the ability to perform accurately because of the feedback. Even under the presence of non linearity's the system operates better than open loop system. But it is less stable compared to open loop system. Example: Pressure control system, speed control system, robot control system, temperature control system.

3. LITERATURE SURVEY

Panos Gevros, Jon Crowcroft, Peter Kirstein, and Saleem Bhatti proposed "Congestion Control Mechanisms and the Best Effort Service Model" In this article we revisit the best effort service model and the problem of congestion while focusing on the importance of cooperative resource sharing to the Internet's success, and review the congestion control principles and mechanism which facilitate Internet resource sharing.

Mamata Rath, Umesh Prasad Rout, Niharika Pujari, Surendra Kumar Nanda and Sambhu Prasad Panda proposed "Congestion Control Mechanism for Real Time Traffic in Mobile Adhoc Networks" This paper highlights on congestion control issues in real time environment as well as proposes an upgraded traffic shaping mechanism in TCP/IP protocol suite of network model for real time applications with basic concept using the token bucket traffic shaping mechanism during packet routing at the intermediate nodes.

Mamata Rath, Binod Kumar Pattanayak proposed "Energy Competent Routing Protocol Design in MANET with Real time Application Provision" In this paper the authors have developed a robust and energy efficient routing protocol for MANET with real time support. Their approach is different as it calculates the remaining residual battery power, bounded delay and packet processing rate of the intermediate node before selecting a node to forward the packet in the direction of destination.

4. PROPOSED SYSTEM

Congestion is the state of sustained network overload where the demand for network resources is close to or exceeds capacity. Network resources, namely link bandwidth and buffer space in the routers, are both finite and in many cases still expensive. The Internet has suffered from the problem of congestion which is inherent in best effort datagram networks due to uncoordinated resource sharing. It is possible for several IP packets to arrive at the router simultaneously, needing to be forwarded on the same output link. Clearly, not all of them can be forwarded simultaneously; there must be a service order. In the interim buffer space must be provided as temporary storage for the packets still awaiting transmission. Sources that transmit simultaneously can create a demand for network resources (arrival rate) higher than the network can handle at a certain link. The buffer space in the routers offers a first level of protection against an increase in traffic arrival rate. However, if the situation persists, the buffer space is exhausted and the router has to start dropping packets. Traditionally Internet routers have used the first come first served (FCFS) service order, typically implemented by a first in first out (FIFO) queue, and drop from the tail at buffer overflow as their queue management strategy.

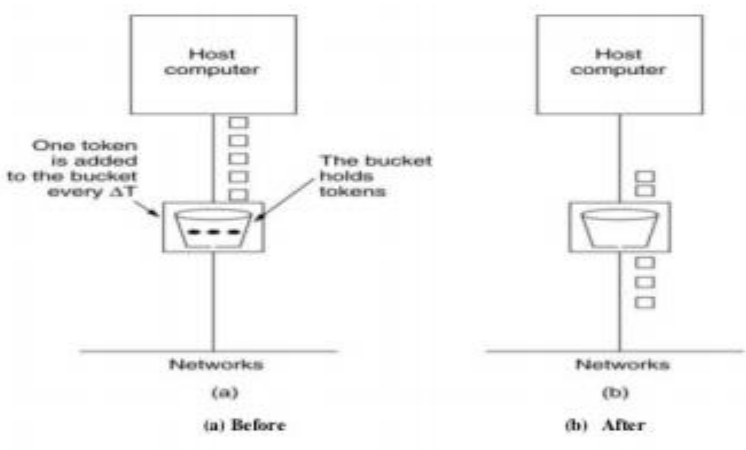

Fig.1.Token System

The problem of congestion cannot be solved by introducing "infinite" buffer space inside the network; the queues would then grow without bound, and the end-to-end delay would increase. Moreover, when packet lifetime is finite, the packets coming out of the router would have timed out already and been retransmitted by the transport protocols[2].

5. ANALYSIS

In control theory a controller changes its input to a black box and observes the corresponding output. The goal is to choose the input as a function of the observed output so that the system state conforms to some desired objective, provided that the system state can be observed. From a control-theoretic viewpoint the end host flow adjustment is the response to a servo-control loop which needs to match the source's sending rate to the rate that corresponds to its fair share at the bottleneck link. The problem is that the appropriate bottleneck service rate becomes known to the source after a delay, and the new rate (after any adjustments) takes effect at the bottleneck only after another delay. The precision of the servo-control loop determines performance; if the queue at the bottleneck link is empty, throughput will be less than the maximum. If there are always packets in the queue, the link will never be idle, but if the queue size grows beyond a limit, packets will start being discarded. However, in flow control, the output of the system (the rate of a flow as seen at the receiver) does not depend only on the actions of that particular flow, but also on the actions of all other flows sharing the same path.

In principle explicit feedback can be in the form of congestion notification or rate indication. Due to the limitations in the information that can be carried in protocol headers explicit feedback can be binary or multivalued (usually limited to a small number of values: "how much congestion has been experienced"). In the case of binary feedback the appropriate operating point is found through an iteration process of network feedback and host adjustments. For explicit feedback the only methods proposed for TCP/IP networks is the ICMP Source Quench messages and Explicit Congestion Notification (ECN) proposal. The ICMP Source Quench message is sent by the IP layer of a host or router to throttle back a sender in case the host/router runs out of buffers or throws datagram away ICMP Source Quench is very rarely used in the Internet, and although there is no substantial evidence, the current feeling is to deprecate this message because it consumes bandwidth at times of congestion, and is generally an ineffective and unfair fix to congestion . In the ECN feedback scheme the router sets a bit in the packet header (CE bit) whenever it detects incipient congestion.

Closed-loop flow control schemes target more dynamic network environments where it is a requirement for the sources to dynamically adapt their rate to match their fair share of network resources. The fair share usually fluctuates, and the sender must be able to track these changes and adjust its rate to allow for more efficient resource utilization. Closed-loop schemes can be adaptive window, in which the source indirectly controls the transmission rate by modifying the number of packets sent but not yet acknowledged (window), or adaptive rate, in which the source, every time it sends a packet, sets a timer with a timeout value equal to the inverse of the appropriate transmission rate and transmits the next packet when the timer expires. The potential damage to the network is constrained in different ways, but window-based schemes are easier to implement because they do not require a fine- grained timer, which is hard to implement in non-real-time operating systems. If a closed-loop flow control scheme appears ineffective, either the sources suffer from excessive packet loss or the network resources are underutilized.

CONCLUSION

Best effort service has been tremendously successful for data traffic, which today accounts for the vast majority of Internet traffic; there are no indications that this will stop being the case in the future. The main reason for pursuing QoS was concerns about the requirements of emerging real- time and streaming multimedia applications, which could not be met in the existing service model. Nevertheless, it has been amply demonstrated that many popular applications (packet audio, videoconferencing) are able to adapt to dynamic network conditions by changing their transmission rate using different coding techniques, and therefore perform sufficiently well under moderate congestion levels. Thus, it is likely for the Internet to evolve toward a best effort network which, if controlled and provisioned appropriately, will be able to satisfy the majority of popular applications that are willing to tolerate service deterioration due to transient congestion.

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