Path Congestion Control in Centralized Autonomous System

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ABSTRACT
This paper analyzes the importance of a centralized controller based system with congestion over the network. Some previous researches show validity of the centralized controller by experiments [11]. However, the effectiveness has not proved analytically. Therefore, this paper provides an idea for the congestion control over the path instead of over coming it from the congested node. When delays in the packet arrival over the network takes place that information instead of slowly flowing to all the nodes can be transferred to the centralized node at once when autonomous system is established and this can be then further transferred to the nodes without delay that need to send their packets using that path. This will over come many problems like delays, lack of efficiency of the path as well as node, retransmission and many more. The flowchart and load charts show the validity of this control in the network.

Keywords
Congestion control, centralized systems, autonomous system, overload on system performance.

1. INTRODUCTION
TCP (Transmission control protocol) [1] is used by many typical applications over satellite internet [2] the proposed method combines the TCP with Centralized system. It is one in which most communications are routed through one or more major central hubs. Such a system allows certain functions to be concentrated in the system's hubs, freeing up resources in the peripheral units. Another benefit of centralization is the ease of maintaining accurately updated lists of data that can be easily accessed from all points [6].

Centralization's weaknesses are centered on the system's heavy reliance on a few central components; if the system's hubs are put out of operation, either accidentally or through hostile action, the system and its peripheral components are severely affected. In the computer world, centralization most frequently refers to File Sharing and Networks. The major Advantages of centralized systems is once the master has been installed in the system, all functions and facilities of the system can be used and expansion costs are lower than other systems because the input and output modules contain less intelligence and thus contain fewer components.

1.1 Congestion Control
Congestion is a problem that occurs on shared networks when multiple users contend for access to the same resources (bandwidth, buffers, and queues).In packet-switched networks, packets move in and out of the buffers and queues of switching devices as they traverse the network.

In fact, a packet-switched network is often referred to as a "network of queues." A characteristic of packet-switched networks is that packets may arrive in bursts from one or more sources. Buffers help routers absorb bursts until they can catch up. If traffic is excessive, buffers fill up and new incoming packets are dropped [8]. Increasing the size of the buffers is not a solution, because excessive buffer size can lead to excessive delay. Congestion also occurs at routers in core networks where nodes are subjected to more traffic than they are designed to handle [7]. There are no virtual circuits with guaranteed bandwidth. Packets are injected by any host at any time, and those packets are variable in size, which make predicting traffic patterns and providing guaranteed service impossible. While connectionless networks have advantages, quality of service is not one of them. The idea behind congestion control is to maximize traffic access under the premise of stable operation of the system in order to achieve higher operation efficiency [4].

1.2 Congestion Control Basics
A system is said to be congested if it is being offered more traffic than its rated capacity. Most of the time, the system overload is due to too many active users. System maintenance and repair actions can also lead to system congestion [3]. Whatever be the cause of overload, it will manifest as depletion of resources that are critical to the operation of the system. These resources can be CPU, free buffers, link bandwidth etc. Resource crunch will lead to lengthening of various queues for these resources. Due to lengthening of queues the response time of the system to external events will increase beyond permissible limits. For example, in Xenon, system overload will lead to increase in dial tone delay.

2. IMPACT OF OVERLOAD ON SYSTEM PERFORMANCE
Increase in response time will lead to application level timeouts. This will further worsen the situation because applications will needlessly resend messages on timeouts, causing further congestion. If this condition continues the system might reach a condition where it can service no users. Thus in absence of any congestion control, the system will perform much below its rated capacity, leave alone handling the excess traffic. Refer to the figures1 and figure 2 below for a comparison of systems load handling capability with and without congestion control. (The system load is represented in Busy Hour Call Attempts, i.e. BHCA. The system has a rated capacity of 5000 BHCA) [3]

2.1 The Common Congestion Control Methods
Congestion detection is usually conducted in units of the cell to determine whether there’s a congestion situation in the cell and whether to conduct congestion recovery [4]. Congestion control, including congestion detection, congestion resolution and congestion recovery, is executed separately in uplink and downlink channels. In CSMA/CD, downlink congestion detection is conducted by measuring the TCP (transmission carrier power) of the downlink tile slot in the cells, while the uplink load is measured by the RTWP (Received Total

Wideband Power) of the uplink time slot. By comparing the results with the congestion resolution and recovery over a period of time, load condition of this time slot can be known

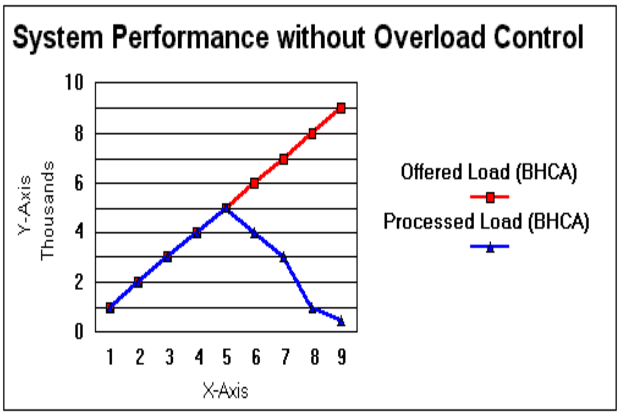

Fig 1. System Performance without Load

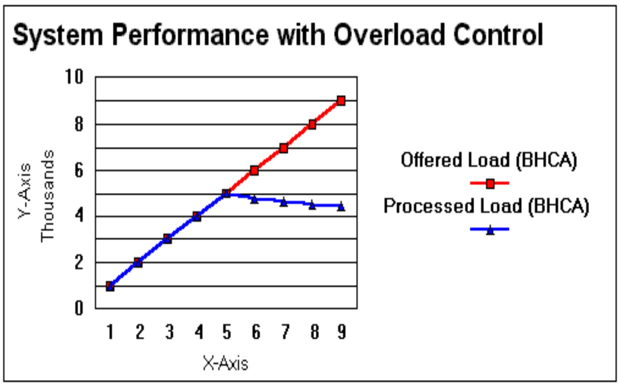

Fig 2. System Performance With Load

2.2 Congestion Resolution

Congestion resolution is executed according to the estimated load volume to be reduced in the time slot, thus the system can be avoided of a long-time congestion situation. Therefore, to estimate the volume of load to be reduced in the time slot is the key to congestion resolution [4]. As the data packet increase the buffer get filled sequentially, but the rate of transferring depend on the method of transmission thus the probability of stopping the transmission or accepting the packet gets off for a time slot which in turn invites many other network problems. The process of congestion resolution with the overload on the node is shown in figure 3.

When multiple packets within the same window are lost, the fast recovery algorithm treats each packet loss in a window as an independent congestion signal, thus halving the congestion window multiple times. A retransmission timeout is triggered and then slow-start begins to recover from packet losses, causing substantial performance degradation [10]. And when node is congested the delays for the packet transfer takes place at the path or sometimes stop transferring for some time and also that information transfer very slow to the nodes following that path. This can also arise many other network problems.

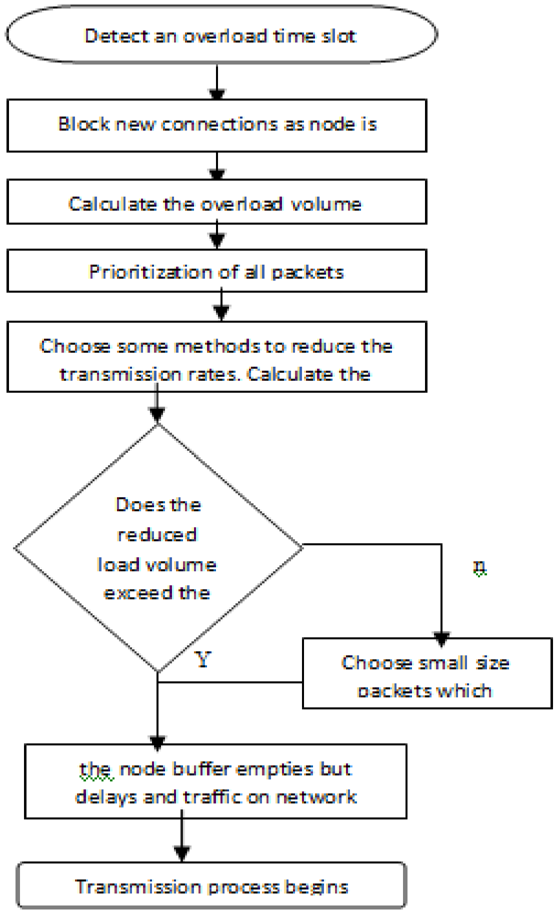

Fig 3. Common Congestion Detection At The Node.

3. PROPOSED SYSTEM

To make the networks services flexible with the guarantee of parameters performance (time, gigue, flow and rate of loss of packages), it necessarily to integrate a concept of priority using the mechanisms of scheduling, management and control in the network, and on the other hand to ensure a total quality of service. The quality of service (QoS) can be based on the architecture which offers a differentiation by priority based on a classification of packages at the entry of the network and a differentiated treatment inside. The management of the quality of service from beginning to end implies the presence of specific mechanisms of quality management [5].A network congestion controller that operates autonomously and asynchronously on the basis of every basic measurements available at the sources [9].

Figure 4 is a small autonomous system with 7(A, B, C, D, E, F, G) nodes in it with one node (B) as the centralized one. In this if there a congestion at the path between C and D and the nodes F, G want to send the data to C through D then the centralized node B informs that there is congestion at that path and thus u either slow down the speed of sending or make sure there is no failure on the network regarding packet transfer. Since it was the warning to all of them same can be given to all other node

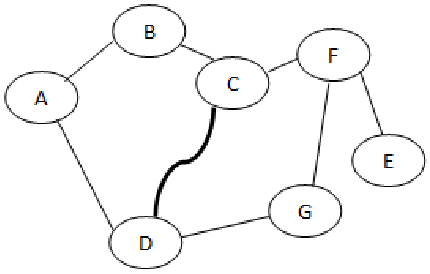

Fig 4. The autonomous system with congested path

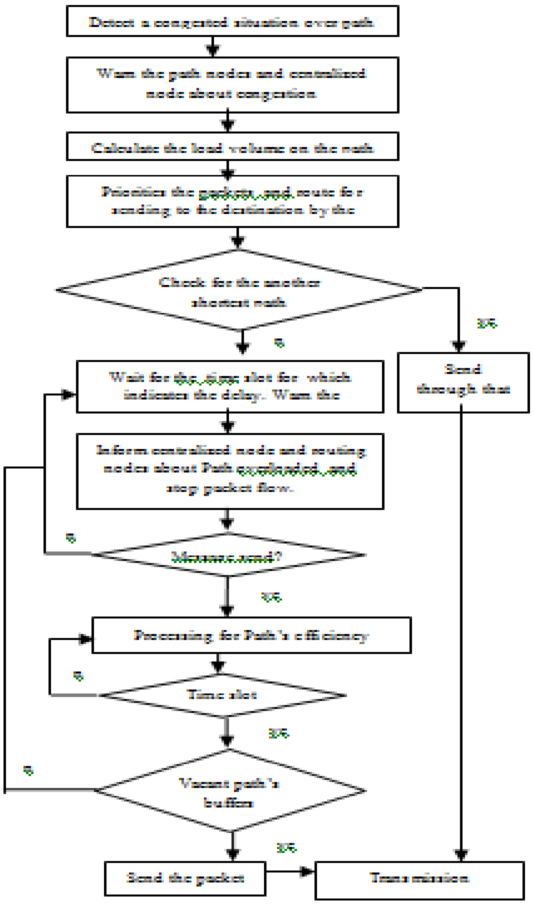

Fig 5. The improved Congestion Detection At The Path

because to transfer the packet information first reaches to the centralized node thus path is protected before hand so the efficiency of any one node do not get affected hence the path when encounters the congestion is also protected and the problem of path failure is also managed together with congestion control.

The following figure 5 shows the diagrammatic flowing of the congested message to nodes using that congested path which in turn not stop the packet transfer but only slow down the transfer speed and many other network problems can be avoided.

4. CONCLUSION

After a period of time, it owes time slot are detected in the carrier frequency, then the congestion recovery can be executed. Different from the common methods, the improved method will process the overall time slot together. Furthermore developments have been made in the congestion control yet have not been completely removed. Hence this proposal suggested above in figure 5 for the development can be used in controlling and improvement in delays and path protection. Continuing with the work still more research can be made in its context.

5. ACKNOWLEDGEMENT

This research has been done partly and further implementation will prove the actual research need of it. Our thanks to the experts who have contributed towards development of the paper.

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