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Controlling Packet Loss at The Network Edge Using STLCC Mechanism

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***Abstract* - The continuous data transmission of audio, video and text through the Internet without the packet loss is extremely difficult. The packet loss is mainly depends on congestion control [3]. Multiple number of algorithmsand protocols have been evolved for controlling congestion. These protocols help to decrease packet loss which in turn improves network performance [4].When peer-to-peer data flow dominates the traffic of the internet, almost all the protocols became helpless. A new and better mechanism named Stable Token Limited Congestion Control (STLCC) is proposed.STLCC basically combines two algorithms XCP and TLCC to examine analytically and then assign resources [5] as per the access link and further maintains congestion control system stable.**

***Keywords* - congestion, congestion control, token, TLCC, XCP, STLCC.**

I. Introduction

Internet provides continuous audio, video, and data traffic. This continuous data transmission services of the internet requires congestion control protocols and algorithms to reduce the packet loss and thus gain network performance. Congestion control [2] is considered as the turning points in the packet switching networks. Congestion control mechanism should avoid congestion disruption and should also serve fairness to competing flows and maximize transport performance factors like throughput, delay and loss whereas Throughput increases congestion decreases and if delay decreases then congestion also decreases [1].

II. Literature Survey

Congestion control is the excellent attempt over the internet actually developed for a collaborative environment. It still relies on the TCP congestion control algorithm at nodes supported with load shedding at congested link. This concept is known as Terminal dependent congestion control. Even though routers are supplied with Active queue Management[2] can enhance transport performance. They are neither capable to avoid congestion disruption nor serves fairness to competing flows. In order to improve legitimacy in high speed networks Core-Stateless Fair Queuing(CSFQ)[3] set up and open loop control system at the network layer which place the label of flow arrival rate onto the packet header at edge router and drops the packetsat core router based on the rate label if congestion happens.

CSFQ is the first to get almost fair bandwidth allocation among flows with O(1) complexity at core routers. In networks with Peer-to Peer traffic, CSFQ can provide fairness to competing flows, but unfortunately it is not what end-users and operators really want. Token-Based Congestion Control (TBCC)[4] limits the total token resource occupied by an end-user. In TBCC end user cannot get extra bandwidth resource required even though he has set up many connections. It randomly selects a flow, re-estimates the flow rate, and checks whether the re-estimated rate insufficient with the label on the flow packet. Subsequently Self-Verifying CSFQ will put a heavy load on the border router and makes the weighted CSFQ null and void.

In Token-Limited Congestion Control (TLCC)[6] the inter-domain router limits the total output token rate to peer domains. When the output token rate surpasses the threshold, TLCC will reduce the Token-Level of output packets, and then the output token rate will decrease. Similarly to CSFQ and TBCC, TLCC uses also the iterative algorithm to evaluate the congestion level of its output link, and requires a large amount of time to reach a stable state. With bad parameter configuration, TLCC may lead the traffic to drop into an oscillated process. The window size of TCP flows will always get large when acknowledge packets are received, and the congestion level will increase at the congested link. At congestion times many flows will discard their packets. Then, the link will be inactive and the congestion level will decrease. The two steps may be repeated alternately, and then the congestion control system will never reach stability. To solve the oscillation problem, a new and better mechanism named Stable Token Limited Congestion Control (STLCC) is proposed. STLCC basically combines two algorithms XCP and TLCC [5]. In STLCC, the output rate of the sender is controlled as per the algorithm of XCP [7], so there will be least chances of packet lost at the congested link. Simultaneously the edge router assigns all the access token resource to the incoming flows uniformly. When congestion happens, the incoming token rate increases at the core router, and then the congestion level of the congested link will also increase. Thus STLCC can examine the congestion analytically and then assign resources as per the access link and further maintains congestion control system stable.

III. Methodology

In this paper a new and better mechanism named Stable Token Limited Congestion Control (STLCC) is proposed. STLCC defines output and input traffic and produces congested index that push the packet loss to the network edge. Thus the performance of the network is improved and also collision problem is solved. It basically combines the algorithms of TLCC and XCP altogether. In this new STLCC mechanism the edge and the core routers will write a rate of the quality of service provided by the router by writing a digital number in the Option Field of the datagram of the packet which is called a token.The path routers will read token andinterpreted its value to evaluate the rate of congestion particularly at the edge router The edge router at the source reduces the congestion on the path based on the token number The output rate of the sender is controlled as per the algorithm of XCP[4]. XCP helps the routers in the network to continuously adjust the sending speed of any participating hosts. These adjustments are done by changing the contents of the packets (XCP header) transferred between the sender and receiver. The feedbacks from routers are used by the sender to adjust the sending speed to match the routers current load. So, there is no chance of packetloss [8]. The STLCC can evaluate the congestion level analytically and aassign network resources as per access link that further maintain the congestion control system stable.

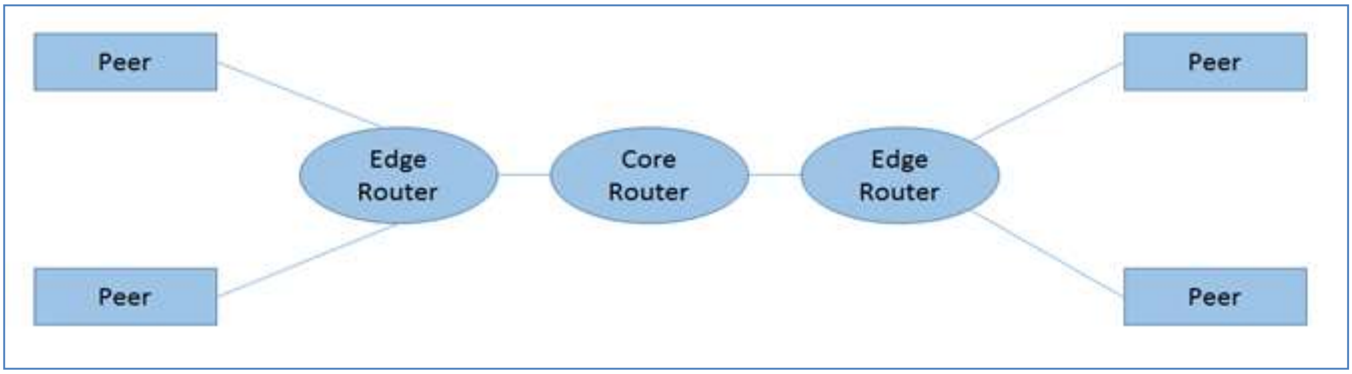


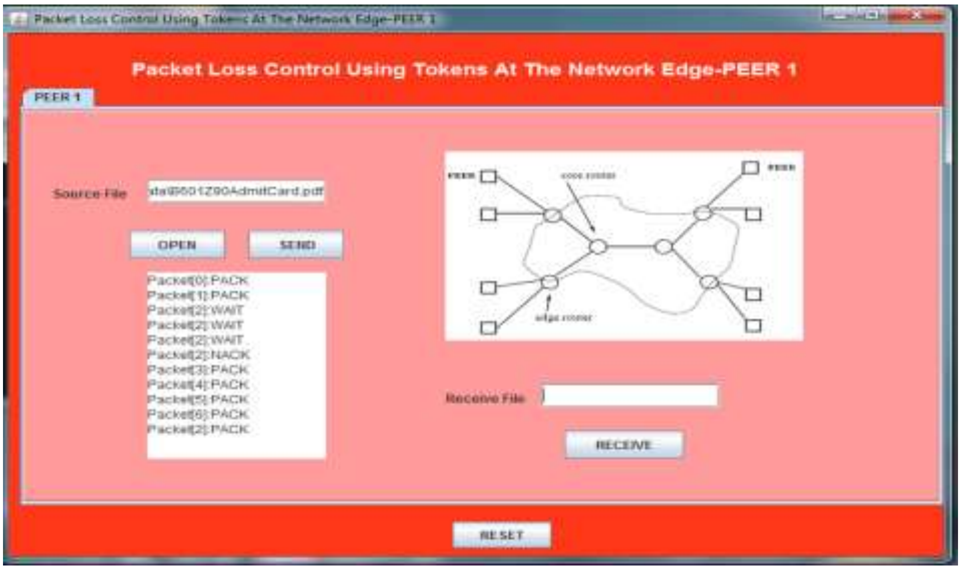
Figure: Architecture of STLCC

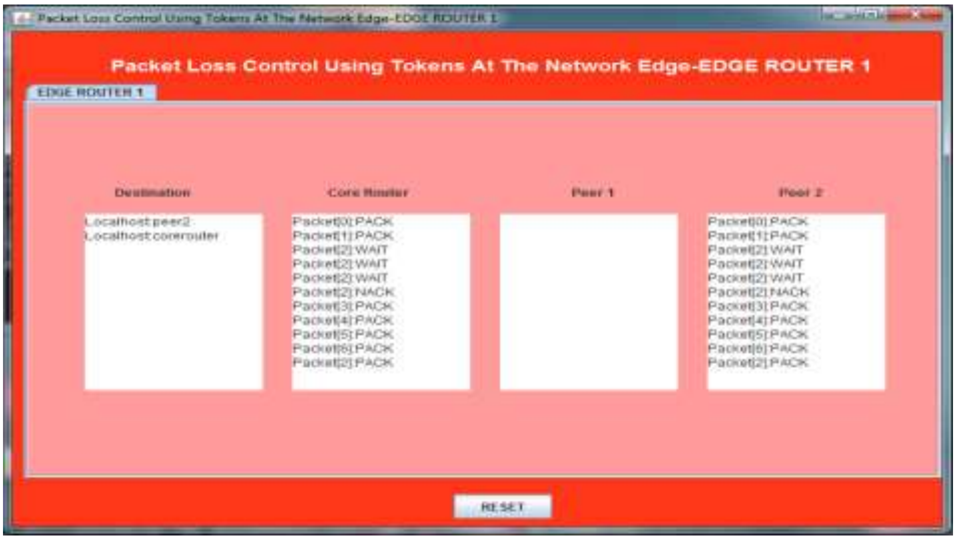
IV. Implementation

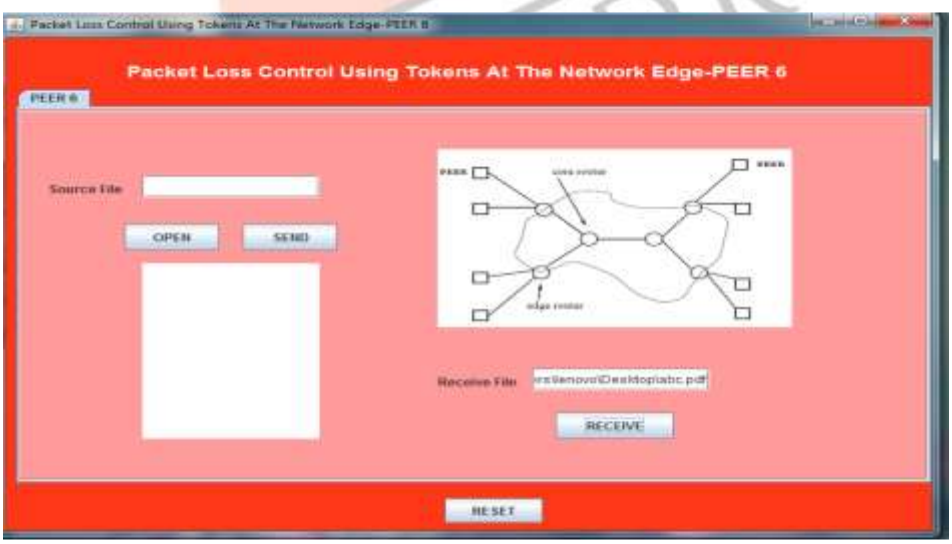
By assuming data transmission between sender and receiver the logic can be implemented. Consider a multilayer network that comprises of sender and receiver and routers. Whenever sender transmits data the data is transferred over network in the form of packets. A packet is a small piece of data transmitted over network with an option field of the datagram. The routers can be edge router or core router. Edge router sits at the edge of the network and transfers packets between one or more LANs and can also be used to connect to core router. Core router transmits packet to computer host within a network. It is design to operate as an internet backbone.

Steps:

1. The data files are subdivided into packet at the peer side and then transmitted to the edge router.
2. After this edge router evaluates quality of service the network can provide (that is at a time how many packets it can transfer).
3. Then edge router allocates a random value to each of the packet which is written in the option field of the datagram of the packet and then it forwards packets to core router.
4. Core router read this token value and interpreted as its value.
5. Later the Core router controls outgoing packet rate of the sender. And then router adjusts the sending speed of hosts and routes it to the receiver.
6. Sender use feedbacks from core router to adjust the speed of further transmission to fit the routers.







V. RESULT

The results of this paper are shown by creating classes to peers, edge router and core router. In the beginning the sender (peer1) chooses the data files and sends the files to receiver (peer6) through router. The file is sending in the form of packet. At first packets are transmitted to edge router attached to the sender. After getting first packet edge router overwrites sender's data rate with its present data rate in the option field of the datagram and sends the acknowledgement to the sender and forwards packets to other routers. When packets are transferred with restricted number of resources then packet is kept in queue that provides results as negative acknowledgement to the sender [4]. After receiving negative acknowledgement from the edge router the sender adjust its present data rate. So there is no chance of packet loss at the congested link. This type of data transfer will be applied at each and every router and finally packets will be received by receiver.

VI. CONCLUSION

In this paper STLCC is introduced which can be deploy on the present internet.STLCC can measure congestion stage logically and allocate network resources as per the access link that leads tostable congestion control system. The network with firm congestion control leads to high quality performance and it will be achievable to build a network with restricted number of resources having fast data transmission with accuracy and no delay.

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