IJDCST @Dec, Issue- V-3, I-1, SW-13
ISSN-2320-7884 (Online)
ISSN-2321-0257 (Print)

# An Increased Efficiency Router making use of Congestion handle approaches within High Speed Networks

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**ABSTRACT**: Network traffic management is a core area of research that is of great importance in the field of communication. Although many models have been proposed since time being, all those techniques have their own short comings. Congestion is one of the major problems in today's internet. So for managing traffic and to keep the network stable, Congestion Control algorithms are used. Internet faces the problem of congestion due to its increased use. A new protocol called STLCC (Stable Token Limited Congestion Control) is proposed for controlling packet loss using tokens. It integrates TLCC and XCP algorithms. TLCC uses the iterative algorithm to estimate the congestion level of its output link and the output rate of the sender is controlled according to the algorithm of XCP, so there is almost no packet loss at the congested link. Thus STLCC can measure the congestion level analytically, allocate network resources according to the access link, and further keep the congestion control system stable.

**INDEX TERMS:** congestion, congestion control, token, TLCC, XCP, STLCC.

**INTRODUCTION:** Network traffic management can prevent a network from severe congestion and degradation in throughput-delay performance. Congestion in a network may occur when the load on the network is greater than the capacity of the network. Congestion control is 'adapting speed of transmission to match available end-to-end network capacity'. In order to make use of the bandwidth those high-speed networks offers, we need to have a proper and efficient mechanism to control congestion in these nodes. Many classic ways to handle congestion control have been proposed, and is being made use today for network traffic management. In today's internet different types of data flow from one end to another and number of users are also increased. So there is a need of congestion control algorithms. Congestion in Internet occurs when the link bandwidth exceeds the capacity of available routers. This results in long delay in data delivery and wasting of resources due to lost or dropped packets. The increased use of multimedia applications also results in busty flows in the internet. So there is a requirement of regulation busty flows in the very large network in the internet. To regulate these busty flows, resource allocation must be done efficiently. Internet provides simultaneous audio, video, and data traffic. This is possible when the Internet guarantees the packet loss which depends very much on congestion control. A series of protocols have been introduced for controlling the network congestion. Modern IP network services provide for the simultaneous digital transmission of voice, video, and data. These services require congestion control protocols and algorithms which can solve the packet loss parameter can be kept under control. Congestion control is therefore, the cornerstone of packet switching networks. It should prevent congestion collapse, provide fairness to competing flows and optimize transport performance indexes such as throughput, delay and loss.

**PRELIMINARIES:** Before taking into consideration our research work, it would be helpful to re-examine the close connection among type of network traffic, network congestion and buffering in network routers. Internet is defined as the network of networks connected by means of routers. Router directs the packets across the links with the help of bidirectional links. The router decides on the basis of information obtained from routing table about the next ongoing destination link to which packets move to. Line card attached to each of these links are used to perform the packet processing job like stripping off the packet header to make routing decisions. In real time network environment capacity of each link is finite and aggregate demand as compared to the available capacity of the resources may exceed. So the moment, link exceeds its available capacity known to be an overloaded and when this happens it becomes congested. This congestion may be persistent(permanent) or transient (temporary). In case of transient congestion packet arrived abruptly in burst. Intransient case solution to congestion is possible by providing a considerable buffer space in router for allowing packets for out-bound link to spend short period before being forwarded to next link. In case of persistent congestion, to avoid from packets drop due to full buffer one possible solution is to increase the size of buffer space with increase in length of the congested period but increase in buffer space however is not an ultimate solution. Two popular approaches used to control congestion in Internet routers are:

• Congestion prevention, which comes to play before network faces congestion in this case the end systems need to negotiate with the network so that no more traffic than the desired quantity, the network can handle, will be allowed into the network therefore no congestion will occur. This case is also known as "*Open-Loop Congestion Control*" because when the initial negotiation is made between router and the end-system after that both systems will act independently and as a result the end-system get no information from the network about the current traffic and network status, therefore termed as *"Open-Loop Congestion Control"*.

• The 2nd approach on the other hand comes into play after the network faces congestion, most of the end-systems in today's networks use reliable data transport protocol such as transmission control protocol (TCP) [3], which has an ability to recognize congestion indicators i.e. lost packets and responding to congestion by reducing the transmission rate. This type of congestion is also termed as "Closed Loop Congestion Control" since the end-system needs to get feedback information from the network about the current congestion status. In this case end-system responds to congestion signal by reducing the load it generates and tries to match the available capacity of the network in order to alleviate the congestion status. We called this type of congestion control method as *"closed-loop"*. The data transfer between end systems in packet oriented network such as Internet occurs in shape of fixed and variable units of packets of limited size. In general packet oriented networks get congested locally therefore congestion control mechanism usually perform to improve network overall performance and hence it is achieved by controlling the load produced by the network traffic. Based on the current load condition of the network, the congestion control is done through controlling the sending rate of data streams of each source which not only used to prevent congestion but also leads to high utilization of the available bandwidth. Network protocol frequently inform the sending sources about the current load conditions of the network and as a result the sources store these load conditions in the congestion control variable and these variables are accordingly used for controlling the congestion which leads to achieve high bandwidth utilization and better performance. But this approach has serious limitation i.e. additional overhead is required by the congestion control information that is transferred through the network protocol. In addition the network protocol and routers are not directly involved to control the congestion in network where as the protocols working on top of the network protocol are responsible to control the congestion and in this case each source on the basis of information stored in its congestion control variable locally perform the activity of congestion control but the major problem with this approach is that the network information collected by the sender does not reveal the fresh status of the network which leads to sub optimal congestion control in terms of overall network performance and utilization.

**EXISTING WORK:** Many classic ways to handle congestion control have been proposed, and is being made use today for network traffic management. There are mainly two classes of approaches: implicit congestion control and explicit congestion control. Here, this study suggests application of fuzzy logic in determining the optimum source sending rate. The ability of fuzzy logic to handle a loosely-defined input and to produce crisp output from those inputs makes it suitable for application in our proposed system. The queue size variation is used as the input to the fuzzy logic controller. Later, after applying fuzzy solving steps, we produce the desired receiving rate of the router as crisp output. We consider a backbone network interconnected by a number of geographically distributed routers, in which the core attached to the access routers which cooperate with the core routers to enable end-to-end Congestion occurs Congestion occurs when many flows traverse a router and causes its IQ Size (Instantaneous Queue Size) to exceed the buffer capacity, thus making it a bottle neck in the Internet. Since any router may become bottleneck along an end-to-end data path, we would like each router to be able to manage its traffic.

**PROPOSED WORK:** This paper proposes a solution by introducing a new protocol called STLCC (Stable Token Limited Congestion Control). It integrates the algorithms of TLCC and XCP altogether. In this new method the edge and the core routers will write a measure of the quality of service guaranteed by the router by writing a digital number in the Option Field of the datagram of the packet which is called a token. The token is read by the path routers and interpreted as its value will give a measure of the congestion especially at the edge routers. Based on the token number the edge router at the source reduces the congestion on the path. The output rate of the sender is controlled according to the algorithm of XCP. XCP allows 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 transfer speed to fit the routers current load. So, there is almost no packet loss at the congested link. The STLCC can evaluate the congestion level analytically and allocate network resources according to the access link that further maintain the congestion control system stable.

**RENDERING:** This logic can be implemented by assuming transmission of data between source and destination. Consider a multilayer network that consists of source, destination and routers. Whenever source sends data, the data can be transmitted over the network among routers in the form of packets. A packet is a small piece of data sent over a computer network and having an option field of the datagram. The router either may be Edge router or Core router. An Edge router is a device that routes data packets between one or more local area networks (LANs).A core router is a router that forwards packets to computer hosts within a network (but not between networks).The set of packets transmitted by the sender are forwarded to remaining routers with help of edge router. The edge router evaluates quality of service it can provide and writes this as value in the Option Field of the datagram of the packet and forwards the packet to core routers. This value is called as token

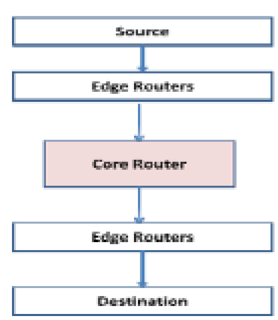


Fig: Structures connected with Curbing Package decline using tokens in the network border.

The path routers in the network read the token value and interpreted as its value. Based on the token number the edge router at the source minimizes the congestion on the path.The outgoing packet rate of the sender is controlled according to the algorithm of XCP. XCP allows 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 transfer speed to fit the routers current load. Because of this process and the congestion in the network is stable.

**OUTCOMES:** This project results can be shown by creating classes to nodes, edge router and core router. Initially source node selects the file and transmits the file to another node through routers. The file is transmitted in the form packets. Initially packets are forwarded to the edge router connected to the source. After receiving the first packet, edge router overwrites the source data rate with its current data rate in the option field of the datagram and gives the acknowledgement to the source and forwards packet to other routers. When packets are transmitted with limited number of resources then packet is kept in waiting state that gives the result as negative acknowledgement to the source. After receiving negative acknowledgement from the edge router, source adjust its current data rate .So, there is almost no packet loss at the congested link. This way of transmission will be done at each and every router and finally packets will be received by destination.

**SUMMARY:** The simple version of STLCC is proposed, which can be deployed on the current Internet. STLCC can evaluate congestion level analytically and allocate network resources according to the access link that leads to stable congestion control system. The network with stable congestion control leads to the good performance and it will be possible to build a network with limited number of resources having fast transmission of data with accuracy and no delay.

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