RANDOM EARLY DETECTION (RED), ACTIVE QUEUE MANAGEMENT(AQM) IN RELATION TO PACKET DROP – A REVIEW

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ABSTRACT

Packet Drop appears due to congestion arising in network due to congestion arising in network due to limited hardware resources. It results in degrade in the performance of the network. Many of the useful and timely information of great importance can be lost due to packet drop. Various performance issues like long delay while delivering messages, buffer overflows can be in a network involving the packet drop. Various congestion control techniques like Random Early Detection (RED), Active Queue management (AQM) can be applied to reduce the packet drop. This paper reviews the various solutions adopting the RED and AQM which were helpful to minimize the negative effect of congestion in the form of packcet drop by various researchers. Study and exploaration of various possibilities for further research in this area is the main objective of this paper.

Keyword: - *RED, AQM, Congestion Control, Packet Drop, Communication Delay etc ……*

1. INTRODUCTION

As the network size grow, network performance related problems like congestion control, packet drop comes on the priority and are critical to resolve. So, these are prioritize as high priority issues. Increased demand of internet, time sensitive applications lead to new network architectures especially keeping more effective congestion control as there one of main objective. Shared resources (queues, bandwidth and buffer) results in competition between various users for these resources. In case of uneven traffic, queues are utilized for smoothness at routers.

Router assisted congestion control methods like active queue management (AQM) are used to improve the performance of the network. AQM takes into account the various parameters like average queue size, queueing delay, loss rate and other parameters to calculate the dropping probability on the bases of which it filter out the packets (to drop) from a congested router to improve its performance. As a result of this , AQM becomes the hotspot for the researchers working and dealing in the field of network architecture for the network improvement. New algorithms like Random Early Detection had been proposed based on AQM which attracted wide attention among research societies. RED was proposed by Floyd as the only one candidate algorithm of RFC2309. Sensitivity towards the various parameters leads to development of various algorithms like: Adaptive random early detection (ARED), Stabilized random early detection (SRED), flow random early detection (FRED), BLUE algorithm, and so on.

According to research, RED is used to calculate the packet-loss-ratio through average condition of router's current queue, then predicts the possibility of a congestion. If forecast of network data flow is available earlier to network operations, the congestion can be avoided much effectively. Queue scheduling not only decides which packet to forward but also resolves the problem of the bandwidth distribution among the incoming flows. Queue size is directly proportional to the difference between incoming packet rate and the departure rate of the packets. As queue length approaches to its maximum limit (full), packet dropping is observed due to lack of buffer space. Discarding the packets does not reduce the number of packets in the network, as source retransmits the packet using the timeout mechanism when the packet is failed to reach the destination. The new proposed method may take into account the different schemes like Random Early Detection (RED), Active Queue Management (AQM) and the effect of input variables on the output variables or responses.

2. LITERATURE SURVEY

Congestion Control Techniques, As the number of connection increases, they fights for a share of limited link bandwidth resulted in congestion. TCP congestion control becomes major method to regulate the rates of different connections by sharing network links. TCP adopts window based method for the congestion control. In the early phase of communication, when connection gets established, sender attempts to ramp up its transmission rate by increasing its congestion window exponentially. For preventing these excessive losses due to exponential increase in transmission rate, TCP sender apply congestion avoidance algorithm. In this, if window size approaches the maximum allowed window size or exceeds its threshold value, TCP enters into congestion avoidance phase. In this phase, window size is increased very slowly at the rate of one segment per round trip time. When the aggregate transmission rate for the active connection increases, the queue size grows and finally the packet drop occurs. TCP detects this packet loss through the duplicate acknowledgements from the receiver. TCP cuts the transmission rate in half after receiving duplicate acknowledgment by halving its congestion window size.

One major problem associated with the TCP congestion control algorithm is that the TCP congestion control algorithm is that TCP sender's decreases their rate of transmission only after detection of the packet drop by the queue overflow. In this scenario lots of time elapses between the packet drop at router and its detection at the traffic source. In the meantime, a large number of packets may be dropped as the sender continues to transmit at a rate that the network can not support. TCP congestion control algorithms are explicit feedback algorithms.

The active queue management (AQM) is a router assisted congestion control technique which improves the performance of the networks. The AQM algorithm handles the congestion by dropping the packets from a congested router where dropping probability is computed with the help of average queue size, loss rate, queuing delay, or other parameters. A novel approach based on design of experiments is proposed to study the performance measures related to several AQM schemes viz., random early detection (RED), random exponential marking modified RED, adaptive RED, stabilized RED, three-section RED, and AQM with random dropping. The impact of several input factors on the performance measures viz., throughput, queuing delay, loss-rate is investigated by using the factorial design where it is used to find the interaction of input factors. The relative changes in the output responses on account of changes in input factors or variables are evaludated. Sensitivity analysis is carried out by computing the weighted sum relative changes of response variable with respect to input factors for each AQM Scheme. Based on the sensitivity anaylsis it appears that a new AQM with random dropping is most robust while in contrast to others.

3. CONCLUSION

A new framework can be proposed in the context of performance study of communication networks. The new proposed method may take into account the different schemes like Random Early Detection (RED), Active Queue Management (AQM) and the effect of input variables on the output variables or responses. An important finding of the analysis is that AQMRD performs to a higher sensitivity level when changes are made of responses with respect to input factors are considered. It indicates that the new AQMRD scheme achieves good performance irrespective of setting of input parameters such as number of FTP sources, buffer size, and window size. Minimum and maximum value analysis is carried out for throughput, loss rate, and queuing delay. The results has low rate and lowest queuing delay but achieves higher throughput as the number of FTP sources increases. The advantage of the factorial design framework is that it is able to incorporate the effect of interaction of input factors. This helps in highlighting the role and relevance of the input factors on the overall performance metric of the network.

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