QUEUING OPTIMIZATION FOR CONSTANT BIT RATE TRAFFIC IN NS2

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ABSTRACT: The networks around us have become more multimedia centric thereby enabling more personal information to be proposed along all over. In such a scenario, security of the data becomes the highest priority however, security enabling often makes us compromise on the speed and agility due to heavy algorithmic calculations. So, to keep a balance between the two, we need to perform traffic engineering of secured data. In the paper we have tried to implement sophisticated Fair Queuing method to make traffic more streamlined the comparison is done with the default Queue management technique i.e. Droptail. The result in the paper may be utilized effectively to optimize constant bit rate traffic

Keywords : CBR,FQ,SFQ, DROPTAIL,NS2,TRAFFIC ENGINEERING

I. INTRODUCTION

In order to study the importance and practical usage of traffic management in CBR, A detailed study of difference between CBR and VBR is done and which is as under

TYPES OF DATA TRAFFIC:
1. Constant Bit Rate (CBR).
2. Variable Bit Rate (VBR).

Constant Bit Rate (CBR)

CBR is a term used in telecommunications, relating to the quality of service. When referring to codes, constant bit rate encoding means that the rate at which a codes output data should be consumed is constant. CBR is useful for streaming multimedia content on limited capacity channels since it is maximum bit rate that matters, not the average, so CBR would be used to take advantage of all of the capacity. CBR would not be the optimal choice for storage as it would not allocate enough data for complex sections. The problem of not allocating enough data for complex sections could be solved by choosing a high bits for encoding process, though the size of the file at the end would be proportionally larger. In case of streaming video as a CBR,the source could be under the CBR data rate target. So in order to complete the stream, its necessary to add stuffing packets in the stream to reach the data rate wanted. With limited bandwidth available, the recommended mode is normally CBR (Constant Bit Rate) as this mode generates a constant bit rate that can be predefined by a user. During CBR encoding, the bit rate or the number of bits per second is kept the same through the encoding process. Constant bit rate (CBR)encoding persists the set data rate to setting over the wholevideo clip. CBR encoding does not optimize media files for quality but will save the storage space. CBR is most commonly used for streaming video content using the flash media server. CBR is used for timing sensitive traffic. Examples are voice, interactive video conferencing. CBR provides consistent delay across the network. Example ATM network. Advantage of CBR method is that audio data typically processes faster (compared to VBR).

Variable Bit Rate (VBR)

VBR stands for variable bit rate. VBR encoding adjusts the data rate down and to the upper limit, based on the data required by the compressor. This means that during a VBR encoding process the bit rate of the media file will dynamically increase or decrease depending on the media files bit rate needs. VBR takes longer to encode but produces the most favourable results as the quality of the media file is superior. VBR is most commonly used for HTTP delivery. With VBR, a predefined level of image quality can be maintained regardless of motion or the lack of it in a scene. This means that bandwidth use will increase when there is a lot of activity in a scene and will decrease when there is no motion. This is often desirable in video surveillanceapplications where there is a need for high quality, particularly if there is motion in a scene. Since the bit ratemay vary, even when an average target bit rate is defined,the network infrastructure must be able to accommodate high throughput [8]. VBR is used for bursty data application and also provide pre-assigned and variable data rate. There are two modes of VBR. They are VBR-rt (Variable Bit Rate Real-Time) and VBR-nrt (Variable Bit Rate Non Real Time). VBR-rt is intended for real-time applications, such as compressed voice over IP (VOIP) and video conferencing. These require tightly constrained delays and delay variation. Examples of VBR-nrt include data traffic such as X.25, frame relay, transaction processing, LAN-to-LAN, and non-realtimebuffered voice and video traffic. Impact of CBR Traffic on Energy Consumption in MANET ICMAEM-2017

II. METHODOLOGY AND RESULTS

Our networks consist of a heterogeneous traffic sources delivery UDP based and TCP based traffic to the destination. Although all the observations are carried out on UDP based traffic in the presence of TCP traffic, but the results may be used as a ground work for computing more complicated traffic scenarios like TCP based web traffic or UDP based multimedia traffic the simulation setup is done on the windows XP machine running on virtual box with Cygwin and NS2.35.

It has been observed that when a sophisticated active Queue management technique with enhanced packet filling and traffic engineering capabilities are employed in the network in NS-2 some performances degradation is observed. This is clearly shown by the fact that non algorithmic queue management such as Droptail performs better than algorithmic active queue management technique`

However this degradation in the performance is not of concern when it comes to the security of the network . Moreover this main objective of the paper is to compare the faire queue technique with the Stochastic Fair queuing in NS2` all things being equal the following observations were made which clearly make fair queuing a better choice of queuing management.

We find Throughput of the network by varying between router destination links in 0.5, 1.2, 1.7, 2.0 Mbps we found throughput for Droptail, Fair queuing and Stochastic fair queuing, and queue size 10 for scenario 1 and queue size 05 for scenario 2

Table 1 Calculation of throughput at queue size 10

Queuing Method	Bandwidth			
	0.5	1.2	1.7	2
DROPTAIL	501766.78	958105.64	987249.54	1001821.49
FQ	322634.01	765183.95	972900.3	1001821.49
SFQ	353263.65	794776.66	969034.6	1001821.49

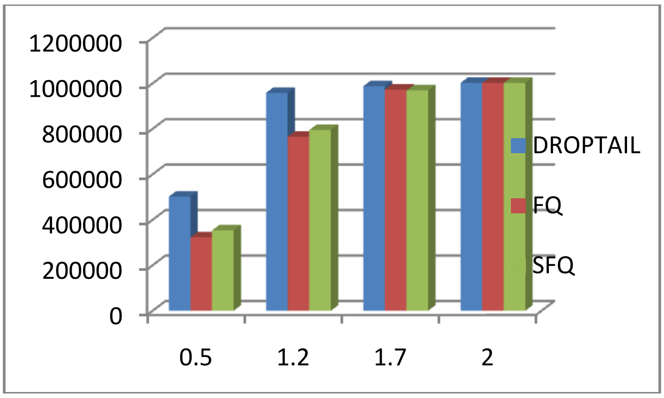

Fig.1 Comparison of throughput at queue size 10

Table .2 Calculation of throughput at queue size 5

Queuing Method	Bandwidth			
	0.5	1.2	1.7	2
DT	501798.56	972677.59	952641.16	981785.06
FQ	322634.01	765183.95	972900.3	1001821.49
SFQ	353264.65	794776.66	969034.6	1001821.49

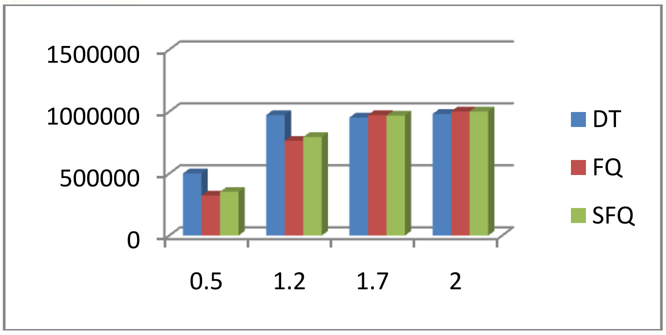

Fig. 2 Comparison of throughput at queue size 5

1. Fair queuing techniques are resilient to changes in queue limit or queue size i.e.when the queue limit is decreased to half or the link is narrower resources constrain link fair Queuing method do not degrade going from queue size 10 to 5 Droptail degrades sharply.

2. The packet loss rate and throughput of the network remains unaffected when queue size is decreased in case of fair queuing method whereas non algorithmicqueuing Techniques are degraded in both performance parameters

3 The third point of observation is the fact that among Fair Queuing techniques

SFQ performs better at low resources that are low bandwidth links as compared to fairQueuing. At lower bandwidths or when the networks conditions are more challenging SFQ manages the flow of packets at the router more efficiently and hence give more performance both in terms of packets loss rate and throughput

4 finally we observe that if the network bandwidth is kept at a considerably high valve there is no need to use SFQ , we can simply use fair queuing and save more processing power as Fair Queuing performs better than SFQ on high bandwidth links . Finally we conclude that a non-algorithmic queuing method such as Droptail is recommended where security and traffic engineering is not a concern . We perform the calculation of throughput for constant bitrate traffic in the first scenario we calculate

However for a bigger sophisticated networks we prefer fair queuing, although it will increase the processing power used in the network thereby reducing the battery life but it the cost that we pay for better traffic engineering .Among the fair queuing methods FQ can be used for high bandwidth networks and SFQ must be used for low resources networks in the term of bandwidth.

III. CONCLUSION

The results in the paper have been enlisted in the previous section. The results of the work guide in to the point that network performance is compromised as a level of security in the increased. Enhanced algorithmic and computational loads in the network at routing nodes causes bluishness in the network however implementation of effective queue management is also of paramount importance. The result in the paper maybe taken as a reference study for future works the areas where this work might be extrapolated as enlisted below

- The experimentation may be done on complex traffic classes like https, DNS etc. may be used.
- The work may be extended over TCP based traffic has higher scope of traffic engineering using sophisticated acknowledgement technique
- Finally this work may be extended to wireless technologies of newer generationslike 4g, LTE etc.

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