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Speed analysis for QOS in ATM network – a comparison

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ABSTRACT
The approaches to QoS support of ATM networks are explained, The Performance of several kinds of schemes such as ABR CBR and VBR are compared based on transit delay and total delay based on all the six Qos parameters. Some simulation work is done and related results are shown and discussed.

Introduction

One of the technology accepted for next stage telecommunication network is Asynchronous transfer mode (ATM.) It is Supporting existing, future and even unknown applications. ATM-network is able to integrate a variety of service with diverse traffic characteristics and Quality of Service (QoS) requirements . ATM makes use of packet-switched technology, which transfers information in fixed size units called cells. Each cell consists of 53-bytes the first 5 bytes contain cell-header information and the remaining 48 bytes contain the 'payload'(user information). The structure of an ATM cell is as shown

Fig1

ATM has been designed to support the high bandwidth optical signaling of present and future information super highways (Vuskovic.M,1999).

The goal of an ATM network is to integrate different classes of traffic, making efficient use of resources(bandwidth, buffers etc) and at the same time, guaranteeing the Quality of Service (QoS) of each traffic class, unfortunately, these two requirements (efficient resource utilization and reliable service guarantee) are in conflict with each other (M.Gerla,D.Cavendish,S.Mascolo,1996).

The problem of traffic integration, congestion control and to achieve a good Quality of Service has been the main focus of ATM research in recent years. The prevailing solution is to subdivide traffic into four classes,

1) Constant Bit rate CBR
2) Variable Bit rate VBR
3) Available bit rate ABR
4) Unspecified bit rate UBR

Quality of Service:

The definition of QoS given by International Telecommunication unit-Telecommunication (ITU-T) is "QoS is the collective effect of service performances that determine the degree of satisfaction of a user of the specific service". Another definition says

"Quality of service is the ability to provide different priority to different applications, users, or data flows, or to guarantee a certain level of performance to a data flow"

The traffic related measures for QoS in ATM network can be divided into two classes

1) Connection level parameters
2) Cell level Parameters

Cell level parameters:

1. Cell loss ratio.
2. Max cell transfer delay
3. Peak-to-peak cell delay variations
4. Cell error ratio
5. Cell mis-insertion ratio
6. Severely errored cell block ratio

The assessment of all the six cell level QoS parameters are done based on

1. Speed: ATM network has to specify how fast cells can be delivered at the destination.
2. Cell transfer delay (CTD) and cell delay variation(CDV) measure the speed of ATM networks in delivering cells, CTD measures the transit delay and CDV measures the variations in these delays.

Cell Transfer Delay (CTD):

The delay experienced by a cell between the first bit of the cell is transmitted by the source and the last bit of the cell is received by the destination.

This includes propagation delay, processing delay and queuing delays at switches. Maximum Cell Transfer Delay (Max CTD) and Mean Cell Transfer Delay (Mean CTD) are used.

Accuracy: Cell Error Ratio (CER), Cell Mis-insertin Ratio(CMR) and severely errored cell block ratio(SECBR) parameters specify the accuracy with which cells are delivered. CER is the ratio of the total number of cells delivered with error to the total number of cells delivered.

$$CER = \frac{\text{Total no. of cells delivered/sec}}{\text{Error}}$$

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CMR is the number of cells, meant for some other destination inserted per second. SECBR is the ratio of severely errored cell blocks to the total transmitted cell blocks.

Switching Delay: This is the time to switch an ATM cell through the switch. The typical values of switching delay range between 10 and 1000Micro Secs. This delay has two parts. 1.Fixed Switching Delay and it is because of internal cell transfer through the hardware. 2.Queueing delay and this is because of the cells queued up in the buffer of the switch to avoid the cell loss.

Jitter on the Delay: This is also called as Cell Delay Variation(CDV) and this is denoted as the probability that the delay of the switch will exceed a certain value. This is called a quantile and for example, a jitter of 100Micro secs at a 10exp-9 quantile means the probability that the delay in the switch is larger than 100Micro secs. is smaller than 10exp-9.

Cell Delay Variation (CDV):

The difference of the maximum and minimum CTD experienced during the connection. Peak-to-peak CDV and Instantaneous CDV are used.

Simulation: The speed has been calculated on two parameters i.e. Cell transfer delay (CTD) and Cell delay variation (CDV). Three sceneries are run on network 1, they differ in traffic size. The total traffic generated with each scenery and the result collected are listed in table. The simulations only run 10 seconds as per the simulated data collected Since the traffic generated in bunch, it is difficult to scale the traffic size, because when the traffic increases, and if it exceeds the capacity of network, the request is rejected; therefore, the load is hard to exceed 150Mbps. Because no network overload is simulated, the throughput increases with the load. Ideally, the throughput should be increase with increased load and become static under infinite load.

$$CMR = \frac{\text{Total no. of cells misinserted/sec}}{\text{Total no of cells/sec}}$$

The latency(The delay in data transmission from source to destination) and jitter(The variation in latency) is very small, this is because congestions do not occur because of the sable traffic and the QoS is guaranteed for each service. From the table, it can be seen that the cell delay for ABR service is largest amongst the three categories.

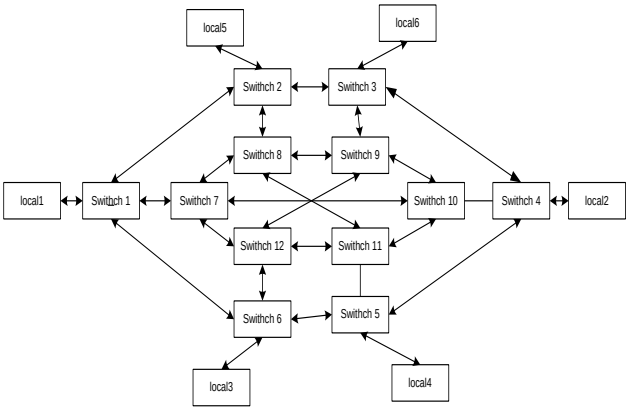
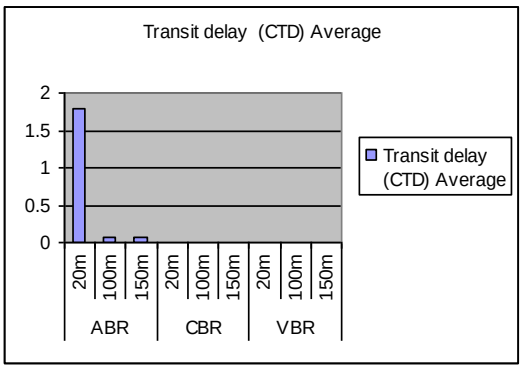
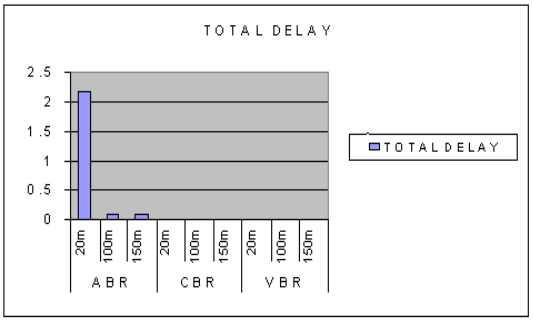
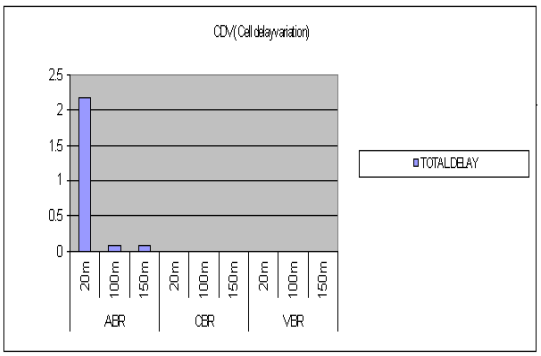


Figure 3 -- Network 2







Conclusion

This report deals with the definition and deployment of the QoS in ATM networks. The simulations shows that ATM can guarantee the QoS for various classes of applications. The average CTD and CDV of ABR is quite high for low freq i.e 20 mbps as compare to higher frequencies. So the performance of CBR and VBR is better then ABR in terms of speed for high frequencies.

Reference

[1] Larry L.Peterson, Bruce S.Davie , “Computer Networks, a systems approach”, second edition. http://www.opnet.com/, December, 2002.

[3] an estimation of traffic parameters for VBR services in ATM networks” Vol 24, 2001, 1380-1389 Author: J.Paek, C.Oh, K.Kim

[4] A Dynamic Traffic shaping technique for a scalable QoS in ATM networks” Vol: 5, No: 4, October 2008,93-101Author: Trancis Ogwu, Mohammad Talib, Ganiyu Aderounmu and Olufade Onifade.

[5] Cell Delay Variation (CDV):
The difference of the maximum and minimum CTD experienced during the connection. Peak-to-peak CDV and Instantaneous CDV are used.

[6] Design and analysis of delay control for CBR services in ATM networks Computer Communications, Volume 21, Issue 5, 15 May 1998, Pages 445-459 Y. C. Chen, C. T. Chan & S. C. Hu.

[7] Design and performance analysis of a new RTM algorithm for VBR traffic in ATM networks Computer Communications, Volume 19, Issue 3, March 1996, Pages 205-215 Intae Ryoo, Hitoshi Aida and Tadao Saito

[8] P.Newman. Traffic Management for ATM Local Area Networks, IEEE Communication Magazine,1994.

[9] H.T.Kung. Flow Controlled Virtual Connections Proposal for ATM Traffic Management. ATM Forum 94-0632R2, September 1994.

Figure 2- table

Parameters	Bit Rate	Transit delay (CTD) Average	Variations in these delays (CDV) Average	TOTAL DELAY
ABR	20mbps	1.8	0.37	2.17
	100mbps	0.078	0.00066	0.0787
	150mbps	0.078	0.00066	0.0787
CBR	20mbps	0.00164	0	0.0016
	100mbps	0.000164	0	0.0002
	150mbps	0.00164	0	0.0016
VBR	20mbps	0.00125	0	0.0013
	100mbps	0.00106	0	0.0011
	150mbps	0.00106	0	0.0011