International Journal of Network and Communication Research
Vol.3, No.2, pp.21-29, October 2016
Published by European Centre for Research Training and Development UK (www.eajournals.org)

INTERNETWORKING TRANSMISSION IN CELLS LOSS DESIGNING MPLS AND ATM NETWORKS

P. Rajan
Research Scholar
Bharathiyar University
Coimbatore-641046

Dr. Arul Lawrence Selvakumar
Prof. and Head
Dept. of CSE
Rajiv Gandhi Institute of Technology
RT Nagar, Bangalore-32.

ABSTRACT: *ATM is the new generation of computer and communication networks that are being deployed throughout the telecommunication industry as well as in campus black bones. OPNET is a CAD tools which is specialized in communication protocols and networks. We examine its performance and its effect on the traffic pattern in an ATM network. In this paper we also report the studies of simulation efficiency and network performance of simulated network using firewall.*

KEYWORDS: Internetworking Transmission, Cells loss, MPLS , ATM, Networks

INTRODUCTION

Asynchronous Transfer Mode (ATM) is a connection-oriented packet switching technique that is universally accepted as the transfer mode of choice for Broadband Integrated Services Digital Network. This report describes key features of the ATM network and some relative simulation work we have done by OPNET. ATM is considered as a specific packet oriented transfer mode based on fixed length cells. Each cell consists of a 48bytes of information field and a 5bytes of header, which is mainly used to determine the virtual channel and to perform the appropriate routing. Cell sequence integrity is preserved per virtual channel. ATM is connection-oriented[3]. The header values are assigned to each section of a connection for the complete duration of the connection. Signaling and user information are carried on separate virtual channels.

The information field of ATM cells is carried transparently through the network. No processing like error control is performed on it inside the network. All services (voice, video, data,) can be transported via ATM, including connectionless services. To accommodate various services an adaptation function is provided to fit information of all services into ATM cells and to provide service specific functions.

RELATED WORKS

This attribute specifies the service category used by the application. OPNET supports all five categories specified by the ATM Forum Traffic Management Specification 4.0: CBR, rt-VBR, nrt-VBR, ABR, and UBR. For a call to be admitted by call admission control, there should be at least one path to the destination where all nodes support the requested service category. This attribute specifies the traffic parameter settings for the connection. The Requested Traffic

Contract[5] allows you to specify the peak cell rate (PCR), minimum cell rate (MCR), sustainable cell rate (SCR), and mean burst duration (MBS) in the incoming and outgoing directions. During call admission control, these requested values are compared to the supported parameters on all intermediate nodes.

This attribute specifies the application's requested Quality of Service, which includes the peak-to-peak cell delay variation (ppCDV), the maximum cell transfer delay (maxCTD), and the cell loss ratio (CLR). During call admission control, these requested values will be compared to the supported parameters on all intermediate nodes. This attribute specifies the queue index. To automatically assign indices to the queues, you can use the Per VC setting. Alternatively, you can assign each queue a unique queue number. The queue number is used to identify the queue being monitoredfor certain statistics (such as queue length).

This attribute allows you to specify the amount of bandwidth that is allocated to a specific queue. This is the maximum bandwidth available to this queue. It is calculated as a percentage of the link bandwidth. For CBR calls, this attribute regulates the maximum bandwidth reserved and hence guarantees this bandwidth as well. This is the minimum guaranteed bandwidth expressed as a percentage of link bandwidth. For non-CBR calls, this attribute defines the bandwidth reserved. For example, for a rt-VBR call, SCR is the minimum guaranteed bandwidth. The value specified for minimum guaranteed bandwidth is equal to the weight of this queue when the ATM QoS Priority Scheme attribute[7] is set to weighted round-robin. This attribute determines the number of cells in the queue.

These attributes are used when selecting a buffer for a call that is waiting for admission through a port in a node. A buffer is selected if both of the following requirements are met: The traffic parameters (PCR, SCR, MCR, and MBS) of the incoming call are less than or equal to the value specified in the Traffic Parameters attribute. The QoS parameters (maxCTD, ppCDV, CLR) of the incoming request are greater than or equal to the values specified in the QoS Parameters attribute. queues are serviced depending on the weights assigned to them. Weights are determined according to the Minimum Guaranteed Bandwidth attribute (in ATM Port Buffer Configuration Queue Parameters attribute) of each queue parameter. This scheme ensures that the guaranteed bandwidth is reserved.

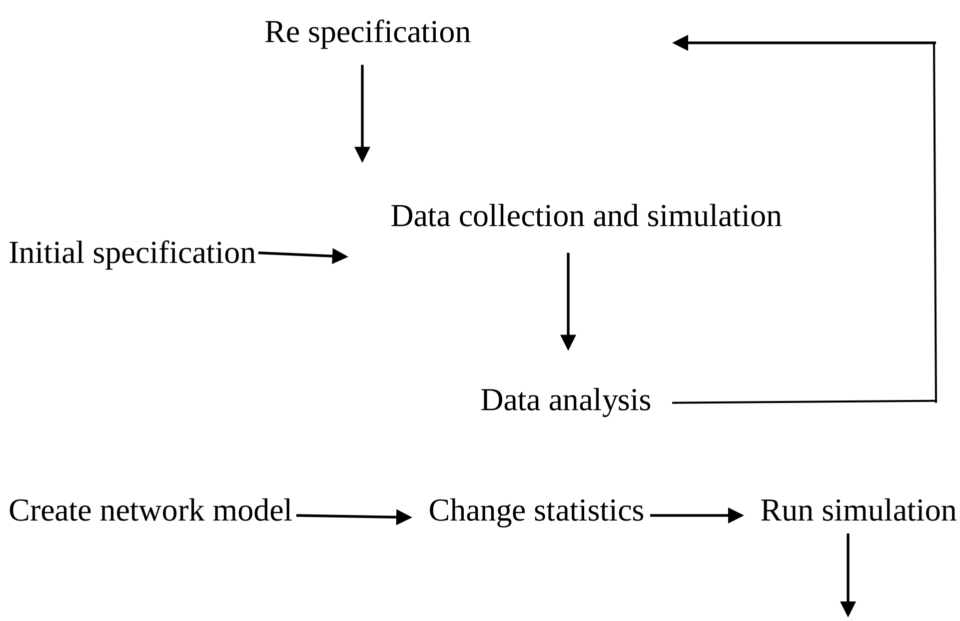
All queues have the same priority and therefore have the same chance of being serviced. The link's bandwidth is equally divided amongst the queues being serviced. In our study, the performance of different ATM switch buffer queuing schemes for *round-robin* and *weighted round-robin* didn't have too much difference. In conclusion, discrete-event simulation provides detailed, accurate network simulation results and can observe a wide variety of network statistics. However, this method of simulation generally requires ample significant time and memory. Since the public machine in the CSE department can't run the OPNET simulation properly, all the simulation work in this report is done in my own PC at home, so the simulation results may be not perfect enough, the time and the memory have a strong impact on the simulation. the routing process detects a neighbor node or link failure/recovery and updates its routing tables immediately. The node sends out route advertisements that reflect its updated routing table[8]. Failure is detected implicitly when no route costs have been received in two or more route update periods.

ATM is a connection oriented network and deed with the concept of virtual connections. In ATM networks routing at the ATM switches is done using routing table which have been setup statistically at the time of the network or dynamically depending on the VC going through the ATM switches. In ATM networks depending on the application traffic shaping may be need to be done at every switch of a virtual connections. ATM support different classes of traffic, so the simulator for ATM network needs to provide traffic modeling features. Data structure is initialized using the values needed from the input file. The database to store the value of the parameters to be monitored periodically is initialized. The events needed to start the simulation process are put in the event queue.

SIMULATION RESULTS

We can simply adjust the traffic load by changing the *Traffic Scaling Factor* in *Configure Simulation* menu before we run the simulation every time. The three traffic components: video, voice and data are generated; we use rt_VBR for video, CBR for the voice, and ABR for data traffic[4]. However, the ratio of the three kinds of traffic is difficult to set to exactly 30%, 40% and 30%. Fig2 is the comparison of the traffic generated by video, voice and data.

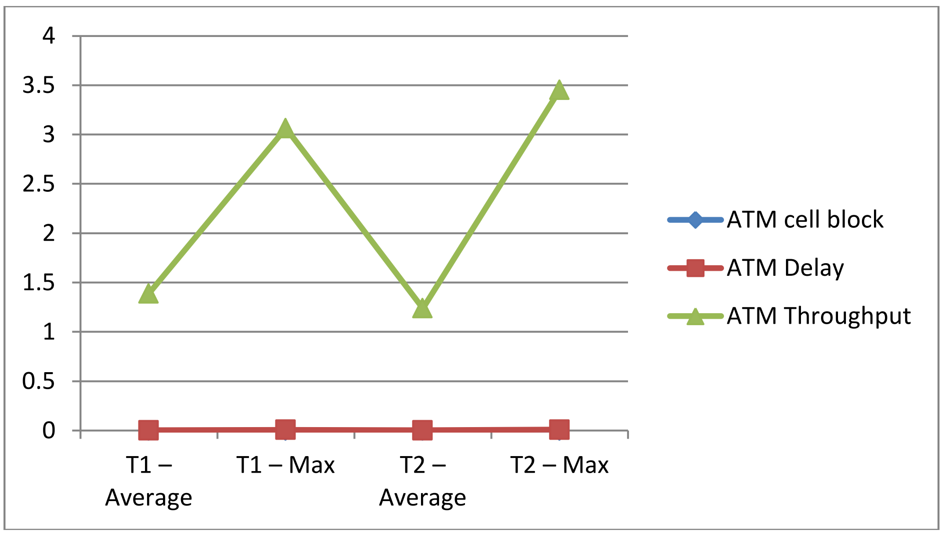
The shortest path routing algorithm we are using in OPNET is a dynamic routing protocol, ATM Distance Vector Routing. Since the OPNET only support two types of queuing schemes: *round-robin* and *weighted round-robin*, and the simulation is limited by the time constriction, we can only compare the two queuing schemes running for 30 seconds processing time(the actual time for the simulation is much longer, may take half an hour to several hours). The following two tables are the results for running at two different queuing schemes.



Write report ← Analyze result

Table : Cell Transmission rate

Statistic Parameter	T1 – Average	T1 – Max	T2 – Average	T2 – Max
ATM cell block	0	0	0	0
ATM Delay	0.003	0.007	0.003	0.009
ATM Throughput	1.390	3.064	1.239	3.453



Sample coding

```
noofswitches = 3;
nameofswitches : A, B, C, D, E;
nooflinks = 2;
linksare : A-B, B-C, B-D, B-E;
noofsources =23;
43
routesare {
src1 A-B-C;
src2 A-B-D;
src3 A-B-E;
}
linkinfo {
default {
bandwidth = 55442 KB ;
```

```
buffer = 300 cells;
propdelay = 50 micro;
}
A-B {
bandwidth = 15442 KB ;
buffer = 300 cells;
propdelay = 50 micro;
}
}
sourceinfo {
default {
starttime = 1 msec;
livetime = 100 sec;
peakrate = 2492.045 kb;
averagerate = 6048.3 kb;
burstsize = 100 cells;
RESERVEDBANDWIDTH = 10 MB;
burstduration = 1 msec;
bursttolerance = 10 million;
celllossprobability = 1 inmillion;
video;
interburstgap = 10 micro;
delaytolerance = 1 msec;
}
44
src1 {
starttime = 1 msec;
livetime = 100 sec;
peakrate = 345.04 kb;
averagerate = 60.7 kb;
burstsize = 10 cells;
RESERVEDBANDWIDTH = 0.2 MB;
burstduration = 1 msec;
bursttolerance = 10 million;
celllossprobability = 1 inmillion;
data;
interburstgap = 10 micro;
delaytolerance = 1 msec;
}
src2 {
starttime = 1 msec;
livetime = 100 sec;
peakrate = 64.045 kb;
averagerate = 25.37 kb;
burstsize = 10 cells;
```

```
RESERVEDBANDWIDTH = 0.2 MB;
burstduration = 1 msec;
bursttolerance = 30 million;
celllossprobability = 1 inmillion;
singlevoice;
interburstgap = 10 micro;
delaytolerance = 1 msec;
}
}
bapolicyinfo {
default {
LIFD;
infinite;
distributed;
45
}
A {
CLP1;
fixed;
shared;
}
}
bwpolicyinfo {
default {
reserved;
}
}
switchoutput {
default {
LOSSOFCELLS;
BUFFERUTILIZATION;
frequency = 1 msec;
file = swds10;
}
B {
BUFFERUTILIZATION;
frequency = 3 msec;
file = swds12;
}
}
linkoutput {
default {
linkutilization;
frequency = 1 msec;
file = linkds10;
```

```
}
46
}
sourceoutput {
default {
endtoenddelay;
qdelay;
throughput;
frequency = 1 msec;
file = srcds10;
}
src2 {
endtoenddelay;
throughput;
frequency = 4 msec;
file = srcds11;
}
}
accuracy = 0.02 ;
simulationduration = 20;
```

PERFORMANCE RESULTS

Flexibility in modeling the target system eases in development of model parameters and fast model execution speed. Addition of new schemes algorithm and components of the target system should be facilitated developing on the requirement and a simulator should be modular in structure. Sine all communication network exhibit some sort of random behavior and simulator must contain good statistical capabilities such as random number generator with multiple random number streams and a standard probability distribution[2]. The user should be able to specify various kinds of topological and network development parametric changes in the network and observe the system performance. It should provide standard performance measure such as average delay average throughput average load as well more specialized measure such as number of voice cells travelled through link and number of times a request for connection setup has failed etc.,

ATM is considered as a specific packet oriented transfer mode based on fixed length. Each cell consists of 48 bits of information field and a 5 bytes of a header which is mainly used to determine the VC and to the VC and to perform the VC and perform the approximate routing cell sequence integrity is presented per VC. ATM is connection oriented and the connection values are assigned to each series of a connection. Signaling and user information are carried on separate VC. The information field of ATM cell is carried transparently through the network number processing like error control is performed on it side the network. All services can be transported is ATM including connectionless services[1]. To accommodate various services an adaption function is provided to fit information of all services into ATM cells and to provide service specific functions.

CONCLUSION

We simulated two FDDI and two ATM network scenarios. Our major contribution is modeling the mechanism for ATM networks. The model is available from the OPENT contributed model depot. The software simulation package, OPNET, which specializes in discrete-event simulation of communication systems, has many attractive features and can simulate large communication networks with detailed protocol modeling and performance analysis. In our study, the performance of different ATM switch buffer queuing schemes for *round-robin* and *weighted round-robin* didn't have too much difference. In conclusion, discrete-event simulation provides detailed, accurate network simulation results and can observe a wide variety of network statistics. However, this method of simulation generally requires ample significant time and memory. Since the public machine in the CSE department can't run the OPNET simulation properly, all the simulation work in this report is done in my own PC at home, so the simulation results may be not perfect enough, the time and the memory have a strong impact on the simulation.

Acronyms

OPNET – OPERATION NETWORK

CAD – COMPUTER AIDED DESIGN

ATM – ASYNCHRONOUS MODE

VBR – VARIABLE BIT RATE

ABR - AVAILABLE BIT RATE

PCR – PEAK CELL RATE

MBS – MAXIMUM BURST SIZE

CBR – CONSTANT BIT RATE

CTD – CELL TRANSFER DELAY

CDV – CELL DELAY VARIATION

CLR – CELL LOSS RATIO

QOS – QUALITY OF SERVICE

MCR – MODIFIED CELL RATE

VC – VIRTUAL CHANNEL

PC – PERSONAL COMPUTER

FDDI – FIBER DISTRIBUTED DATA INTERFACE

CSE COMPUTER SCIENCE AND ENCINEERING

REFERENCES

1. Modelling Traffic Management in ATM Networks by Rohil Goyal, 2008
2. Modelling and Simulation of ATM Networks by David C Blight
3. A Simulator for ATM Networks by Somanchi Brij Vinod April 1995
4. ATM Network QOS Parameter and Performance by Parag Jain , November 2000
5. ATM and Network Intrusion for Packet Data Networks by Sugantha Shukla , June 2014
6. Performance and Comparision of ATM Based Network by Hafiz M , 2006
7. Congestion Control in ATM Networks by Guiomor Correl
8. ATM Transfer Between Base Station and Controller by Julio Berrocal