

# To Minimize the Cost of Packets Drop in the Network by Average Performance

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## ABSTRACT

There has been substantial interest from researchers in the development and contribution of modules in NS2. One of the challenges in NS2 modeling is to seamlessly integrate real world traffic data into the NS2 network model. Ethernet is the fastest wired network protocol, with connection speeds of 10 megabits per second (Mbps) to 100 Mbps or higher. Wired networks can also be used as part of other wired and wireless networks. Normally the traffic in NS2 is generated from the traffic agents such as TCP and UDP agents whose parameters are based on certain statistical distribution. The aim of this paper is to demonstrate how traffic agents in NS2 simulator are used to generate different types of traffic based on real traffic network. We also simulate the design of 5 node wired network scenario, its packet drop rate analysis through TCP protocol using NS2 as a simulator. Analyzed the performance of 5 node network when the packet is drop down by graphical method also called as Xgraph when rate parameter is in mb and also analyzed the performance of same network by changing the value of rate parameter at same time so no packets would drop down at same time and also analyzed the performance by Xgraph method. In this work, a modified sniffer program was used to capture real traffic data from a production network and output to a traffic text file. This traffic test file is then used by the NS2 traffic agents in the simulated network model representing the real production network. To validate that the simulation works accurately, the output trace file of NS2 after simulation is compared with the traffic generated at the destinations of the production network.

**Keywords:** Comparative Analysis, Literature Review Hybrid Mechanism, Coding, NS2 and X Graph

## I. INTRODUCTION

In Today's world the use of Internet is growing considerably day by day in the scope and there are so many results revealed for the functional requirement of the internet which is in the form of number of new protocols and so many designed algorithms. These functional requirements include security, QOS(quality of-service), policies, mobile networking etc. these algorithms and protocols growth gives the solution of so many problems for today's world of internet. Several protocols like SIP, HTTP, UDP, ICMP, TCP, RIP etc. expansion gives us privacy and also secure our data on the internet. In real world till now there are number of algorithms and protocols developed and designed (also by simulator) to cover the operational needs of internet but they certain have some shortcomings. There are so many simulator tools developed and evolved to test the

work of real environment but they still have certain limitations because by using the different approaches such as the use of several topologies and another one is lot of traffic generation on the network make simulator task difficult. In about 1991 internet gains popularity and now become a part of our real world.

## II. METHODS AND MATERIAL

### A. Comparative Analysis

Mr. Ajay Singh and Dr. Pankaj Dashore did well in their paper as in [5]. But they only analyze the packet flow, how packets come from source to destination through the router node and analyze its drop rate using Xgraph tool in NS-2 but we analyzed packet flow and drop rate as well as we improvise the packet drop rate we also explain how the packet drop rate is improvised and no

packet would drop down at same time by altering the rate parameter of Exponential traffic.

## B. Literature Review

As in [1] the study of TCP in NS-2 in which they worked on different formulae to calculate the performance of TCP in NS-2 and also gave installation steps for NS-2. we study about the 4 types of traffic and two protocols (TCP,UDP) how to create the topologies and network components. With NS-2 they design the wired network, wireless network and their performance analysis by graphical method[2]. As we know that the NS-2 is open source tool and widely used for network simulation area and there are different kind of traffic is generated for the different type of packets so this traffic and its parameters calculate the overall TCP/UDP packet drop rate by different methods such as by calculating the throughput by running AWK, perl script etc. in NS-2 as Dr. Neeraj Bhargava and Dr. RituBhargava, Anchal kumawat, Bharat Kumar calculate the performance of TCP throughput by different parameters of simulation they use VBR traffic which is generate the video traffic at source to destination in form of packet as in [3]. They analyse the performance using both the tools Xgraph and Gnuplot. These both are the tools of NS-2 which shows the performance of network project graphically. We analysed the performance by Xgraph method in this paper. Up to this study of NS-2 and how well it works on the wired network and calculates its performance or throughput using different simulation tools and traffic generators.

Now we will study about the integrating the agents and its combined security and integrity work on the wired, wireless and on sensor network using NS-2 as a network simulator they work well in the area of security how to encrypt and decrypt the data so it provide the security to data or information in the network[4]. As so ever there are so many projects and research work is done under the area of wired and wireless network by using simulator NS-2. As NS-2 is also used as the REAL simulator in between year 1988-1990. NS-2 is widely used for security purpose and for doing simulation before using it as real world. We work in area of TCP packet when it will drop and when it will not drop in this paper using NS-2.

Ashish Kumar: The paper describes a Multicasting network using two queuing algorithms Drop Tail and Random Early Detection (RED). A simulation environment is created in NS2 to analyze and contrast Drop Tail and RED for queue management on basis of drop out data packets in network. The experiment indicates better performance of RED on the basis of reducing drop out data packets. The topology is created using TCL to simulate multicast network and graphs are generated in Trace graph, to contrast the difference.

A.L. Sangal: Distributed Denial of Service (DDoS) attack is one of the biggest threats now days. This paper aims at providing the simulation results of buffer size and attack intensities effect on various queuing algorithms such as Drop Tail, Fair Queuing (FQ), Deficit Round Robin (DRR) and Random Early Detection (RED) using ns-2 as a simulation environment. The results in this paper indicate that RED is the best algorithms in terms of providing maximum bandwidth to legitimate users against various attack intensities. It is also cleared from simulation results that there is no effect of variation in buffer size on queuing algorithms such as Fair Queuing, and Deficit Round Robin while Drop Tail and Random Early Detection algorithms are giving the best performance on buffer size 60 against various attack intensities. This paper also covers the basic overview of Denial of Service Attack (DoS), Distributed Denial of Service attack (DDoS), attacking methods, DDoS defense approaches and Queuing Algorithms.

Dr. G.Padamavathi: Internet faces the problem of congestion due to its increased use. AQM algorithm is a solution to the problem of congestion control in the Internet. There are various existing algorithms that have evolved over the past few years to solve the problem of congestion in IP networks. Congested link causes many problems such as large delay, underutilization of the link and packet drops in burst. There are various existing algorithms that have evolved over the past few years to solve the problem of congestion in IP networks. In this paper, study of these existing algorithms is done. This paper discusses algorithms based on various congestion-metrics and classifies them based on certain factors. This helps in identifying the algorithms that regulate the congestion more effectively.

### C. Hybrid Mechanism

Hybrid Mechanism is a simple procedure as compared to Variable Bit Rate and over Constant Bit rate which is very simple and not very effective. Here I used to compare both the method and generate the new one which is superior over the both and help to provide congestion control within the network. I made two simulation methods to test the performance of CBR and VBR in wired network separately. But then I found the average packet losses are almost same in both the cases. Therefore while in communication if packets lost are there it will affect the Quality of services. Therefore to minimize it HYBRID mechanism is used.

### D. Coding of Average Algorithm Used

```
# Create scheduler
#Create an event scheduler wit multicast turned on
set ns [new Simulator -multicast on]
#$ns multicast
#Turn on Tracing
set tf [open output.tr w]
$ns trace-all $tf
# Turn on nam Tracing
set fd [open mcast.nam w]
$ns namtrace-all $fd
# Create nodes
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]
set n5 [$ns node]
set n6 [$ns node]
set n7 [$ns node]

# Create links
$ns duplex-link $n0 $n2 1.5Mb 10ms DropTail
$ns duplex-link $n1 $n2 1.5Mb 10ms DropTail
$ns duplex-link $n2 $n3 1.5Mb 10ms DropTail
$ns duplex-link $n3 $n4 1.5Mb 10ms DropTail
$ns duplex-link $n3 $n7 1.5Mb 10ms DropTail
$ns duplex-link $n4 $n5 1.5Mb 10ms DropTail
$ns duplex-link $n4 $n6 1.5Mb 10ms DropTail

# Routing protocol: say distance vector
#Protocols: CtrMcast, DM, ST, BST
set mproto DM
set mrthandle [$ns mrtproto $mproto {}]
```

```
# Allocate group addresses
set group1 [Node allocaddr]
set group2 [Node allocaddr]
# UDP Transport agent for the traffic source
set udp0 [new Agent/UDP]
$ns attach-agent $n0 $udp0
$udp0 set dst_addr_ $group1
$udp0 set dst_port_ 0
set cbr1 [new Application/Traffic/CBR]
$cbr1 attach-agent $udp0
# Transport agent for the traffic source
set udp1 [new Agent/UDP]
$ns attach-agent $n1 $udp1
$udp1 set dst_addr_ $group2
$udp1 set dst_port_ 0
set cbr2 [new Application/Traffic/CBR]
$cbr2 attach-agent $udp1
# Create receiver
set rcvr1 [new Agent/Null]
$ns attach-agent $n5 $rcvr1
$ns at 1.0 "$n5 join-group $rcvr1 $group1"
set rcvr2 [new Agent/Null]
$ns attach-agent $n6 $rcvr2
$ns at 1.5 "$n6 join-group $rcvr2 $group1"
set rcvr3 [new Agent/Null]
$ns attach-agent $n7 $rcvr3
$ns at 2.0 "$n7 join-group $rcvr3 $group1"
set rcvr4 [new Agent/Null]
$ns attach-agent $n5 $rcvr4
$ns at 2.5 "$n5 join-group $rcvr4 $group2"
set rcvr5 [new Agent/Null]
$ns attach-agent $n6 $rcvr5
$ns at 3.0 "$n6 join-group $rcvr5 $group2"
set rcvr6 [new Agent/Null]
$ns attach-agent $n7 $rcvr6

$ns at 3.5 "$n7 join-group $rcvr6 $group2"
$ns at 4.0 "$n5 leave-group $rcvr1 $group1"
$ns at 4.5 "$n6 leave-group $rcvr2 $group1"
$ns at 5.0 "$n7 leave-group $rcvr3 $group1"
$ns at 5.5 "$n5 leave-group $rcvr4 $group2"
$ns at 6.0 "$n6 leave-group $rcvr5 $group2"
$ns at 6.5 "$n7 leave-group $rcvr6 $group2"

# Schedule events
$ns at 0.5 "$cbr1 start"
$ns at 9.5 "$cbr1 stop"
$ns at 0.5 "$cbr2 start"
$ns at 9.5 "$cbr2 stop"
#post-processing
$ns at 10.0 "finish"
```

```

proc finish {} {
global ns tf
$ns flush-trace
close $tf
exec nam mcast.nam &
exit 0
}
# For nam

```

```

#Colors for packets from two mcast groups
$ns color 10 red
$ns color 11 green
$ns color 30 purple
$ns color 31 green

```

```

# Manual layout: order of the link is significant!
#$ns duplex-link-op $n0 $n1 orient right
#$ns duplex-link-op $n0 $n2 orient right-up
#$ns duplex-link-op $n0 $n3 orient right-down
# Show queue on simplex link n0->n1
#$ns duplex-link-op $n2 $n3 queuePos 0.5

```

```

# Group 0 source
$udp0 set fid_ 10
$n0 color red
$n0 label "Source 1"
# Group 1 source
$udp1 set fid_ 11
$n1 color green
$n1 label "Source 2"
$n5 label "Receiver 1"
$n5 color blue
$n6 label "Receiver 2"
$n6 color blue
$n7 label "Receiver 3"
$n7 color blue
#$n2 add-mark m0 red
#$n2 delete-mark m0"
# Animation rate
$ns set-animation-rate 3.0ms
$ns run

```

### III. RESULTS AND DISCUSSION

#### X-graph

X-graph is tool used in NS-2 simulator to show the result of the calculation done. This tool comes together with all-in-one program of network simulator. It automatically get installed with the package installer and

to run the outcome it does not require any special instruction.

Sample screen for multicasting structure.

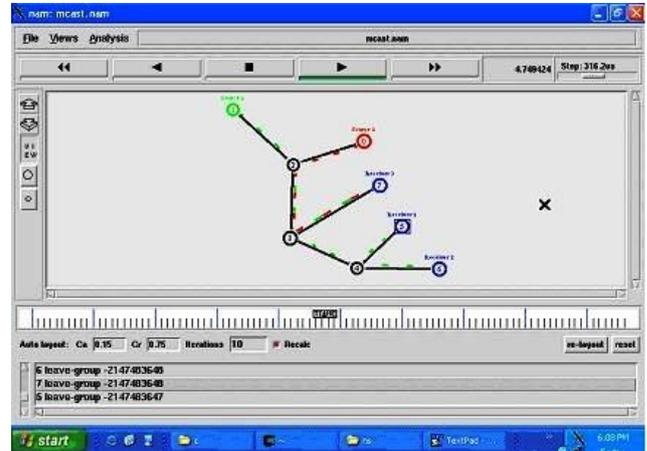


Figure 1: Average Traffic

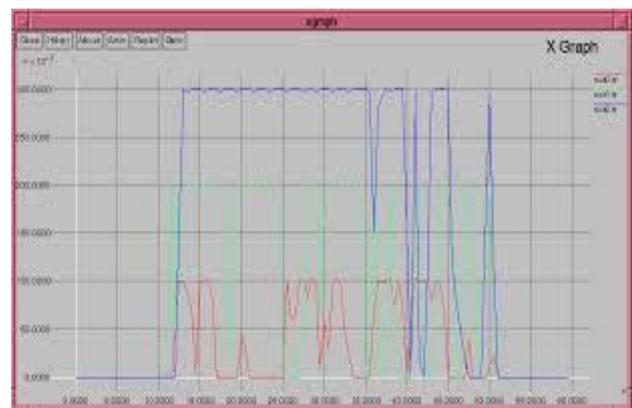


Figure 2 : X-Graph

#### Advantage and Disadvantage of NS2

##### Advantages

- Cheap
- Does not require costly equipment
- Complex scenarios can be easily tested.
- Results can be quickly obtained
- more ideas can be tested in a smaller time frame.
- Supported protocols
- Supported platforms
- Modularity
- Popular

## Disadvantages

- Real system too complex to model. i.e. complicated structure.
- Bugs are unreliable
- Traffic Scenario for wired and wireless network

## Traffic Scenario for wired network using TCL scripts

In this network we create a wired network traffic scenario by using tcl scripts which consist

- Eight nodes
- Delay of 10 ms
- Bandwidth of 7 Mb
- Data transfer between node 1 to 2 using UDP agent and node 1 to 0 using TCP agent
- TCP,UDP Agents
- CBR, FTP Application

## Static Wired Network

In this routing if the link is break between nodes then rerouting is not possible. In this routing scheme there is no routing protocols used. When we generated a static wired network ,on simulation traffic flows from one node to desired destination

## Dynamic Wired Network

In this routing if the link breaks between nodes then routing is possible from other routes. Distance Vector Routing Protocol is used. When we generated a Dynamic wired network, on simulation traffic flows from one node to desired destination.

## TCL Language

Tool Command Language or Tcl; is a scripting language created by John Ousterhout. It is commonly used for rapid prototyping, scripted applications, GUIs and testing. Tcl is used on embedded systems platforms, both in its full form and in several other small-footprint versions [7]. Advantage of using Tcl language in NS2 is, it does not need special editors, nor does it have any complex structure that needs to be followed during coding. The sequence of statements is also not necessary to be maintained, as it automatically fetches the required

instructions for topology generation and other task as and when required.

Agents represent endpoints where packets in the network layer are constructed and consumed. These agents are the third component of the node. In NS2, the agent's role is to provide the destination address; its function is to generate the packets and the interface to the application class (Fig. 3). In NS2 there are several types of agents, each has a specified role [3]. The four types of agents and their roles are defined as follows:

- TCP agent is for emitting TCP traffic.
- UDP agent is for emitting UDP traffic
- TCP Sink agent is for the receipt of TCP traffic.
- NULL Agent is for receiving UDP packets.

## IV. CONCLUSION

In this paper we evaluate Constant Bit rate (CBR), Exponential Bit Rate Or Variable Bit Rate(VBR) and found that in CBR mechanism the loss is minimum as compare to VBR .But we cannot negotiate on the Quality of service which is provided by the CBR traffic which is low as compare to VBR. Therefore an average of both the technique that is HYBRID Bit Rate is created which Ultimately it can be used for the communications on a network Link and to avoid network congestion and poor performance of the network. Our ultimate goal in this work is to integrate real live traffic parameters from a real production network into a network simulation model. The network simulation model is itself a representation of the production network. If the network model representation of the real network is accurately modeled, then together with the real live traffic parameters, the simulated network model will produce an output similar to the one generated by the real production network.

## V. REFERENCES

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