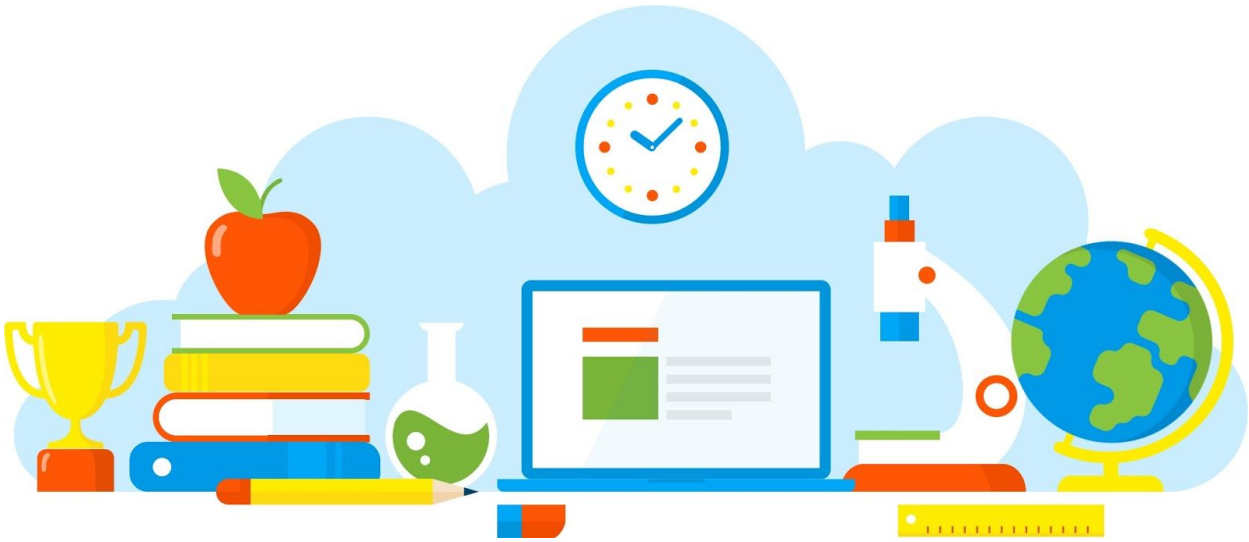

Assignment Report

This report contains work from Assignment 4 of course CSN 361.

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Class - CSE B.Tech. 3rd Year

Submission Files - Repository Link

QUESTION 1: Write a Network Simulator (NS2) code to simulate a three-node network with duplex links among them as shown in the figure. Show the topology using NAM. Study the variation in the number of packets dropped with the variation of the queue size in the nodes and with the variation of the bandwidth of the links.

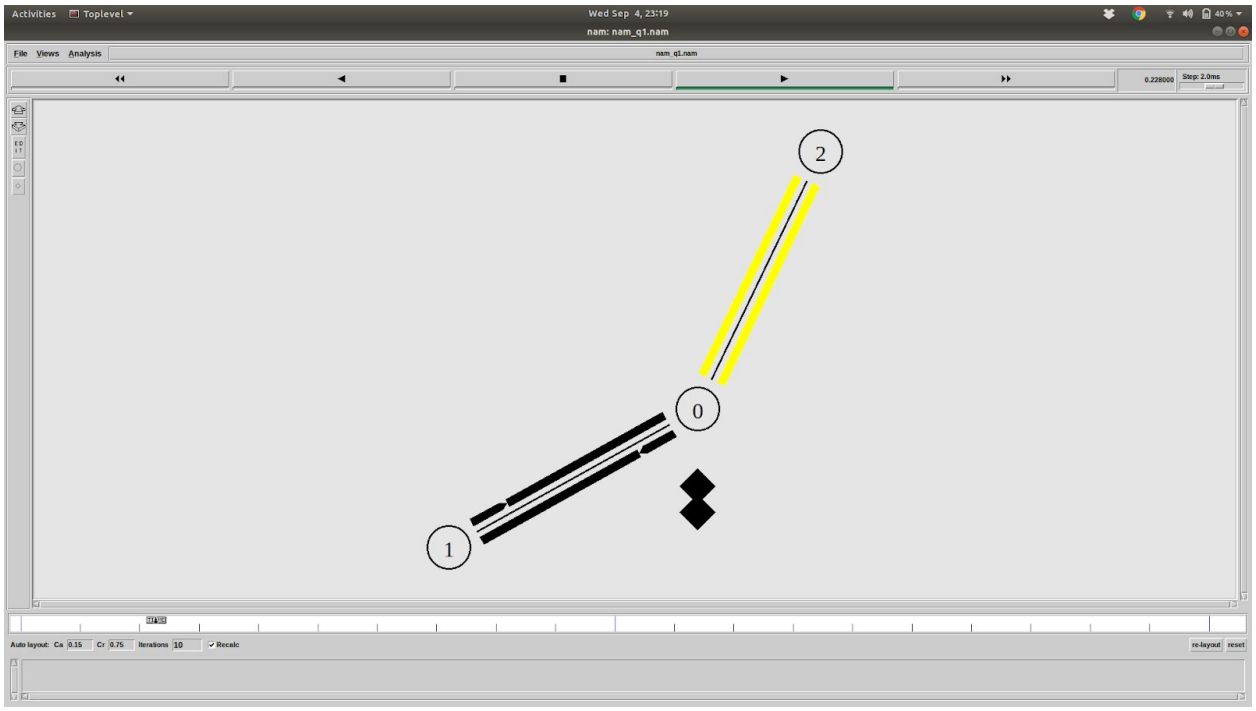
SOLUTION CODE:

```
set ns [new Simulator]

$ns rtproto DV

set nf [open nam_q1.nam w]
$ns namtrace-all $nf

proc finish {} {
    global ns nf
    $ns flush-trace
    close $nf
    exec nam nam_q1.nam
    exit 0
}

for {set i 0} {$i < 3} {incr i} {
     set node($i) [$ns node]
}

set queuesize1 5
set queuesize2 10

set colors(0) Red
set colors(1) Blue
set colors(2) Orange
set colors(3) Black
set colors(4) Yellow
set colors(5) Green

$ns duplex-link $node(0) $node(1) 1Mb 10ms DropTail
$ns queue-limit $node(0) $node(1) $queuesize1
$ns duplex-link $node(0) $node(2) 512kb 10ms DropTail
```

```
$ns queue-limit $node(0) $node(2) $queuesize2

for {set i 1} {$i < 3} {incr i} {
    set node1 0
    set node2 $i
     set tcp_con [new Agent/TCP]
     $ns attach-agent $node($node1) $tcp_con
     $tcp_con set class_ $i

     set sink_node [new Agent/TCPSink]
     $ns attach-agent $node($node2) $sink_node
     $ns connect $tcp_con $sink_node

     $ns color $i $colors([expr ($i) % 6])
     $tcp_con set fid_ $i

     set ftp_con [new Application/FTP]
     $ftp_con attach-agent $tcp_con
     $ns at 0.1 "$ftp_con start"
     $ns at 1.5 "$ftp_con stop"
}
for {set i 1} {$i < 3} {incr i} {
    set node1 $i
    set node2 0
     set tcp_con [new Agent/TCP]
     $ns attach-agent $node($node1) $tcp_con
     $tcp_con set class_ $i

     set sink_node [new Agent/TCPSink]
     $ns attach-agent $node($node2) $sink_node
     $ns connect $tcp_con $sink_node

     $ns color $i $colors([expr ($i) + 2 % 6])
     $tcp_con set fid_ $i

     set ftp_con [new Application/FTP]
    $ftp_con set packetSize_ 20
    $ftp_con set rate_ 50Kb
     $ftp_con attach-agent $tcp_con
```

```
      $ns at 0.1 "$ftp_con start"
      $ns at 1.5 "$ftp_con stop"
}

$ns at 2.0 "finish"
$ns run
```

SCREENSHOTS: (while running simulation)



OBSERVATION: First FTP connections send data to and from nodes 0-1 and 0-2 are made. When the bandwidth and the queue sizes are changed, then this change in packet drop is observed: when queue size is reduced, more packets are dropped, while, if bandwidth is increased, packet dropped are less

QUESTION 2: Write a Network Simulator (NS2) code to simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion. Study the variation in the number of packets dropped with the variation of the queue size in the nodes and with the variation of the bandwidth of the links.

Nodes are connected as follows: 0-2, 1-2, 2-3, 3-4 and 3-5

Packet transmissions: 0-4 and 5-1

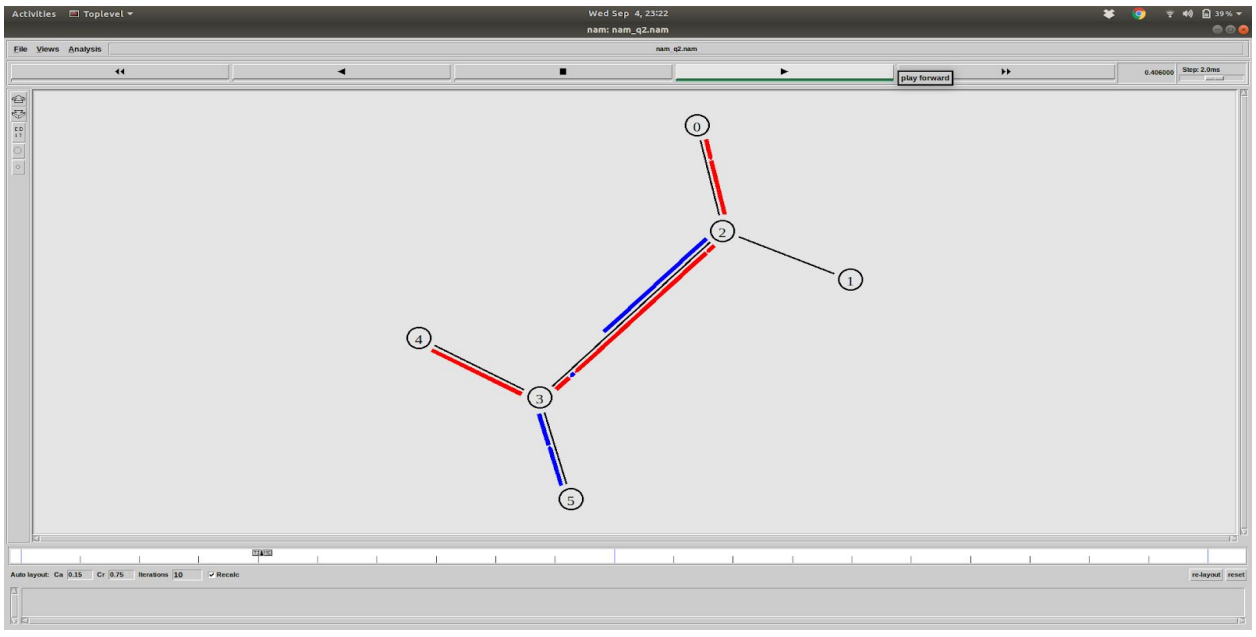
SOLUTION CODE:

```
set ns [new Simulator]

$ns rtproto DV

set nf [open nam_q2.nam w]
$ns namtrace-all $nf

proc finish {} {
    global ns nf
    $ns flush-trace
    close $nf
    exec nam nam_q2.nam
    exit 0
}

for {set i 0} {$i < 6} {incr i} {
     set node($i) [$ns node]
}

set colors(0) Red
set colors(1) Blue
set colors(2) Orange
set colors(3) Pink
set colors(4) Yellow
set colors(5) Green

set queuesize1 5
set queuesize2 10
```

```
set queuesize3 5
set queuesize4 10
set queuesize5 5

$ns duplex-link $node(0) $node(2) 1Mb 10ms DropTail
$ns queue-limit $node(0) $node(2) $queuesize1
$ns duplex-link $node(1) $node(2) 512kb 10ms DropTail
$ns queue-limit $node(1) $node(2) $queuesize2
$ns duplex-link $node(2) $node(3) 1Mb 10ms DropTail
$ns queue-limit $node(2) $node(3) $queuesize3
$ns duplex-link $node(3) $node(4) 512kb 10ms DropTail
$ns queue-limit $node(3) $node(4) $queuesize4
$ns duplex-link $node(3) $node(5) 512kb 10ms DropTail
$ns queue-limit $node(3) $node(5) $queuesize5

#send from 0 to 4
set i 0
set node1 0
set node2 4
set tcp_con [new Agent/TCP]

$ns attach-agent $node($node1) $tcp_con
$tcp_con set class_ $i

set sink_node [new Agent/TCPSink]
$ns attach-agent $node($node2) $sink_node
$ns connect $tcp_con $sink_node

$ns color $i $colors(0)
$tcp_con set fid_ $i

set ftp_con [new Application/FTP]
$ftp_con attach-agent $tcp_con
$ns at 0.1 "$ftp_con start"
$ns at 1.5 "$ftp_con stop"

#send from 5 to 1
set i 1
set node1 5
```

```
set node2 1
set tcp_con [new Agent/TCP]
$ns attach-agent $node($node1) $tcp_con
$tcp_con set class_ $i

set sink_node [new Agent/TCPSink]
$ns attach-agent $node($node2) $sink_node
$ns connect $tcp_con $sink_node

$ns color $i $colors(1)
$tcp_con set fid_ $i

set ftp_con [new Application/FTP]
$ftp_con set packetSize_ 20
$ftp_con set rate_ 50Kb
$ftp_con attach-agent $tcp_con
$ns at 0.1 "$ftp_con start"
$ns at 1.5 "$ftp_con stop"

$ns at 2.0 "finish"
$ns run
```

SCREENSHOTS: (while running simulation)



OBSERVATION: Firstly, FTP connections that send data to and from nodes 0-4 and 5-1 are made. When the bandwidth and the queue sizes are changed, then a change in packet drop is observed. In general, when queue size is reduced, more packets are dropped, while, if bandwidth is increased, packet dropped are less.