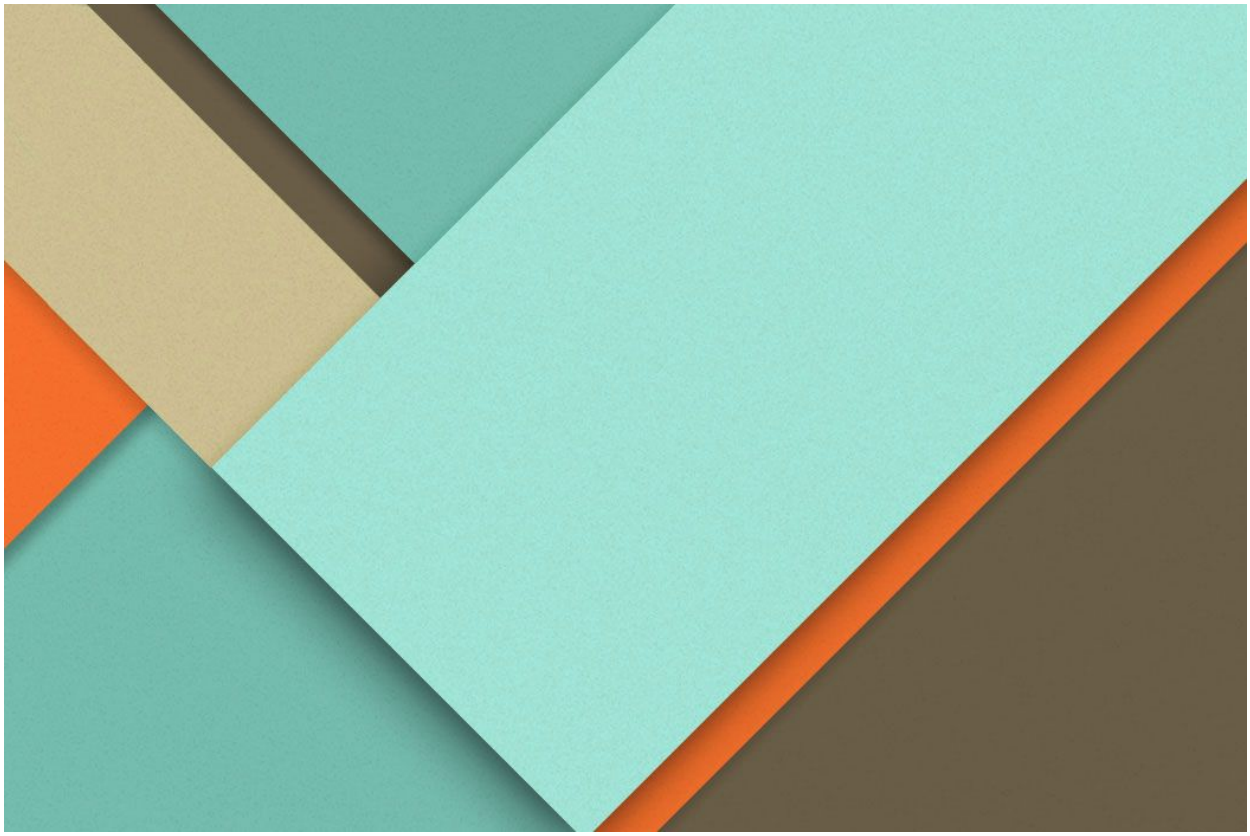

Lab Assignment 4

(Networking Lab)

04.09.2019

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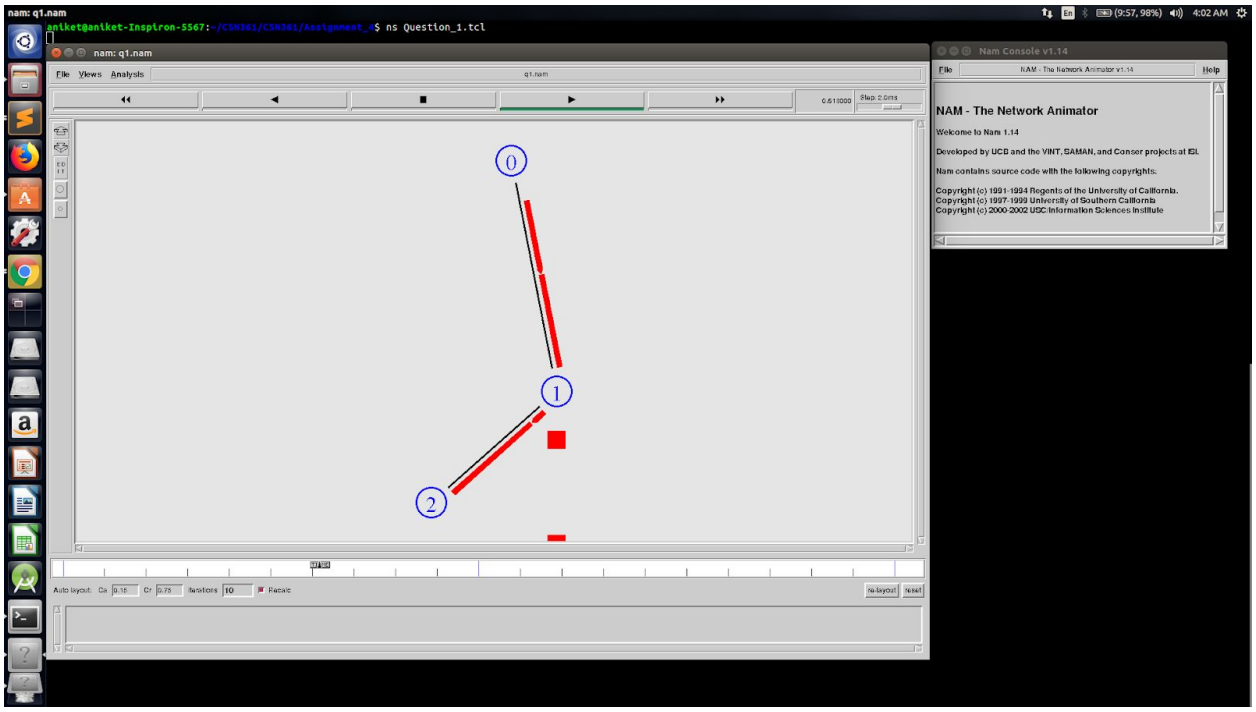
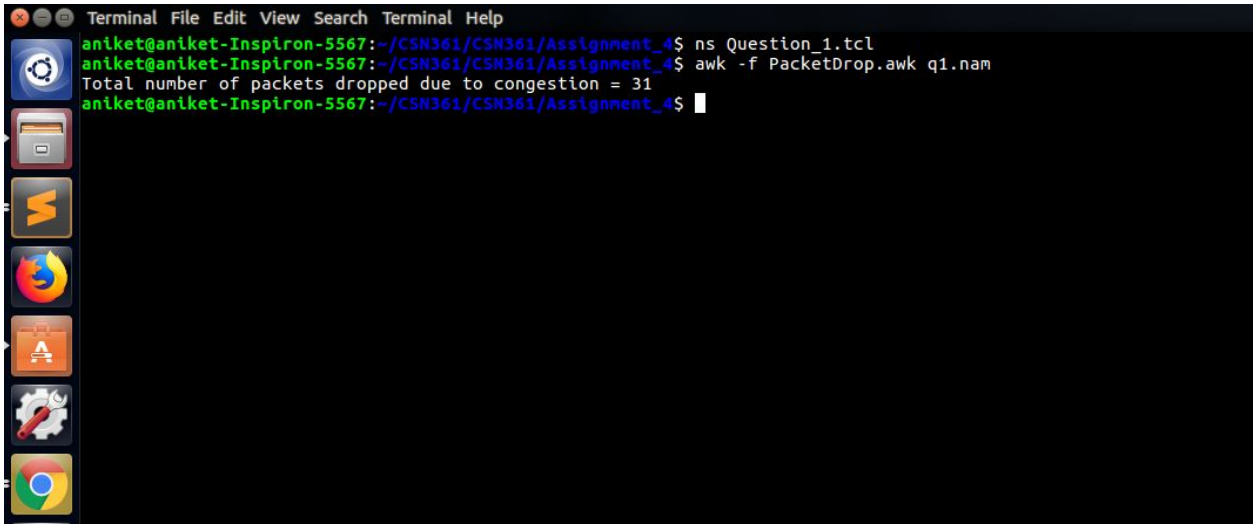
Problem Statements :

Q1 - Write a Network Simulator (NS2) code to simulate a three node network with duplex links among them as shown in 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.

Screenshots :





Algorithm :

```
#Create a simulator object
set ns [new Simulator]

#Routing Protocol used is Distance Vector
$ns rtproto DV

set nf [open q1.nam w]
set f [open q1.tr w]

$ns namtrace-all $nf
$ns trace-all $f

proc end {} {
    global ns nf f
    $ns flush-trace
    close $nf
```

```
    close $f
    exec nam q1.nam
    exit 0
}

# Create the network nodes
set node1 [$ns node]
set node2 [$ns node]
set node3 [$ns node]

$node1 color blue
$node2 color blue
$node3 color blue

#Create links between the nodes
$ns duplex-link $node1 $node2 1Mb 10ms DropTail
$ns duplex-link $node2 $node3 700kb 10ms DropTail

$ns queue-limit $node1 $node2 5
$ns queue-limit $node2 $node3 5

#Building link node1 and node3
set udp_con_0 [new Agent/UDP]
$udp_con_0 set class_ 1
$ns attach-agent $node1 $udp_con_0

set sink_node_0 [new Agent/Null]
$ns attach-agent $node3 $sink_node_0
```

```
$ns connect $udp_con_0 $sink_node_0

$ns color 1 Red
$udp_con_0 set fid_ 1

set cbr_con_0 [new Application/Traffic/CBR]
$cbr_con_0 set packetSize_ 1500
$cbr_con_0 set interval_ 0.015
$cbr_con_0 attach-agent $udp_con_0

$ns at 0.2 "$cbr_con_0 start"
$ns at 1.8 "$cbr_con_0 stop"

$ns at 2.0 "end"

$ns run
```

Q2 - 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 number of packets dropped with the variation of the bandwidth of the links.

Nodes are connected as follows :

0 -- 2

1 -- 2

2 -- 3

3 -- 4

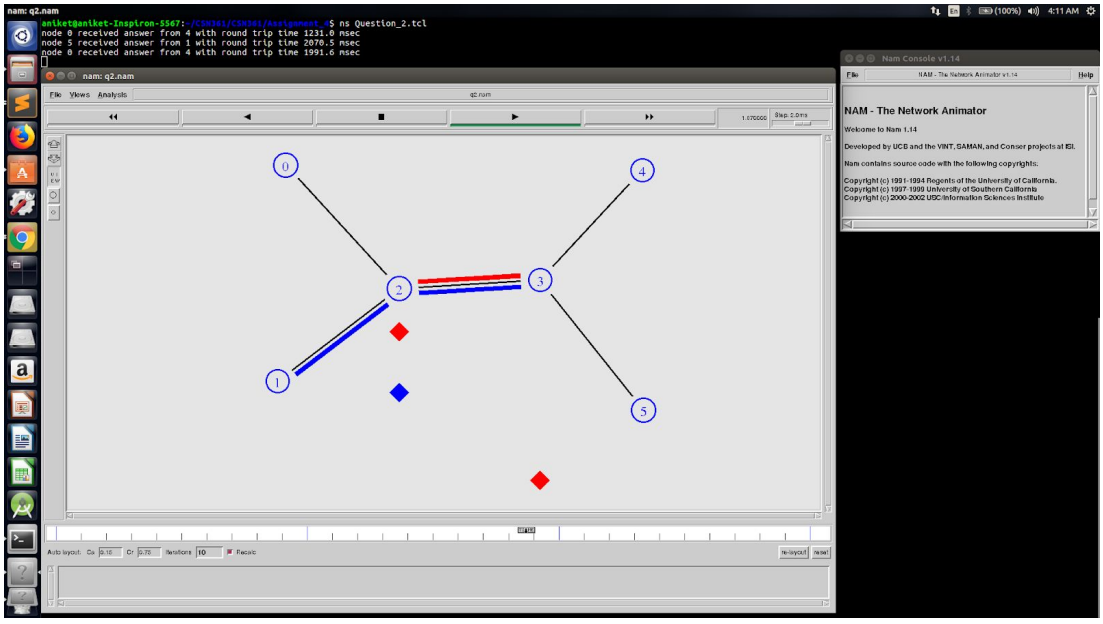
3 -- 5

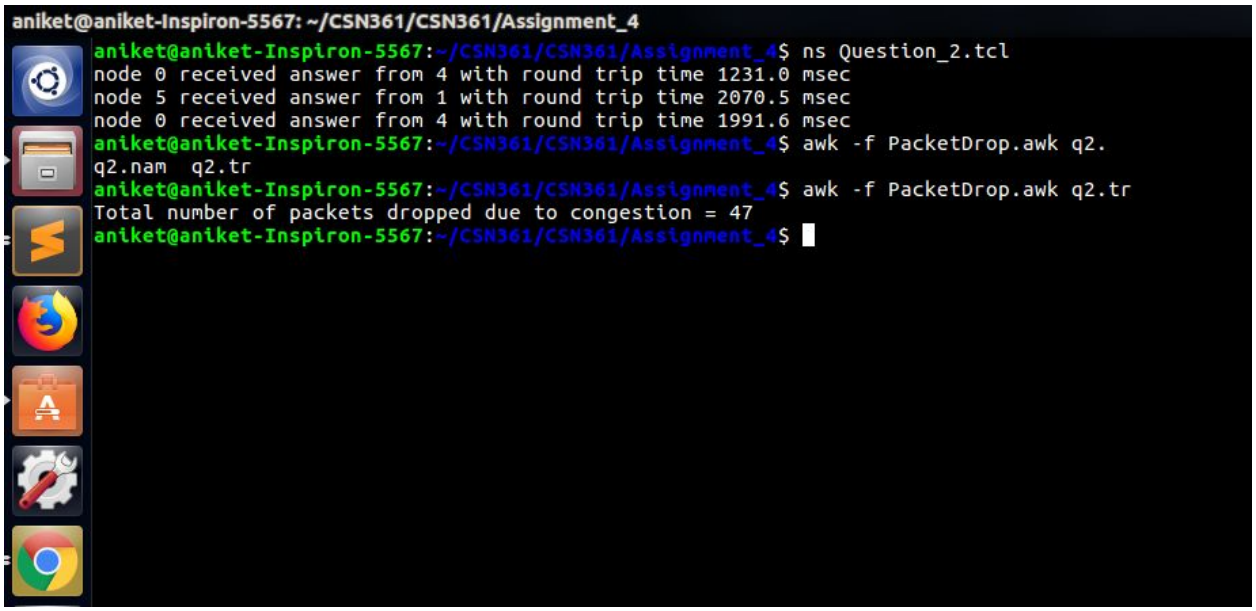
Packet transmissions :

0 ---- 4

5 ---- 1

Screenshots :





Algorithm :

```
set ns [new Simulator]

#Routing Protocol used is Distance Vector
$ns rtproto DV

set nf [open q2.nam w]
set f [open q2.tr w]

$ns namtrace-all $nf
$ns trace-all $f

proc end {} {
    global ns nf f
    $ns flush-trace
```

```
    close $nf
    close $f
    exec nam q2.nam
    exit 0
}

# Create the network nodes
set node0 [$ns node]
set node1 [$ns node]
set node2 [$ns node]
set node3 [$ns node]
set node4 [$ns node]
set node5 [$ns node]

$node0 color blue
$node1 color blue
$node2 color blue
$node3 color blue
$node4 color blue
$node5 color blue


#Create links between the nodes
$ns duplex-link $node0 $node2 10Mb 10ms DropTail
$ns duplex-link $node1 $node2 1000kb 10ms DropTail
$ns duplex-link $node2 $node3 1Mb 10ms DropTail
$ns duplex-link $node3 $node4 1000Mb 10ms DropTail
$ns duplex-link $node3 $node5 500Mb 10ms DropTail
```

```
$ns queue-limit $node0 $node2 5
$ns queue-limit $node2 $node1 5
$ns queue-limit $node2 $node3 5
$ns queue-limit $node3 $node2 5
$ns queue-limit $node3 $node4 5
$ns queue-limit $node5 $node3 5

set p1 [new Agent/Ping]
$ns attach-agent $node0 $p1
$p1 set packetSize_ 50000
$p1 set interval_ 0.0001

$ns color 1 Red
$p1 set fid_ 1

set p2 [new Agent/Ping]
$ns attach-agent $node4 $p2

$p2 set fid_ 1

set p3 [new Agent/Ping]
$ns attach-agent $node5 $p3
$p3 set packetSize_ 30000
$p3 set interval_ 0.00001

$ns color 2 blue
$p3 set fid_ 2
```

```
set p4 [new Agent/Ping]
$ns attach-agent $node1 $p4
$p4 set fid_ 2

Agent/Ping instproc recv {from rtt} {
$self instvar node_
puts "node [$node_ id] received answer from $from with round trip time $rtt msec"
}

$ns connect $p1 $p2
$ns connect $p3 $p4

for {set i 1} {$i < 30} {incr i} {
        $ns at [expr ($i) * 0.1] "$p1 send"
}

for {set i 1} {$i < 30} {incr i} {
        $ns at [expr ($i) * 0.1] "$p3 send"
}

$ns at 3.0 "end"
$ns run
```