



LAB ASSIGNMENT-4

CSN-361



Submitted by
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Problem Statement 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.

Algorithm

- Get ns object
- Open NAM trace file
- Open trace-all file
- Assign node properties and link properties to create the required topology
- Establish a UDP agent and CBT application
- Set the packet size and interval
- Set a null agent
- Run the simulation
- Find the count of drop packets represented by d in the trace file

DataStructure

Simulator, file, Nodes, Nodes array, Agent, Application

Code

```
set ns [new Simulator]

set nf [open Q1.nam w]
$ns namtrace-all $nf
set tf [open Q1.tr w]
$ns trace-all $tf

proc finish { } {
    global ns nf tf
    $ns flush-trace
    close $nf
    close $tf

    exec nam Q1.nam &
    exit 0
}

set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]

$ns duplex-link $n0 $n1 500000b 10ms DropTail
$ns duplex-link $n1 $n2 40000b 10ms DropTail
$ns queue-limit $n0 $n1 3
$ns queue-limit $n2 $n1 6

set udp0 [new Agent/UDP]
$ns attach-agent $n0 $udp0

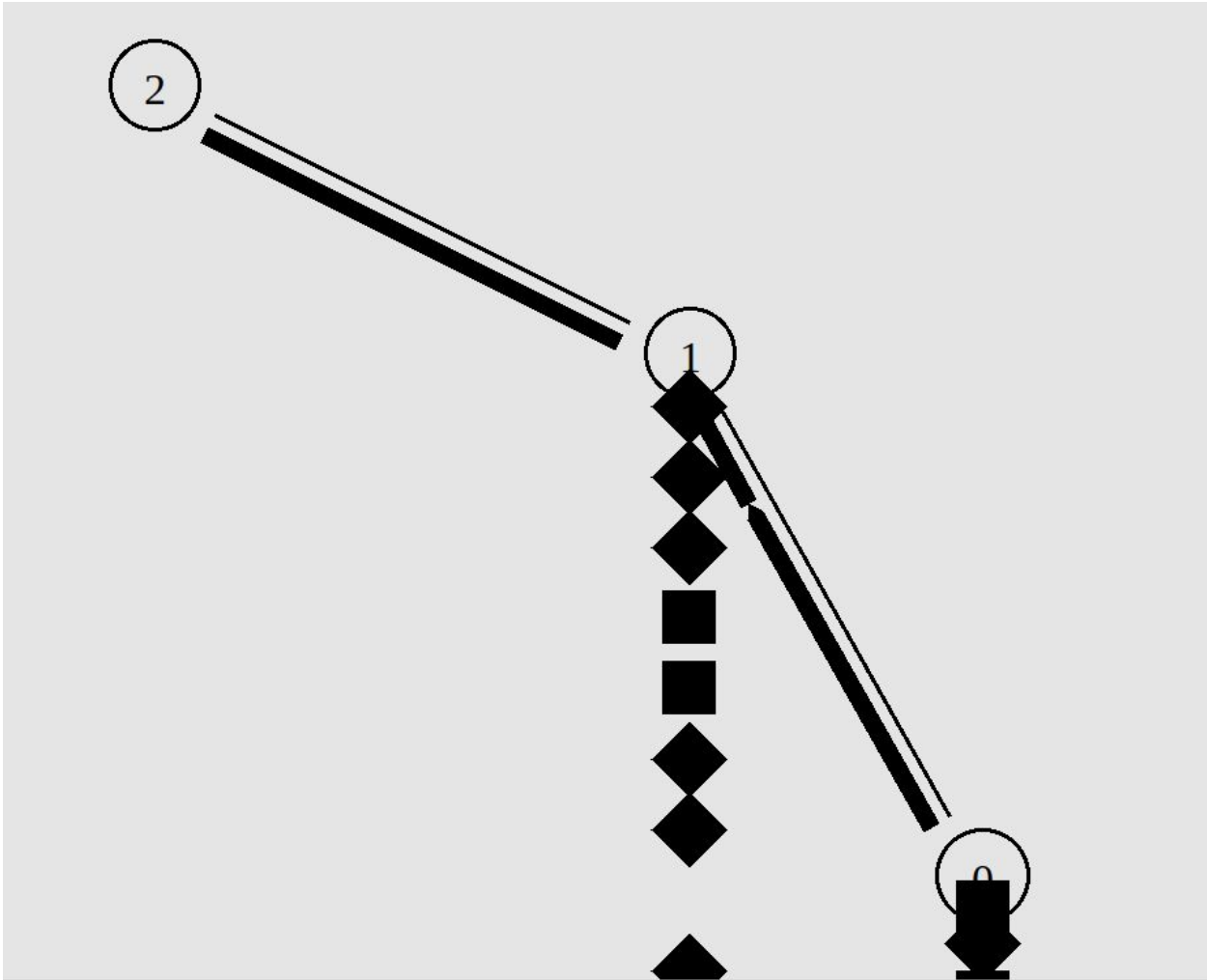
set cbr0 [new Application/Traffic/CBR]
$cbr0 set packetSize_ 500
$cbr0 set interval_ 0.005
$cbr0 attach-agent $udp0

set null0 [new Agent/Null]
$ns attach-agent $n2 $null0
$ns connect $udp0 $null0

$ns at 0.1 "$cbr0 start"
$ns at 1.0 "finish"

$ns run
```

Running Code



Bandwidth: 0 - 1: 50000b
Bandwidth: 1 - 2: 400000b
Latency: 10ms

Queue length Node 0 - 1	10	5	2	6	3
Queue length Node 1 - 2	10	5	2	3	6
Drops (in	112	117	120	116	119

total)					
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Bandwidth: 0 - 1: 400000b

Bandwidth: 1 - 2: 50000b

Latency: 10ms

Queue length Node 0 - 1	10	5	2	6	3
Queue length Node 1 - 2	10	5	2	3	6
Drops (in total)	162	167	170	166	169

```

ritik@rk-desktop /media/ritik/Ritik/assignments/CSN-361/L4 master ns Q1.tcl
ritik@rk-desktop /media/ritik/Ritik/assignments/CSN-361/L4 master grep -o 'd' Q1.tr | wc -l
166

```

Problem Statement 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

Algorithm

- Get ns object
- Open namtrace file
- Open trace-all file

- Assign node properties and link properties to create the required topology
- Establish Ping agent
- Set the Queue length for each link
- Connect respective targets
- Run the simulation
- Find the count of drop packets represented by d in the trace file

DataSet

Simulator, file, Nodes, Nodes array, Agent, Application

Code

```
set ns [new Simulator]

set namFile [open Q1.nam w]
$ns namtrace-all $namFile

set traceFile [open Q1.tr w]
$ns trace-all $traceFile

proc finish {} {
    global ns traceFile namFile
    $ns flush-trace
    close $traceFile
    close $namFile

    exec nam Q1.nam &
    exec gawk -f Q2.awk Q1.tr &
    exit 0
}

#Create the network
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]
set n5 [$ns node]

#Creating Duplex-Link
$ns duplex-link $n0 $n2 .1Mb 10ms DropTail
$ns duplex-link $n2 $n1 .1Mb 10ms DropTail
$ns duplex-link $n2 $n3 .1Mb 10ms DropTail
$ns duplex-link $n3 $n4 .1Mb 10ms DropTail
$ns duplex-link $n3 $n5 .1Mb 10ms DropTail

set pingAgent0 [new Agent/Ping]
set pingAgent1 [new Agent/Ping]
set pingAgent2 [new Agent/Ping]
set pingAgent3 [new Agent/Ping]
set pingAgent4 [new Agent/Ping]
set pingAgent5 [new Agent/Ping]

$ns attach-agent $n0 $pingAgent0
$ns attach-agent $n1 $pingAgent1
$ns attach-agent $n2 $pingAgent2
$ns attach-agent $n3 $pingAgent3
$ns attach-agent $n4 $pingAgent4
$ns attach-agent $n5 $pingAgent5

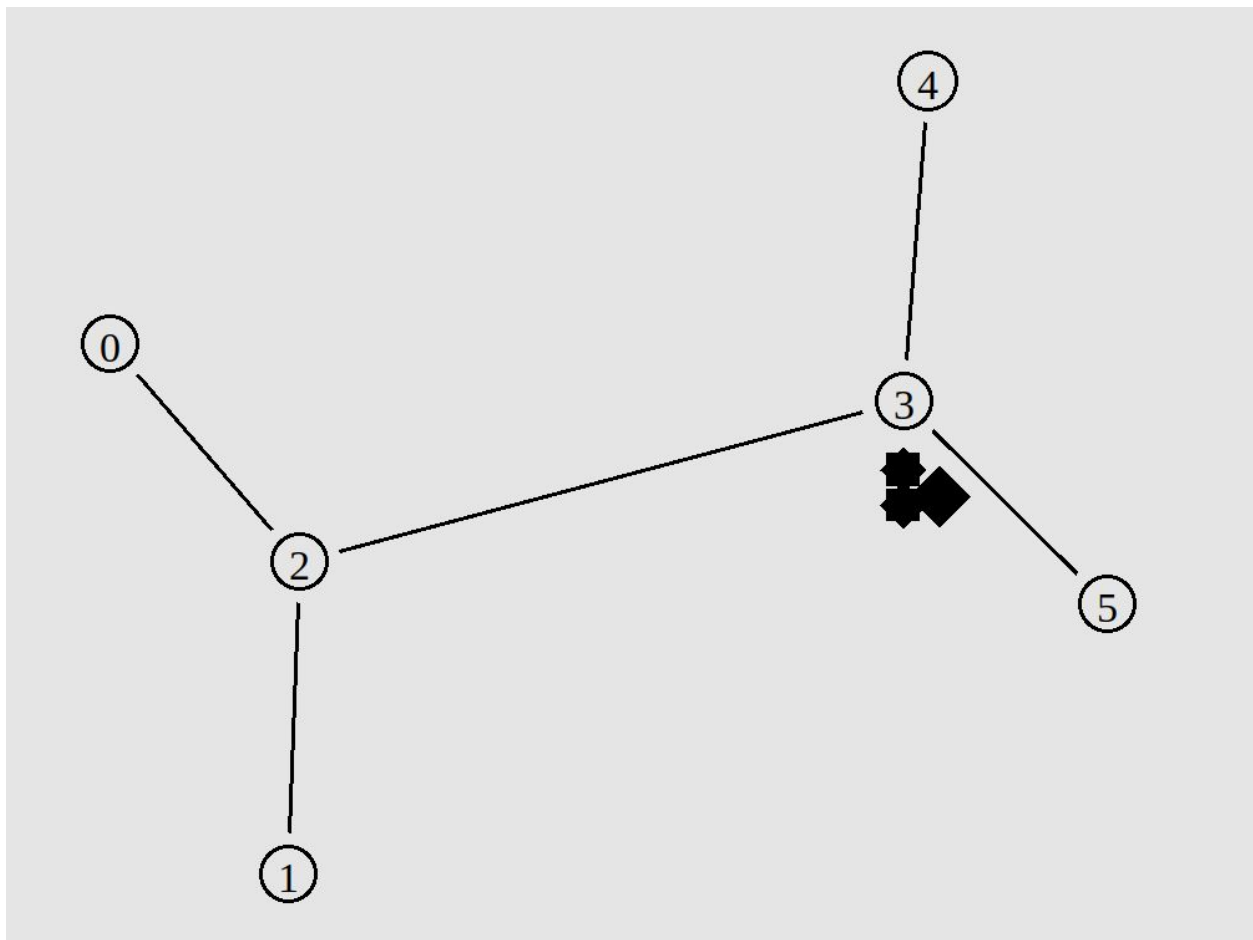
$ns queue-limit $n0 $n2 2
$ns queue-limit $n2 $n1 2
$ns queue-limit $n2 $n3 2
$ns queue-limit $n3 $n4 1
$ns queue-limit $n3 $n5 1

$ns connect $pingAgent0 $pingAgent4
$ns connect $pingAgent5 $pingAgent1

$ns at 0.05 "$pingAgent0 send"
$ns at 0 "$pingAgent5 send"
$ns at 2.0 "finish"

$ns run
```

Running Code



```
ritik@rk-desktop /media/ritik/Ritik/assignments/CSN-361/L4 master ns Q2.tcl
total number of ping packets dropped due to congestion = 2
```