Experiment-4

A network consists of n nodes(n=6).
The duplex links between the nodes is as follows:
no and n2 has 2 Mbps of bandwidth and 10 ms of delay,
n1 and n2 has 2 Mbps of bandwidth and 10 ms of delay,
The LAN is established between the nodes n3, n4 and n5 with 0.5 Mbps of bandwidth and 40 ms delay.
Each node uses drop Tail queue of which the maximum size is 10.
Write a TCL script to observe the packet flow for the given network and observe the output in NAM for this network scenario.

File name:4 .tcl

```
# Simulator
set ns [new Simulator]

set ntrace [open 4.tr w]
$ns trace-all $ntrace

set namfile [open 4.nam w]
$ns namtrace-all $namfile

# coloring
$ns color 1 "Blue"
$ns color 2 "Red"

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

# duplex links
$ns duplex-link $n(0) $n(2) 2Mb 10ms DropTail
```

```
$ns duplex-link $n(1) $n(2) 2Mb 10ms DropTail

# Simplex links
$ns simplex-link $n(2) $n(3) 0.3Mb 100ms DropTail
$ns simplex-link $n(3) $n(2) 0.3Mb 100ms DropTail

# LAN setup
set lan [$ns newLan "$n(3) $n(4) $n(5)" 0.5Mb 40ms LL Queue/DropTail MAC/802_3 Channel]

# Placements
$ns duplex-link-op $n(0) $n(2) orient right-down
$ns duplex-link-op $n(1) $n(2) orient right-up
$ns simplex-link-op $n(2) $n(3) orient right

# setting Queue size
$ns queue-limit $n(2) $n(3) 10
$ns simplex-link-op $n(2) $n(3) queuePos 0.5

# setup TCP-agent
set tcp [new Agent/TCP]
$tcp set fid_ 1
$tcp set packetSize_ 552
$ns attach-agent $n(0) $tcp

set sink [new Agent/TCPSink]
$ns attach-agent $n(4) $sink
$ns connect $tcp $sink

# ftp application for tcp
set ftp [new Application/FTP]
$ftp attach-agent $tcp

# set up UDP agent
```

```
set udp [new Agent/UDP]
$udp set fid_ 2
$ns attach-agent $n(1) $udp

set null [new Agent/Null]
$ns attach-agent $n(5) $null
$ns connect $udp $null

# cbr Application for udp
set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 1000
$cbr set interval_ 0.01
$cbr attach-agent $udp

proc finish {} {
   global ns ntrace namfile
   $ns flush-trace
   close $ntrace
   close $namfile
   exec nam 4.nam &

   # TCP throughput calculation
   set tcpsize [exec grep "^r " 4.tr | grep "tcp" | cut -d " " -f 6 | tail -n 1]
   set numTcp [exec grep "^r" 4.tr | grep -c "tcp"]
   set tcpTime 23.0
   puts "the throughput of ftp"
   puts "[expr ($numTcp * $tcpsize) / $tcpTime] bytes per second"

   # UDP throughput calculation
   set udpsize [exec grep "^r " 4.tr | grep "cbr" | cut -d " " -f 6 | tail -n 1]
   set numudp [exec grep "^r" 4.tr | grep -c "cbr"]
   set udpTime 24.0
   puts "the throughput of cbr"
   puts "[expr ($numudp * $udpsize) / $udpTime] bytes per second"
```

```
}

# events
$ns at 0.1 "$cbr start"
$ns at 1.0 "$ftp start"
$ns at 24.0 "$ftp stop"
$ns at 24.5 "$cbr stop"
$ns at 25.0 "finish"

$ns run
```

Execution Steps:

gedit 4.tcl
ns 4.tcl
gedit 4.tr