PROGRAM:

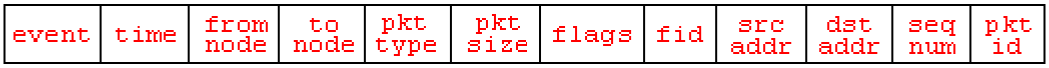
Second.tcl

```
set ns [new Simulator]
##### Setting output files
set file [open second.tr w]
$ns trace-all $file
set namfile [open second.nam w]
$ns namtrace-all $namfile
set tcpfile [open second.tcp w]
Agent/TCP set trace_all_oneline_ true
##### Setting Nodes
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
##### Setting Links
$ns duplex-link $n0 $n2 1.5Mb 20ms DropTail
$ns duplex-link $n1 $n2 1.5Mb 20ms DropTail
$ns duplex-link $n2 $n3 1.5Mb 20ms DropTail
$ns duplex-link-op $n0 $n2 orient right-down
$ns duplex-link-op $n1 $n2 orient right-up
$ns duplex-link-op $n2 $n3 orient right
$ns duplex-link-op $n2 $n3 queuePos 0.5
##### Setting Queue Length
$ns queue-limit $n2 $n3 20
##### Setting UDP Agent
set udp [new Agent/UDP]
$ns attach-agent $n0 $udp
set null [new Agent/Null]
$ns attach-agent $n3 $null
$ns connect $udp $null
$udp set fid_ 0
$ns color 0 blue
##### Setting CBR Application
set cbr [new Application/Traffic/CBR]
$cbr attach-agent $udp
##### Setting TCP Agent
set tcp [new Agent/TCP]
$ns attach-agent $n1 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n3 $sink
$ns connect $tcp $sink
$tcp set fid_ 2
```

```
$ns color 2 yellow
### Setting output file of TCP Agent#
$tcp attach-trace $tcpfile
$tcp trace cwnd_
##### Setting FTP Application
set ftp [new Application/FTP]
$ftp attach-agent $tcp
##### Setting time schedule of simulation
$ns at 1.0 "$cbr start"
$ns at 2.0 "$cbr stop"
$ns at 2.0 "$ftp start"
$ns at 3.0 "$ftp stop"
$ns at 3.0 "finish"
proc finish {} {
global ns file namfile tcpfile
$ns flush-trace
close $file
close $namfile
close $tcpfile
exit 0
}
##### Finish setting and start simulation
$ns run
```

SAMPLE INPUT/OUTPUT:

Second.tr



event	time	from node	to node	pkt type	pkt size	flags	fid	src addr	dst addr	seq num	pkt id

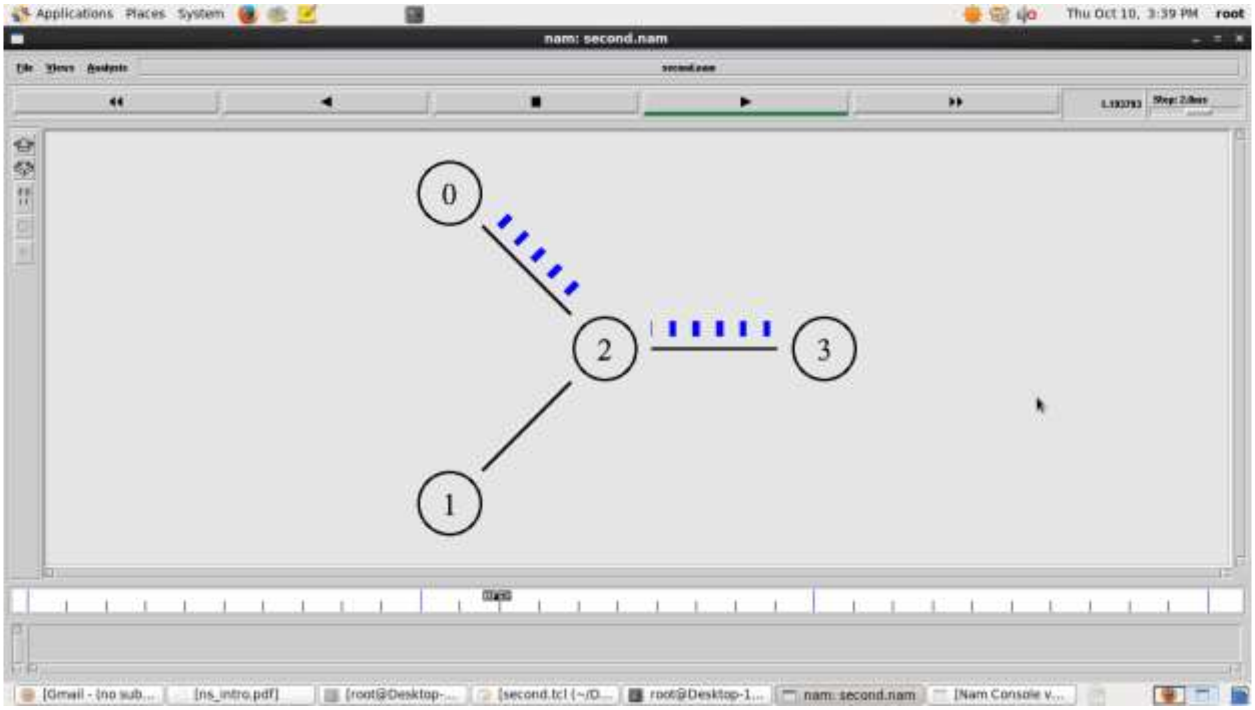
```
+     1.01875   0     2    cbr    210    -------    0    0.0    3.0    5    5
-     1.01875   0     2    cbr    210    -------    0    0.0    3.0    5    5
r     1.02112   0     2    cbr    210    -------    0    0.0    3.0    0    0
+     1.02112   2     3    cbr    210    -------    0    0.0    3.0    0    0
-     1.02112   2     3    cbr    210    -------    0    0.0    3.0    0    0
r     2.040427 2      3    tcp    40     -------    2    1.0    3.1    0    267
+     2.040427 3      2    ack    40     -------    2    3.1    1.0    0    268
-     2.040427 3      2    ack    40     -------    2    3.1    1.0    0    268
r     2.06064   3     2    ack    40     -------    2    3.1    1.0    0    268
```

Second.tcp

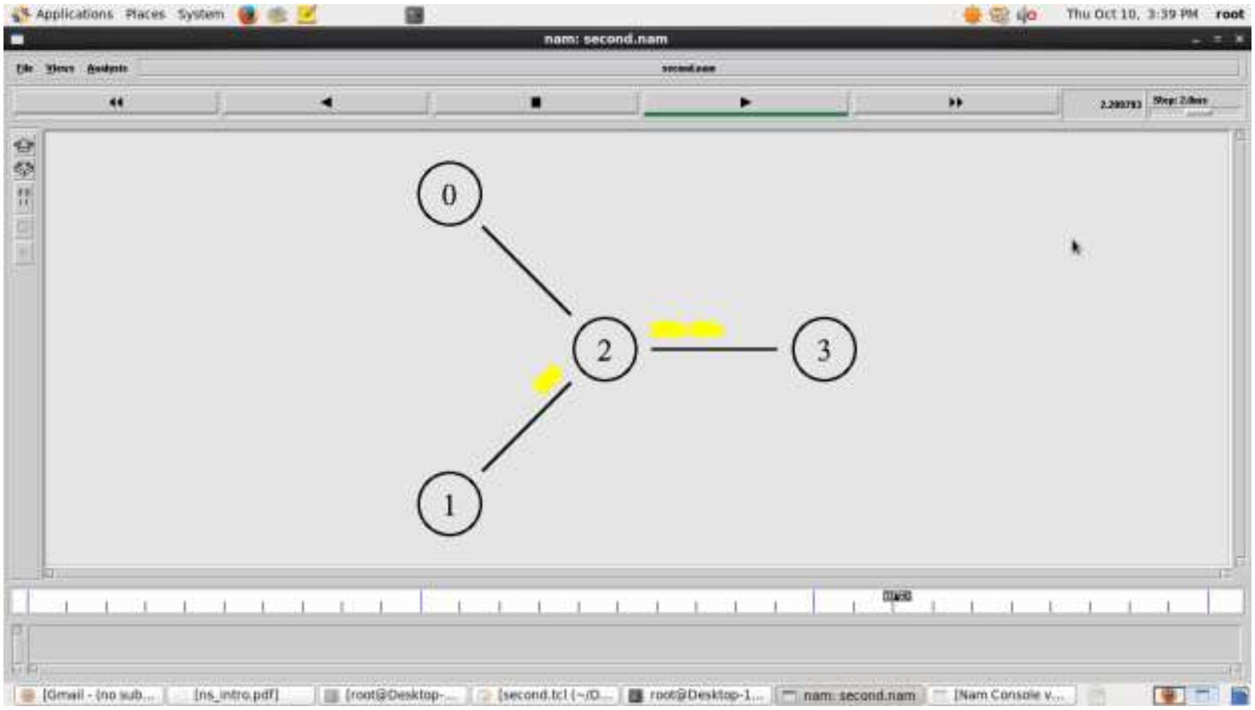
```
time: 0.00000  saddr: 1  sport: 0  daddr: 3  dport: 1  maxseq: -1   hiack: -1   seqno: 0    cwnd: 1.000
ssthresh: 20  dupacks: 0  rtt: 0.000  srtt: 0.000  rttvar: 12.000 bkoff: 1
time: 2.08085  saddr: 1  sport: 0  daddr: 3  dport: 1  maxseq: 0    hiack: 0    seqno: 1    cwnd: 2.000
ssthresh: 20  dupacks: 0  rtt: 0.080  srtt: 0.080  rttvar: 0.040  bkoff: 1
time: 2.17237  saddr: 1  sport: 0  daddr: 3  dport: 1  maxseq: 2    hiack: 1    seqno: 3    cwnd: 3.000
ssthresh: 20  dupacks: 0  rtt: 0.090  srtt: 0.080  rttvar: 0.033  bkoff: 1
time: 2.17792  saddr: 1  sport: 0  daddr: 3  dport: 1  maxseq: 4    hiack: 2    seqno: 5    cwnd: 4.000
ssthresh: 20  dupacks: 0  rtt: 0.090  srtt: 0.080  rttvar: 0.033  bkoff: 1
```

time: 2.26389 saddr: 1 sport: 0 daddr: 3 dport: 1 maxseq: 6 hiack: 3 seqno: 7 cwnd: 5.000 ssthresh: 20 dupacks: 0 rtt: 0.090 srtt: 0.080 rttvar: 0.028 bkoff: 1

UDP:



TCP:



PROGRAM:

Perfo.tcl:

```
#This example is to demonstrate the multicast routing protocol.
set ns [new Simulator -multicast on]
#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 with DropTail Queues
$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 $n6 1.5Mb 10ms DropTail
# Routing protocol: say distance vector
#Protocols: CtrMcast, DM, ST, BST
#Dense Mode protocol is supported in this example
set mproto DM
set mrthandle [$ns mrtproto $mproto {}]
# Set two groups with group addresses
set group1 [Node allocaddr]
set group2 [Node allocaddr]
# UDP Transport agent for the traffic source for group1
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
```

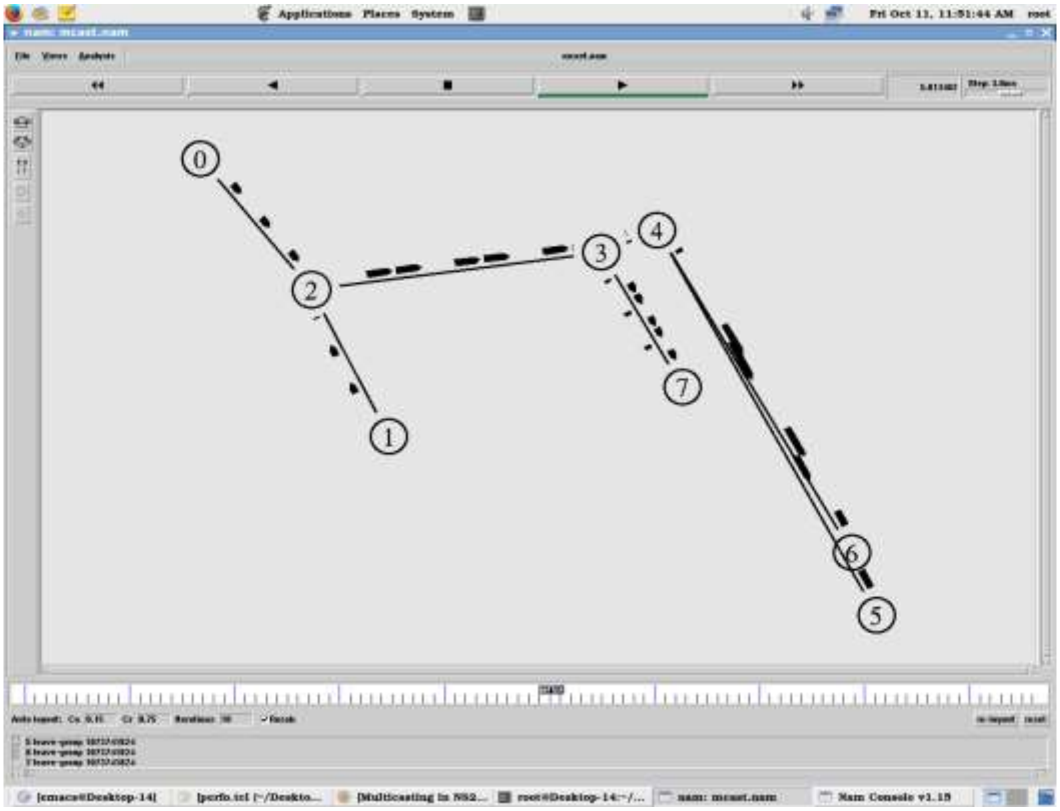
```
# Transport agent for the traffic source for group2
set udp1 [new Agent/UDP]
$ns attach-agent $n1 $udp1
$udp1 set dst_addr_ $group2
$udp1 set dst_port_ 0
set cbr2 [new Application/Traffic/CBR]
$cbr2 attach-agent $udp1
# Create receiver to accept the packets
set rcvr1 [new Agent/Null]
$ns attach-agent $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
#The nodes are leaving the group at specified times
$ns at 3.5 "$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"
$ns at 4.5 "$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
}
$ns set-animation-rate 3.0ms
```

$ns run

SAMPLE INPUT/OUTPUT:

Output.tr:

```
+ 9.24125 0 2 cbr 210 ------- 0 0.1 1073741824.0 2331 4262
- 9.24125 0 2 cbr 210 ------- 0 0.1 1073741824.0 2331 4262
r 9.243917 1 2 prune 80 ------- 30 1.0 2.0 -1 4253
r 9.24461 3 7 cbr 210 ------- 0 0.1 1073741824.0 2323 4239
```



```
5 leave-group 1073741824
6 leave-group 1073741824
7 leave-group 1073741824
```