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Experiment 4

Aim: Write TCL scripts for topology with Graphical simulation of traffic consideration (TCP, UDP) using NAM and plot the graph.

LO No: 3,5

LO statement : Demonstrate and measure different network scenarios and their performance behavior.
Analyze the traffic flow of different protocols.

Theory:

Creating topology
● Two nodes connected by a link
● Creating nodes
set n0 [$ns node]
set n1 [$ns node]
● Creating link between nodes
$ns <link_type> $n0 $n1 <bandwidth> <delay><queue-type>
$ns duplex-link$n0 $n1 1Mb 10ms DropTail

Traffic on top of TCP
● FTP
set ftp [new Application/FTP]
$ftp attach-agent$tcp0
● Telnet
set telnet [new Application/Telnet]
$telnet attach-agent$tcp0
PROCEDURE
STEP 1: Start
STEP 2: Create the simulator object ns for designing the given simulation
STEP 3: Open the trace file and nam file in the write mode
STEP 4: Create the nodes of the simulation using the ‘set’ command
STEP 5: Create links to the appropriate nodes using $ns duplex-link command
STEP 6: Set the orientation for the nodes in the simulation using ‘orient’ command
STEP 7: Create TCP agent for the nodes and attach these agents to the nodes
STEP 8: The traffic generator used is FTP for both node0 and node1

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STEP 9: Configure node1 as the sink and attach i
STEP10: Connect node0 and node1 using ‘connect’ command
STEP 11: Setting color for the nodes
STEP 12: Schedule the events for FTP agent 10 sec
STEP 13: Schedule the simulation for 5 minutes

Code 1:

```
set ns [new Simulator]
set nf [open s1.nam w]
$ns namtrace-all $nf
set nf1 [open s1.tr w]
$ns trace-all $nf1
proc finish {}
{
global ns nf nf1
$ns flush-trace
close $nf
close $nf1
exec nam s1.nam &amp;amp;
exit 0
}
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
$ns duplex-link $n0 $n1 1Mb 10ms DropTail
$ns duplex-link $n1 $n2 1Mb 10ms DropTail
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 cbr1 [new Application/Traffic/CBR]
$cbr1 set packetSize_ 500
$cbr1 set interval_ 0.005
$cbr1 attach-agent $udp0
set null0 [new Agent/Null]
$ns attach-agent $n2 $null0
set null1 [new Agent/Null]
$ns attach-agent $n2 $null
```

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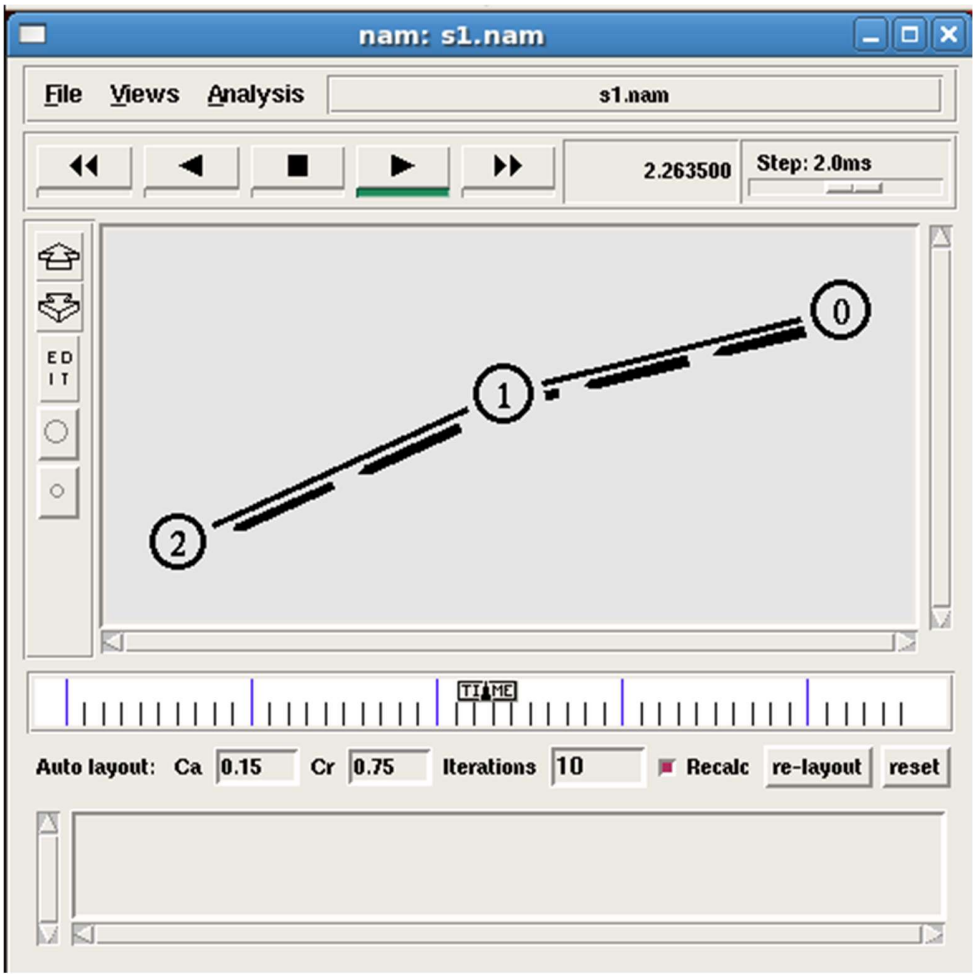
```
$ns connect $udp0 $null0
$ns connect $null0 $null1
$ns at 0.5 &amp;quot;$cbr0 start&amp;quot;
$ns at 2.5 &amp;quot;$cbr0 stop&amp;quot;
$ns at 2.7 &amp;quot;$cbr1 start&amp;quot;
$ns at 4.5 &amp;quot;$cbr1 stop&amp;quot;
$ns at 5.0 &amp;quot;finish&amp;quot;
$ns run
```

Output



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Code 2:

```
#Create a simulator object
set ns [new Simulator]
#Open trace files
set f [open out.tr w]
$ns trace-all $f
#open nam file
set nf [open out.nam w]
$ns namtrace-all $nf
#Define a &amp;#39;finish&amp;#39; procedure
proc finish {} {
global ns f nf
$ns flush-trace
close $f
close $nf
exec nam out.nam &amp;amp;
exit 0
}
#Create five nodes
set s1 [$ns node]
set s2 [$ns node]
set s3 [$ns node]
set G [$ns node]
set r [$ns node]
#Create links between the nodes
$ns duplex-link $s1 $G 1Mb 10ms DropTail
$ns duplex-link $s2 $G 1Mb 10ms DropTail
$ns duplex-link $s3 $G 1Mb 10ms DropTail
$ns duplex-link $G $r 1Mb 10ms DropTail
#Create a TCP agent and attach it to node s1
set tcp1 [new Agent/TCP/Reno]
$ns attach-agent $s1 $tcp1
$tcp1 set window_ 8
$tcp1 set fid_ 1
#Create a TCP agent and attach it to node s2
set tcp2 [new Agent/TCP/Reno]
$ns attach-agent $s2 $tcp2
$tcp2 set window_ 8
$tcp2 set fid_ 2
#Create a TCP agent and attach it to node s3
```

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```
set tcp3 [new Agent/TCP/Reno]
$ns attach-agent $s3 $tcp3
$tcp3 set window_ 4
$tcp3 set fid_ 3
#Create TCP sink agents and attach them to node r
set sink1 [new Agent/TCPSink]
set sink2 [new Agent/TCPSink]

set sink3 [new Agent/TCPSink]
$ns attach-agent $r $sink1
$ns attach-agent $r $sink2
$ns attach-agent $r $sink3
#Connect the traffic sources with the traffic sinks
$ns connect $tcp1 $sink1
$ns connect $tcp2 $sink2
$ns connect $tcp3 $sink3
# You cannot connect two TCP sources to the same TCP sink, You can do that
for UDP traffic
#Create FTP applications and attach them to agents
set ftp1 [new Application/FTP]
$ftp1 attach-agent $tcp1
set ftp2 [new Application/FTP]
$ftp2 attach-agent $tcp2
set ftp3 [new Application/FTP]
$ftp3 attach-agent $tcp3
$ns at 0.1 &quot;$ftp1 start&quot;
$ns at 0.1 &quot;$ftp2 start&quot;
$ns at 0.1 &quot;$ftp3 start&quot;
$ns at 5.0 &quot;$ftp1 stop&quot;
$ns at 5.0 &quot;$ftp2 stop&quot;
$ns at 5.0 &quot;$ftp3 stop&quot;
$ns at 5.25 &quot;finish&quot;
$ns run
```

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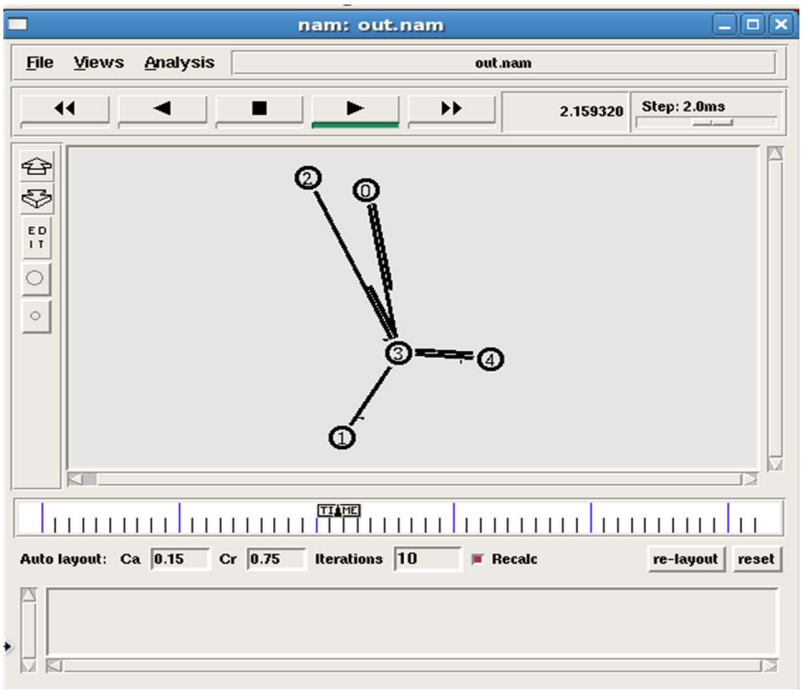
Output 2:



Conclusion: From this experiment we can conclude that we can use TCL scripts for creating topology with Graphical simulation for traffic consideration (TCP, UDP) using NAM.