Program No. 2: Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion in the network.

Program Objective:

- Understand the Implementation of the network topology consisting of n nodes.

```
set ns [new Simulator]
set ntrace [open prog4.tr w]
$ns trace-all $ntrace
set namfile [open prog4.nam w]
$ns namtrace-all $namfile

proc finish {} {
global ns ntrace namfile
$ns flush-trace
close $ntrace
close $namfile
exec nam prog4.nam &
puts "the number of ping packets dropped are"
exec grep -c "^d" prog4.tr &
exit 0
}

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]

$ns duplex-link $n1 $n0 1Mb 120ms DropTail
$ns duplex-link $n2 $n0 1Mb 10ms DropTail
$ns duplex-link $n3 $n0 1Mb 10ms DropTail
$ns duplex-link $n4 $n0 1Mb 10ms DropTail
$ns duplex-link $n5 $n0 1Mb 10ms DropTail
$ns duplex-link $n6 $n0 1Mb 11ms DropTail

Agent/Ping instproc recv {from rtt} {
$self instvar node_
puts "node [$node_ id] received ping answer from $from round-trip-time $rtt ms"
}
set p1 [new Agent/Ping]
```

```
set p2 [new Agent/Ping]
set p3 [new Agent/Ping]
set p4 [new Agent/Ping]
set p5 [new Agent/Ping]
set p6 [new Agent/Ping]

$ns attach-agent $n1 $p1

$ns attach-agent $n2 $p2
$ns attach-agent $n3 $p3
$ns attach-agent $n4 $p4
$ns attach-agent $n5 $p5
$ns attach-agent $n6 $p6

$ns queue-limit $n0 $n4 3
$ns queue-limit $n0 $n5 1
$ns queue-limit $n0 $n6 1
$ns connect $p1 $p4
$ns connect $p2 $p5
$ns connect $p3 $p6

$ns at 0.1 "$p1 send"
$ns at 0.3 "$p2 send"
$ns at 0.5 "$p3 send"
$ns at 1.0 "$p4 send"
$ns at 1.2 "$p5 send"
$ns at 1.4 "$p6 send"
$ns at 2.0 "finish"
$ns run
```

Output:

Steps for execution

1. Open gedit and type program. Program name should have the extension " .tcl
   student@cnpc022:~/ student$ gedit prog4.tcl
2. Save the program.
3. Run the simulation program
   student@cnpc022:~/ student$ ns prog4.tcl
   node 1 received ping answer from 4 round-trip-time 262.0 ms
   node 4 received ping answer from 1 round-trip-time 262.0 ms
   the number of ping packets dropped are 4
4. Here "ns" indicates network simulator. We get the topology shown in the snapshot.
5. Now press the play button in the simulation window and the simulation will begin.
6. To see the trace file contents open the file as ,
   student@cnpc022:~/ student$ gedit prog4.tr