EXPERIMENT-14

Aim: Implementation of various MAC protocols.

Algorithm:

1) Create a Simulator object.
2) Define different colours for different data flows.
3) Open a nam trace file and define procedure, after which close the trace file and execute nam on trace file.
4) Create six nodes and form a network, 0,1,2,3,4,5.
5) Create duplex links between the nodes and add orientation to the nodes for topology.
6) Setup TCP connection between n(0) and n(4).
7) Apply FTP traffic over TCP.
8) Setup UDP Connections between n(1) and n(5).
9) Apply CBR traffic over UDP.
10) Apply CSMA/CA and CSMA/CD mechanisms and study their performance
11) Schedule the events and run the program.

Program Code:

```
#csma.tcl
set ns [new Simulator]
#Define different colors for data flows (for nam)
$ns color 1 Blue
$ns color 2 red
#Open the Trace files
set file1 [open out.tr w]
set winfile [open Winfile w]
$ns trace-all $file1
#Open the NAM trace file
set file2 [open out.nam w]
$ns namtrace-all $file2
#Define a 'finish' procedure
proc finish {} {
global ns file1 file2
$ns flush-trace
close $file1
close $file2
exec nam out.nam &
exit 0
}
#create six nodes
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
```

```
set n3 [$ns node]
set n4 [$ns node]
set n5 [$ns node]
$n1 color Red
$n1 shape box
#create link between nodes
$ns duplex-link $n0 $n2 2Mb 10ms DropTail
$ns duplex-link $n1 $n2 2Mb 10ms DropTail
$ns simplex-link $n2 $n3 0.3Mb 100ms DropTail
$ns simplex-link $n3 $n2 0.3Mb 100ms DropTail
set lan [$ns newLan "$n3 $n4 $n5" 0.5Mb 40ms LL Queue/Droptail MAC/Csma/Ca Channel]
#setup a TCP connection
set tcp [new Agent/TCP/Newreno]
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink/DelAck]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink
$tcp set fid_ 1
$tcp set window_ 8000
$tcp set packetSize_ 552
#setup FTP over TCP connection
set ftp [new Application/FTP]
$ftp attach-agent $tcp
$ftp set type_ FTP
#setup a UDp connection
set udp [new Agent/UDP]
$ns attach-agent $n1 $udp
set null [new Agent/Null]
$ns attach-agent $n5 $null
$ns connect $udp $null
$udp set fid_ 2
#setup a cbr over udp connexion
set cbr [new Application/Traffic/CBR]
$cbr attach-agent $udp
$cbr set type_ CBR
$cbr set packet_size_ 1000
$cbr set rate_ 0.01mb
$cbr set random_ false
$ns at 0.1 "$cbr start"
$ns at 1.0 "$ftp start"
$ns at 123.0 "$ftp stop"
$ns at 124.5 "$cbr stop"
#next procedure gets two arguments: the name of tcp source node will br called here tcp
#and the name of output file
```

```
proc plotWindow {tcpSource file} {
global ns
set time 0.1
set now [$ns now]
set cwnd [$tcpSource set cwnd_]
set wnd [$tcpSource set window_]
puts $file "$now $cwnd"
$ns at [expr $now+$time] "plotWindow $tcpSource $file"}
$ns at 0.1 "plotWindow $tcp $winfile"
$ns at 5 "$ns trace-annotate \"packet drop\""
#PPP
$ns at 125.0 "finish"
$ns run
```

Output: