ABINASH GUPTA
120CS0157
Computer Networks Lab -7

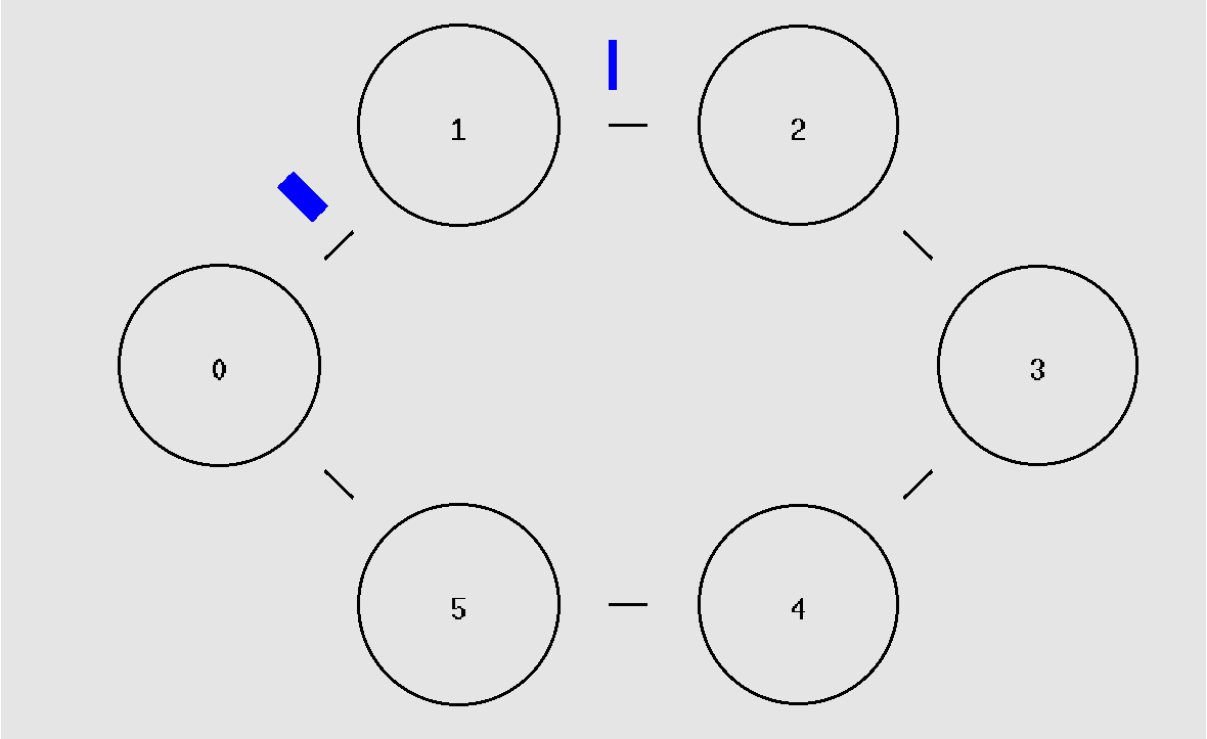
Q1 .Write Tcl script to create scenario and study the performance of token ring protocols through simulation. Create 6 nodes that forms a network numbered from 1 to 6. Create duplex links between the nodes to form a Ring Topology with bandwidth of 100 Mbps and delay of 2ms. Setup TCP Connection between node 1 and node 4. Apply FTP Traffic over TCP. Finish the transmission at 100 sec.

Code

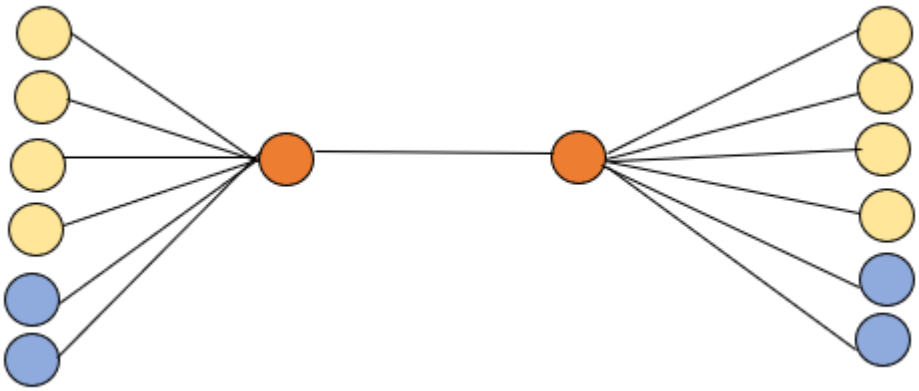
```
#Create a simulator object
set ns [new Simulator]

#Define different colors for data flows
$ns color 1 Blue



#Define the nam trace file
set nf [open q1.nam w]
$ns namtrace-all $nf

#Define 'finish' procedure
proc finish {} {
   global ns nf
   $ns flush-trace

   #Close trace file
   close $nf

   #Execute nam on the trace file
   exec nam q1.nam &
   exit 0
}

#Create six nodes
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]
set n5 [$ns node]
set n6 [$ns node]

#Create links between the nodes
```

```
$ns duplex-link $n1 $n2 100Mb 2ms DropTail
$ns duplex-link $n2 $n3 100Mb 2ms DropTail
$ns duplex-link $n3 $n4 100Mb 2ms DropTail
$ns duplex-link $n4 $n5 100Mb 2ms DropTail
$ns duplex-link $n5 $n6 100Mb 2ms DropTail
$ns duplex-link $n6 $n1 100Mb 2ms DropTail

#Give node positions (for NAM)

$ns duplex-link-op $n1 $n2 orient right-up
$ns duplex-link-op $n2 $n3 orient right
$ns duplex-link-op $n3 $n4 orient right-down
$ns duplex-link-op $n4 $n5 orient left-down
$ns duplex-link-op $n5 $n6 orient left
$ns duplex-link-op $n6 $n1 orient left-up


#Set up a TCP Connections

set tcp [new Agent/TCP]
$tcp set class_ 2
$ns attach-agent $n1 $tcp

set sink [new Agent/TCPSink]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink
$tcp set fid_ 1

#Set up a FTP over TCP Connection
set ftp [new Application/FTP]
$ftp attach-agent $tcp
$ftp set type_ FTP

#Schedule events for FTP agent
$ns at 0.0 "$ftp start"
$ns at 95.0 "$ftp stop"

#Call the finish procedure
$ns at 100.0 "finish"
#Run simulation

$ns run
```

Output :



Q2 .Write a Tcl script that forms a network consisting of 6 nodes, numbered from 1 to 6. Each of source
and destination has bandwidth of 300 Mbps and delay of 20 ms. Set the bottleneck link bandwidth as
500 sec and delay 10ms. Set the routing protocol to Droptail. Define different colors for different data
flows. Send TCP packet from node 1 to node 4 and UDP packet from node 5 to 6. Start the TCP data
transmission at 1 sec and UDP at 15 sec. Finish the transmission at 100 sec. Then run nam



to view the
results.

Calculate the following performance metrics using awk script:
a) Throughput

b) Delay
c) Packet loss ratio
d) Jain Fairness index.
e) Plot throughput graph using gnuplot (Tahoe vs Reno)
f) Plot Jain Fairness index graph using gnuplot

Code :