

PART A

Exp 1) Point to point duplex connection(tcp)

```
set val(stop) 50.0
```

```
set ns [new Simulator]
```

```
set tracefile [open lab1.tr w]
```

```
$ns trace-all $tracefile
```

```
set namfile [open lab1.nam w]
```

```
$ns namtrace-all $namfile
```

```
set n0 [$ns node]
```

```
set n1 [$ns node]
```

```
set n2 [$ns node]
```

```
set n3 [$ns node]
```

```
$ns duplex-link $n0 $n2 500.0Mb 20ms DropTail
```

```
$ns queue-limit $n0 $n2 20
```

```
$ns duplex-link $n1 $n2 500.0Mb 20ms DropTail
```

```
$ns queue-limit $n1 $n2 20
```

```
$ns duplex-link $n2 $n3 500.0Mb 20ms DropTail
```

```
$ns queue-limit $n2 $n3 20
```

```
$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
```

```
set tcp0 [new Agent/TCP]
```

```
$ns attach-agent $n0 $tcp0
```

```
set sink2 [new Agent/TCPSink]
```

```
$ns attach-agent $n3 $sink2
```

```
$ns connect $tcp0 $sink2
```

```
$tcp0 set packetSize_ 1500
```

```
set tcp1 [new Agent/TCP]
```

```
$ns attach-agent $n1 $tcp1
```

```
set sink3 [new Agent/TCPSink]
```

```
$ns attach-agent $n3 $sink3
```

```
$ns connect $tcp1 $sink3
```

```
$tcp1 set packetSize_ 1500
```

```
set ftp0 [new Application/FTP]
$ftp0 attach-agent $tcp0
$ns at 1.0 &quot;$ftp0 start&quot;
$ns at 23.0 &quot;$ftp0 stop&quot;
```

```
set ftp1 [new Application/FTP]
$ftp1 attach-agent $tcp1
$ns at 24.0 &quot;$ftp1 start&quot;
$ns at 48.0 &quot;$ftp1 stop&quot;
```

```
proc finish {} {
global ns tracefile namfile
$ns flush-trace
close $tracefile
close $namfile
exec nam lab1.nam &
exit 0
}
$ns at $val(stop) &quot;$ns nam-end-wireless $val(stop)&quot;
$ns at $val(stop) &quot;finish&quot;
$ns at $val(stop) &quot;puts \&quot;done\&quot;; $ns halt&quot;
$ns run
```

Exp2) Point to Point duplex connection (TCP and UDP)

```
set val(stop) 50.0
set ns [new Simulator]
```

```
set tracefile [open lab2.tr w]
$ns trace-all $tracefile
```

```
set namfile [open lab2.nam w]
$ns namtrace-all $namfile
```

```
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
```

```
$ns duplex-link $n0 $n2 500.0Mb 20ms DropTail
$ns queue-limit $n0 $n2 20
$ns duplex-link $n2 $n3 500.0Mb 20ms DropTail
$ns queue-limit $n2 $n3 20
$ns duplex-link $n1 $n2 500.0Mb 20ms DropTail
$ns queue-limit $n1 $n2 20
```

```
$ns duplex-link-op $n0 $n2 orient right-down
$ns duplex-link-op $n2 $n3 orient right
$ns duplex-link-op $n1 $n2 orient right-up
set tcp0 [new Agent/TCP]
```

```
$ns attach-agent $n0 $tcp0
set sink3 [new Agent/TCPSink]
$ns attach-agent $n3 $sink3
$ns connect $tcp0 $sink3
$tcp0 set packetSize_ 1000 # Change the Packet Size
$tcp0 set interval_ 0.1
```

```
set udp1 [new Agent/UDP]
$ns attach-agent $n1 $udp1
set null2 [new Agent/Null]
$ns attach-agent $n3 $null2
$ns connect $udp1 $null2
$udp1 set packetSize_ 1500
$udp1 set interval_ 0.1
```

```
set ftp0 [new Application/FTP]
$ftp0 attach-agent $tcp0
$ns at 1.0 &quot;$ftp0 start&quot;;
$ns at 20.0 &quot;$ftp0 stop&quot;;
```

```
set cbr1 [new Application/Traffic/CBR]
$cbr1 attach-agent $udp1
$cbr1 set packetSize_ 1000 # Change the Packet Size
$cbr1 set rate_ 1.0Mb
$cbr1 set random_ null
$ns at 24.0 &quot;$cbr1 start&quot;;
$ns at 48.0 &quot;$cbr1 stop&quot;;
```

```
proc finish {} {
global ns tracefile namfile
$ns flush-trace
```

```

close $tracefile
close $namfile
exec nam lab2.nam &
exit 0
}

```

```

15
$ns at $val(stop) &quot;$ns nam-end-wireless $val(stop)&quot;;
$ns at $val(stop) &quot;finish&quot;;
$ns at $val(stop) &quot;puts \&quot;done\&quot;; ; $ns halt&quot;;
$ns run

```

Exp 3) Ethernet Lan (6-10 nodes)

```

set ns [new Simulator]
set tf [open lab3.tr w]
$ns trace-all $tf

```

```

set nf [open lab3.nam w]
$ns namtrace-all $nf
set n0 [$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]
$ns make-lan &quot;$n0 $n1 $n2 $n3&quot; 100Mb 300ms LL Queue/DropTail Mac/802_3
$ns make-lan &quot;$n4 $n5 $n6 $n7&quot; 100Mb 300ms LL Queue/DropTail Mac/802_3
$ns duplex-link $n3 $n4 100Mb 300ms DropTail

```

#error rate

```

set err [new ErrorModel]
$ns lossmodel $err $n3 $n4
$err set rate_ 0.1 #Change the Error Rate 0.1, 0.3, 0.5,

```

```

set udp [new Agent/UDP]
$ns attach-agent $n1 $udp
set cbr [new Application/Traffic/CBR]
$cbr attach-agent $udp
$cbr set fid_ 0
$cbr set packetSize_ 1500

```

```

$cbr set interval_ 0.001 #Change the Data Rate 0.001, 0.01, 0.1,
set null [new Agent/Null]
$ns attach-agent $n7 $null
$ns connect $udp $null
proc finish { } {
global ns nf tf
$ns flush-trace
close $nf
close $tf
exec nam lab3.nam &
exit 0
}
$ns at 0.1 "$cbr start"
$ns at 3.0 "finish"
$ns run

```

Exp 4) Ethernet Lan congestion window.

```

set ns [new Simulator]
set tf [open lab4.tr w]
$ns trace-all $tf
set nf [open lab4.nam w]
$ns namtrace-all $nf

```

```

set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]

```

```

$ns make-lan "$n0 $n1 $n2 $n3" 10mb 10ms LL Queue/DropTail Mac/802_3

```

```

set tcp0 [new Agent/TCP/Reno]
$ns attach-agent $n0 $tcp0
set ftp0 [new Application/FTP]
$ftp0 attach-agent $tcp0
set sink3 [new Agent/TCPSink]
$ns attach-agent $n3 $sink3
$ns connect $tcp0 $sink3

```

```

set tcp2 [new Agent/TCP]
$ns attach-agent $n2 $tcp2
set ftp2 [new Application/FTP]

```

```
$ftp2 attach-agent $tcp2
set sink1 [new Agent/TCPSink]
$ns attach-agent $n1 $sink1
$ns connect $tcp2 $sink1
```

```
set file1 [open file1.tr w]
$tcp0 attach $file1
$tcp0 trace cwnd_
set file2 [open file2.tr w]
$tcp2 attach $file2
$tcp2 trace cwnd_
proc finish { } {
    global nf tf ns
    $ns flush-trace
    exec nam lab4.nam &
    close $nf
    close $tf
    exit 0
}
$ns at 0.1 &quot;$ftp0 start&quot;
$ns at 4.5 &quot;$ftp0 stop&quot;
$ns at 1.5 &quot;$ftp2 start&quot;
$ns at 4 &quot;$ftp2 stop&quot;
$ns at 5.0 &quot;finish&quot;
$ns run
```

Exp 5) Link state Routing Algo

```
set val(stop) 10.0
```

```
set ns [new Simulator]
```

```
set tracefile [open lab6.tr w]
$ns trace-all $tracefile
```

```
set namfile [open lab6.nam w]
$ns namtrace-all $namfile
```

```
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
```

set n4 [\$ns node]

\$ns duplex-link \$n0 \$n1 100.0Mb 10ms DropTail
\$ns queue-limit \$n0 \$n1 50
\$ns duplex-link \$n0 \$n2 100.0Mb 10ms DropTail
\$ns queue-limit \$n0 \$n2 50
\$ns duplex-link \$n2 \$n3 100.0Mb 10ms DropTail
\$ns queue-limit \$n2 \$n3 50
\$ns duplex-link \$n1 \$n3 100.0Mb 10ms DropTail
\$ns queue-limit \$n1 \$n3 50
\$ns duplex-link \$n3 \$n4 100.0Mb 10ms DropTail
\$ns queue-limit \$n3 \$n4 50
\$ns duplex-link \$n0 \$n3 100.0Mb 10ms DropTail
\$ns queue-limit \$n0 \$n3 50
\$ns duplex-link \$n1 \$n2 100.0Mb 10ms DropTail
\$ns queue-limit \$n1 \$n2 50

#Give node position (for NAM)

\$ns duplex-link-op \$n0 \$n1 orient right
\$ns duplex-link-op \$n0 \$n2 orient right-down
\$ns duplex-link-op \$n2 \$n3 orient right
\$ns duplex-link-op \$n1 \$n3 orient left-down
\$ns duplex-link-op \$n3 \$n4 orient left-down
\$ns duplex-link-op \$n0 \$n3 orient right-down
\$ns duplex-link-op \$n1 \$n2 orient left-down

\$ns cost \$n0 \$n1 2
\$ns cost \$n0 \$n2 1
\$ns cost \$n0 \$n3 3

\$ns cost \$n1 \$n0 2
\$ns cost \$n1 \$n2 2
\$ns cost \$n1 \$n3 3

\$ns cost \$n2 \$n1 2
\$ns cost \$n2 \$n0 1
\$ns cost \$n2 \$n3 1

\$ns cost \$n3 \$n2 1
\$ns cost \$n3 \$n1 3
\$ns cost \$n3 \$n0 3

\$ns cost \$n3 \$n4 2
\$ns cost \$n4 \$n3 2

```
set udp0 [new Agent/UDP]
$ns attach-agent $n0 $udp0
set null1 [new Agent/Null]
$ns attach-agent $n4 $null1
$ns connect $udp0 $null1
$udp0 set packetSize_ 1500
```

```
set cbr0 [new Application/Traffic/CBR]
$cbr0 attach-agent $udp0
$cbr0 set packetSize_ 1500
$cbr0 set rate_ 1.0Mb
$cbr0 set random_ null
$ns at 1.0 &quot;$cbr0 start&quot;;
$ns at 5.0 &quot;$cbr0 stop&quot;;
$ns rtproto LS
```

```
#Define a &#39;finish&#39; procedure
proc finish {} {
    global ns tracefile namfile
    $ns flush-trace
    close $tracefile
    close $namfile
    exec nam lab6.nam &amp;
    exit 0
}
$ns at $val(stop) &quot;$ns nam-end-wireless $val(stop)&quot;;
$ns at $val(stop) &quot;finish&quot;;
$ns at $val(stop) &quot;puts \&quot;done\&quot;; ; $ns halt&quot;;
$ns run
```