4)Consider a client and server The server is running a FTP applications over TCP. The client sends a a request to download a file of size 10MB from the serves. Write a tcl script to stimulate this scenario - Let node n0 be the server and node n1 be the client. TCP packet size is 1500 Bytes.

Save this file as p4.tcl:

```
set ns [new Simulator]
set tf [open p4.tr w]
$ns trace-all $tf
set nf [open p4.nam w]
$ns namtrace-all $nf

set s [$ns node]
set c [$ns node]
$ns color 1 Blue
$s label "server"
$c label "client"
#$c shape "box"
#$s shape "box"

$ns duplex-link $s $c 10Mb 10ms DropTail
$ns duplex-link-op $s $c orient right

set tcp0 [new Agent/TCP]
$ns attach-agent $s $tcp0
#$tcp0 set packetSize_ 1500
set sink0 [new Agent/TCPSink]
$ns attach-agent $c $sink0
$ns connect $tcp0 $sink0

set ftp0 [new Application/FTP]
$ftp0 attach-agent $tcp0
$tcp0 set fid_ 1

proc finish { } {
        global ns tf nf
        $ns flush-trace
        close $tf
        close $nf
        puts "Nam file running"
        exec nam p4.nam &
        puts "after Nam file running"
        exec awk -f p4transfer.awk p4.tr &
        puts "awk"
        exec awk -f p4convert.awk p4.tr > convert.tr &
        exec xgraph convert.tr -geometry 800*400 -t "bytes_received_at_client" -x "time_in_secs" -
y"bytes_in_bps" &
        exit 0
        }

$ns at 0.01 "$ftp0 start"
```

```
$ns at 15.0 "$ftp0 stop"
$ns at 15.1 "finish"
$ns run
```

save this file as p4transfer.awk:

```
p4transfer.awk BEGIN{
count=0;
time=0;
total_bytes_sent=0;
total_bytes_received=0;
}{
if($1=="r" && $4==1 && $5=="tcp")
total_bytes_received+=$6;
if($1=="+" && $3==0 && $5=="tcp")
total_bytes_sent+=$6;
}
END{
system("clear");
printf("\nTransmission time to transfer file is %f",$2);
printf("\nActual data sent from server is %f Mbps\n",(total_bytes_sent/1000000));
printf("Data received by the client is %f Mbps\n",(total_bytes_received/1000000));
}
```

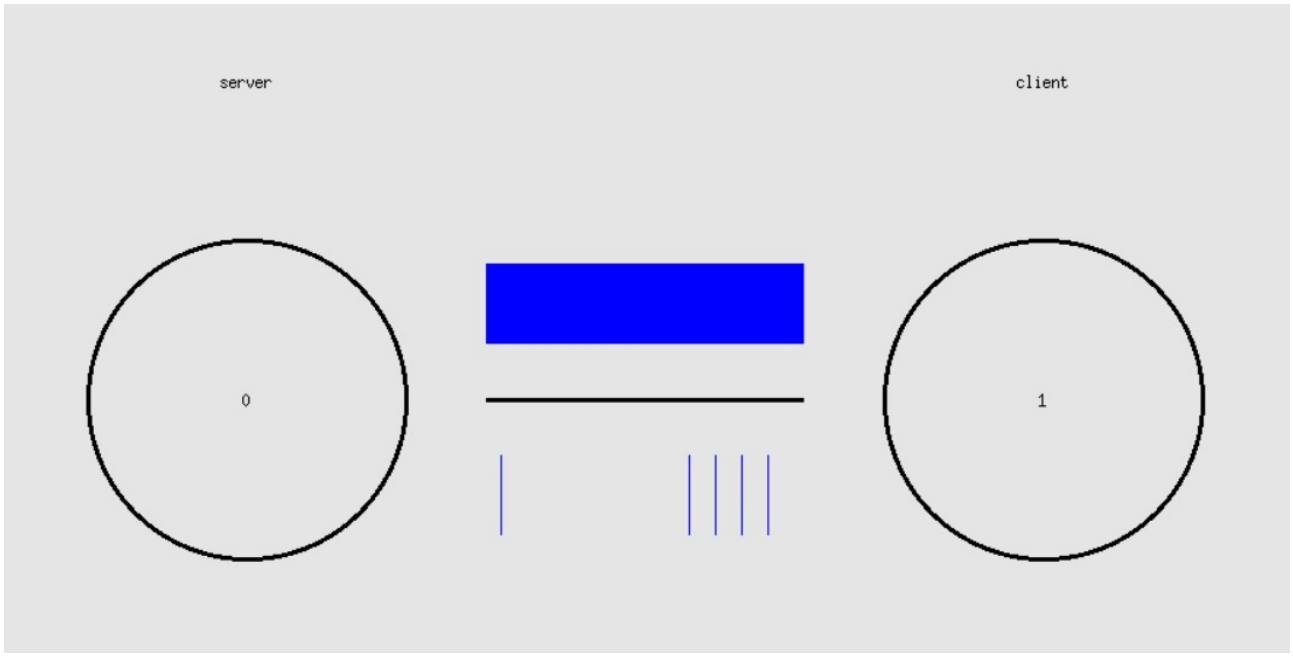
save this file as p4convert.awk:

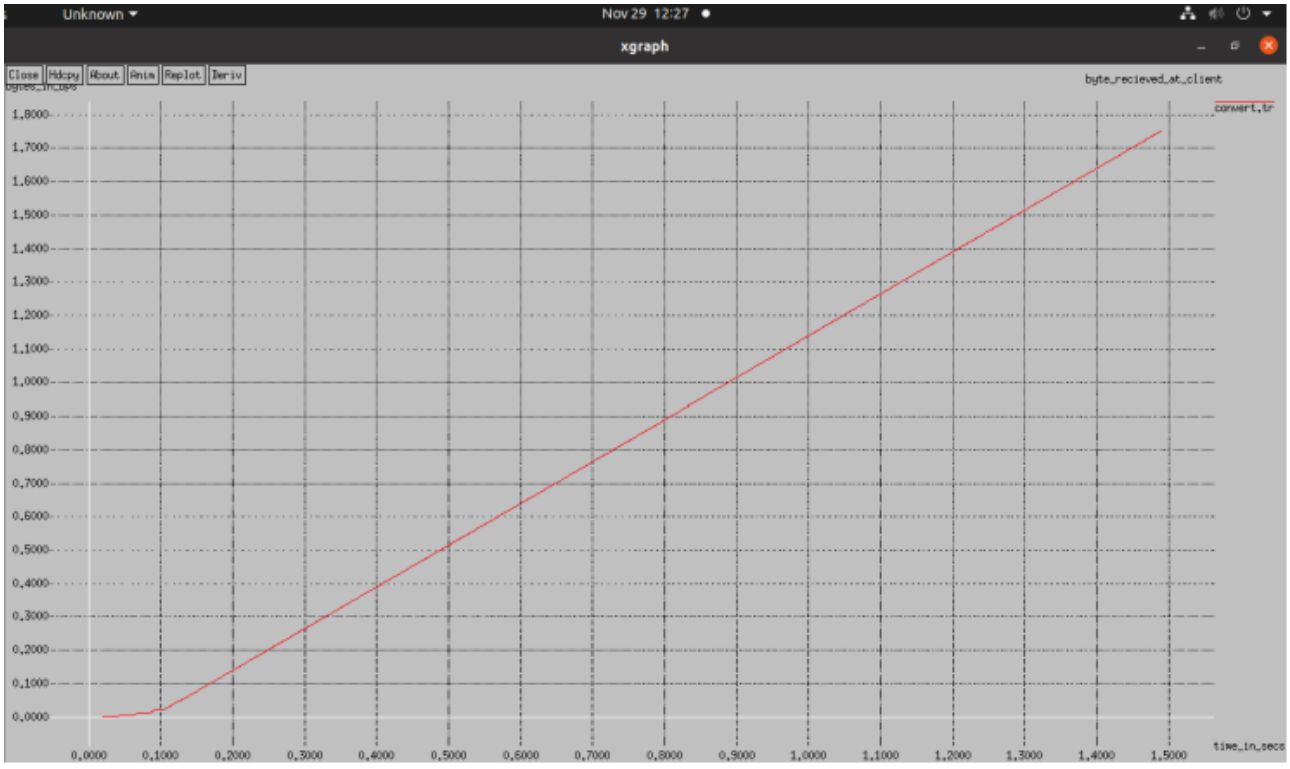
```
BEGIN{
count=0;
time=0;
}
{
if($1=="r" && $4==1 && $5=="tcp")
        {
        count+=$6;
        time=$2;
        printf("\n%f %f",time,(count/1000000));
        }
}
END{
}
```

Execution commands:-

1)ns p4.tcl

Outputs:






```
Transmission time to transfer file is 15.020400
Actual data sent from server is 14.875160 Mbps
Data received by the client is 14.875160 Mbps
```