

Assignment 11 – Performance Evaluation of TCP and UDP

Date: 11/11/2022

Aim:

To write a TCL script to evaluate the performance of TCP and UDP sharing a bottleneck link.

Algorithm:

1. Create six nodes and the links between the nodes as
 - a. 0 → 2 - 2Mb 10 ms duplex link
 - b. 1 → 2 - 2Mb 10 ms duplex link
 - c. 2 → 3 - 0.3Mb 100ms simplex link
 - d. 3 → 2 - 0.3Mb 100ms simplex link (link 2 → 3 is a bottleneck)
 - e. 3 → 4 - 0.5Mb 40ms duplex link
 - f. 3 → 5 - 0.5Mb 40ms duplex link
2. Align the nodes properly.
3. Set Queue Size of link (n2-n3) to 10 (or) 5.
4. Set up a TCP connection over 0 and 4 and its flow id, window size, packet size
5. Set up a UDP connection over 1 and 5 with flow id, type, packet size, rate, random fields.
6. Set different colors for TCP and UDP.
7. Run the simulation for 5 seconds, and show the simulation in network animator and in the trace file.

Code:

```
set ns [new Simulator]
$ns color 1 Blue
$ns color 2 Red
set nf [open out.nam w]
$ns namtrace-all $nf
proc finish {} {
    global ns nf
    $ns flush-trace
    close $nf
    exec nam out.nam &
```

```
    exit 0
}

#Create 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]

#Create links between the 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
$ns duplex-link $n3 $n4 0.5Mb 40ms DropTail
$ns duplex-link $n3 $n5 0.5Mb 40ms DropTail

#Set Queue Size of link (n2-n3) to 10
$ns queue-limit $n2 $n3 10

#Align nodes properly
$ns duplex-link-op $n0 $n2 orient right-down
$ns duplex-link-op $n1 $n2 orient right
$ns simplex-link-op $n2 $n3 orient down
$ns simplex-link-op $n3 $n2 orient up
$ns duplex-link-op $n3 $n4 orient left
$ns duplex-link-op $n3 $n5 orient left-down

#Monitor the queue for link (n2-n3). (for NAM)
$ns duplex-link-op $n2 $n3 queuePos 0.5

# Create tcp agent b/w 0 and 4
set tcp [new Agent/TCP]
$tcp set packetSize_ 1000
$tcp set window_ 10000
$tcp set fid_ 2
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink
```

```
#Create UDP flow id, type, packet size, rate, random fields
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_ 1
```

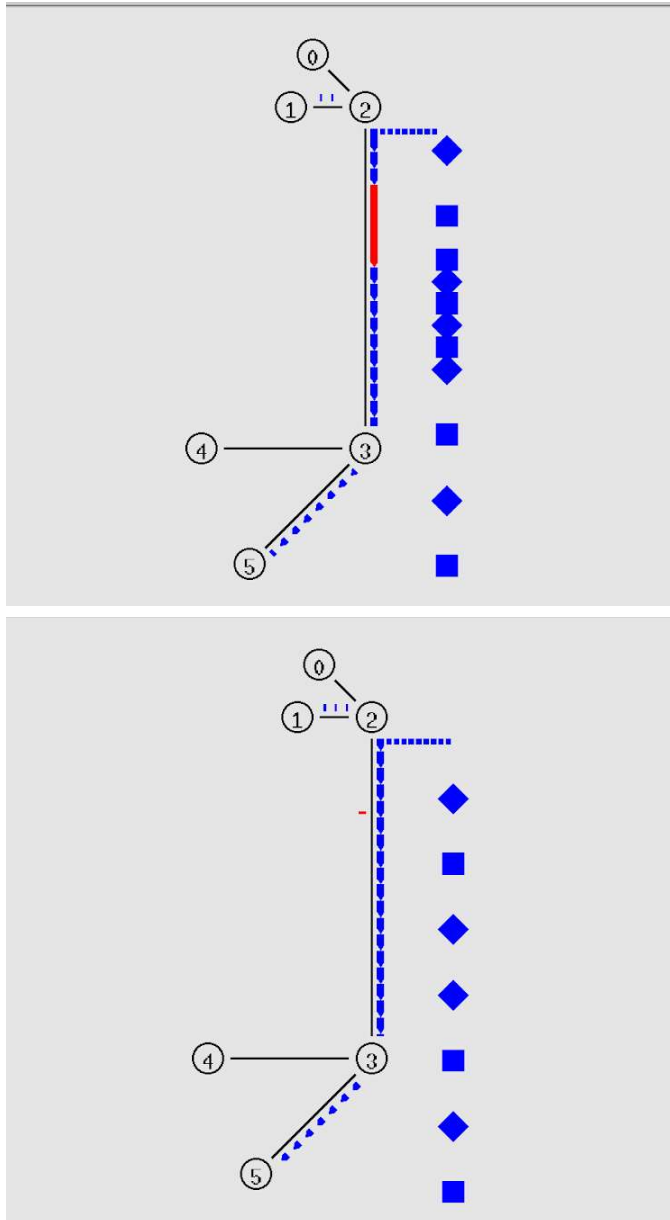
```
#connect ftp and tcp
set ftp [new Application/FTP]
$ftp attach-agent $tcp
```

```
set cbr [new Application/Traffic/CBR]
$cbr set packetsize_ 1000
$cbr set interval 0.010
$cbr attach-agent $udp
```

```
$ns at 1.0 "$ftp start"
$ns at 5.0 "$ftp stop"
$ns at 1.0 "$cbr start"
$ns at 5.0 "$cbr stop"
```

```
$ns at 5.0 "finish"
$ns run
```

Output:



Learning outcomes:

- The implementation of TCP and UDP using NS2 was understood.
- The performance of the two protocols TCP and UDP was evaluated and compared.