Simulation of LAN

CS F303

BITS Pilani
Dubai Campus

Dr. Pranav M. Pawar

Problem Statement

- Create a network of six nodes.
- In this network node 3-5 are the part of LAN. LAN is connected to rest of the network using node 3, node 3 is act as gateway between LAN and rest of the network (node 0-2). The LAN have capacity of 0.5Mb with 40ms propagation delay.
- Link in between LAN and rest of network have capacity of 0.3Mb with 100ms propagation delay, and all other links have capacity of 2Mb with 10ms propagation delay.
- The gateway link have queue limit of 10 packets.
- Node 0 in the network acts as TCP source (packet size = 552 bytes) and node 4 in LAN act as a TCP destination.
- Also node 1 in the network acts as UDP source (packet size = 1000 bytes) and node 5 as a UDP destination.
- The simulation lasts for 125 seconds, where CBR traffic will start at 0.1s and stop at 124.5s, and FTP traffic will start at 1.0s and stop at 124s.

Simulation Script


```
#Create Simulator Object (Simulator is class in ns2)
    set ns [new Simulator]
#Define different colors for data flows (for NAM) ($
    means reference)
    $ns color 1 Blue
    $ns color 2 Red
#Open the Event trace files
    set file1 [open out.tr w]
    $ns trace-all $file1
#Open the NAM trace file
    set file2 [open out.nam w]
    $ns namtrace-all $file2
```

Simulation Script (contd..)


```
#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
    $n0 color blue
    $n0 shape box
```

Simulation Script (contd..)


```
#Create links between the nodes
    $ns duplex-link $n0 $n2 2Mb 10ms DropTail
    $ns duplex-link $n1 $n2 2Mb 10ms DropTail
    $ns duplex-link $n2 $n3 0.3Mb 100ms DropTail

#Create LAN
set lan [$ns newLan "$n3 $n4 $n5" 0.5Mb 40ms LL
   Queue/DropTail MAC/Csma/Cd Channel]

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

Simulation Script (contd..)


```
#Setup a TCP connection (Source agent: TCP,
   Destination agent: TCPSink)
    set tcp [new Agent/TCP]
    $ns attach-agent $n0 $tcp
    set sink [new Agent/TCPSink]
    $ns attach-agent $n4 $sink
    $ns connect $tcp $sink
    $tcp set fid_ 1
    $tcp set packetSize_ 552
#Setup a FTP over TCP connection
   set ftp [new Application/FTP]
   $ftp attach-agent $tcp
```

Simulation Script (contd..)


```
#Setup a UDP connection (Source agent: UDP,
   Destination agent: Null)
    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 connection
    set cbr [new Application/Traffic/CBR]
    $cbr attach-agent $udp
    $cbr set packet_size_ 1000
```

Simulation Script (contd..)


```
# Scheduling the event
    $ns at 0.1 "$cbr start"
    $ns at 1.0 "$ftp start"
    $ns at 124.0 "$ftp stop"
    $ns at 124.5 "$cbr stop“
# Call finish procedure
    $ns at 125.0 “finish”
# Run the simulation
    $ns run
```

```
#Define a 'finish' procedure
proc finish {} {
        global ns file1 file2
        $ns flush-trace
        close $file1
        close $file2
        exit 0  }
```

Running the Simulation Script

- Save the simulation script in specific folder.
- Open the terminal and go up to specific folder.
- Run the simulation script,
  - ns: command to run simulation script.
    - e.g. ns LAN.tcl
- Run the nam file,
  - nam: command to run animation file
    - e.g. nam out.nam

Self Practice Example

- Create a network of eight nodes.
- In this network node 0-6 are the part of LAN. LAN is connected to rest of the network using node 7, node 7 is act as gateway between LAN and rest of the network (node 0-6). The LAN have capacity of 1Mb with 40ms propagation delay.
- Link in between LAN and rest of network have capacity of 1Mb with 50ms propagation delay (Link in between node 0 to node 7).
- Node 7 in the network acts as UDP source (packet size = 1000 bytes) and node 6 as a UDP destination.
- The simulation lasts for 25 seconds, where CBR traffic will start at 0.1s and stop at 24.5s.

Sources

- https://www.isi.edu/nsnam/ns/tutorial/
- https://www.isi.edu/nsnam/ns/

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Thank You!