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**Subject** : NAD

**Expt no** : 2 B

**Aim** : Simulate a four-node point-to-point network, and connect the links as follows: n0->n2, n1->n2 and n2->n3. Apply TCP agent changing the parameters and determine the number of packets sent/received by TCP/UDP.

## Aim:

Simulate a four-node point-to-point network, and connect the links as follows: n0->n2, n1->n2 and n2->n3. Apply TCP agent changing the parameters and determine the number of packets sent/received by TCP/UDP.

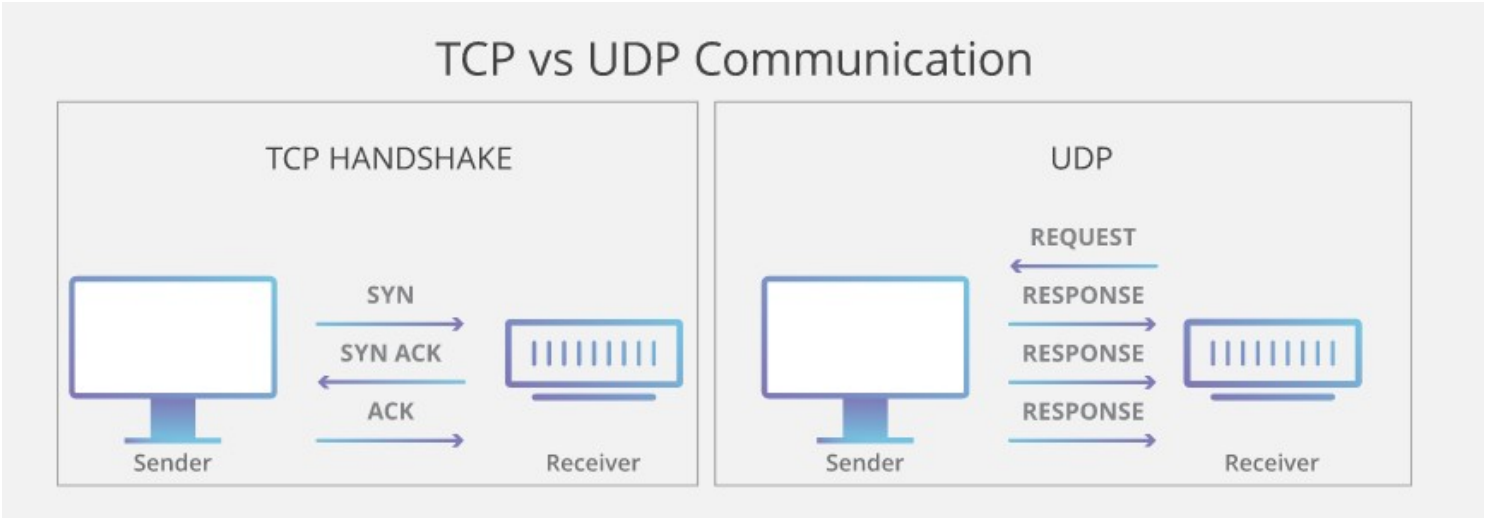
## Objectives:

- To calculate the number of packets lost during transmission in a network.
- To Test the network in varies conditions
- To observe the effect of sending packets of relatively greater size
- To observe the effect of sending packets at a higher rate

## Theory:

**TCP** (Transmission Control Protocol) is a standard that defines how to establish and maintain a network transmission through which application programs can exchange data.

**UDP** (User Datagram Protocol) is an alternative communications protocol to Transmission Control Protocol (TCP) used primarily for establishing low-latency and loss-tolerating connections between applications programs.



## Methodology :

Steps -

1. Create a new simulation
2. Use static routing because the duplex links are predefined Set up trace files in write mode
3. Set up NAM files in write mode (for visualization)
4. Define the finish function to clear trace file and execute nam program to visualize the graph.
5. Create 4 nodes – n1, n2, n3, n4
6. Establish links and set the bandwidth
7. Set the Queue length
8. Set TCP connection between n(0) and n(3)
9. Attach FTP application over TCP
10. Set UDP connection between n(1) and n(3)
11. Attach CBR traffic over UDP
12. Schedule Events
13. Connect the traffic source with the traffic sink and assign flow id color
14. Run the simulation

## Experiment Setup :

The test cases to perform in this experiment :-

1. Link having a relatively low bandwidth with respect to other links

   $ns duplex-link $n0 $n2 0.1Mb 20ms DropTail

   $ns duplex-link $n1 $n2 0.9Mb 20ms DropTail

   $ns duplex-link $n2 $n3 0.1Mb 20ms DropTail

2. Node sending packets of relatively greater size

   $cbr set packetSize_ 2000

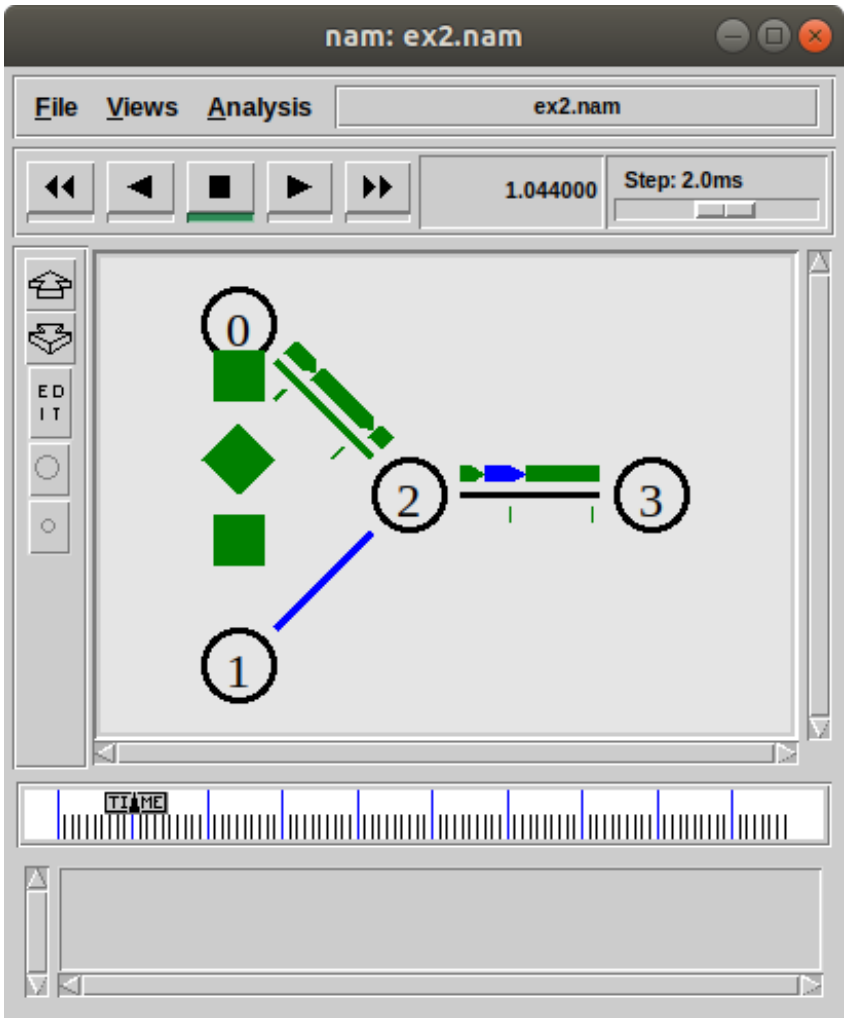
3. Node sending packets at a higher rate.

   $cbr set interval_ 0.01

**Result:**

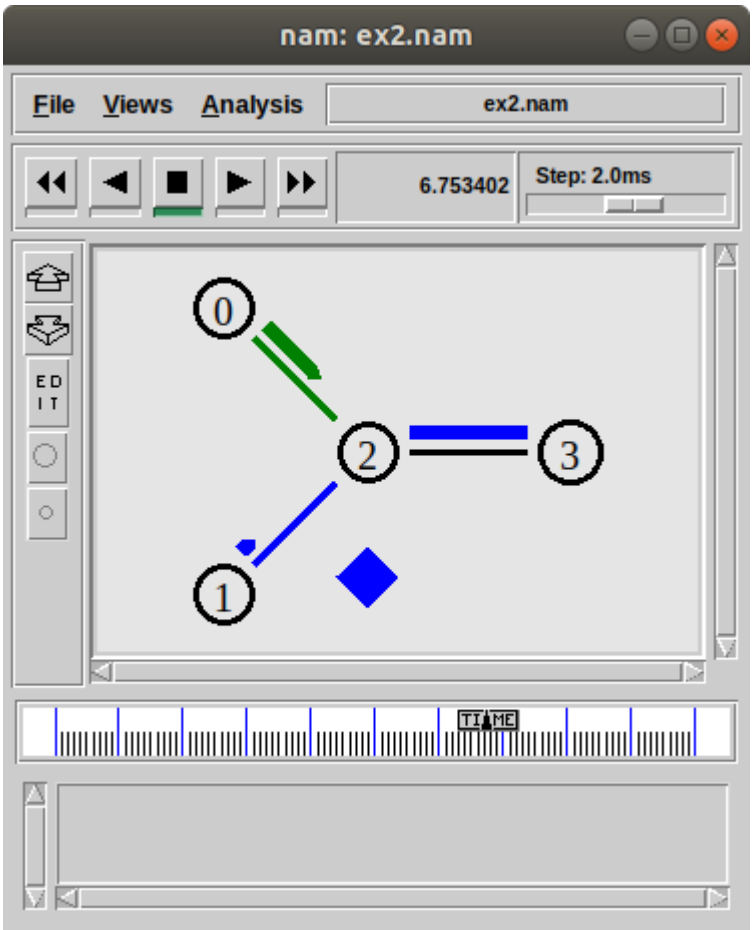
**General Behavior of Network under Constant Bandwidth (0.7 MB):**

```
saeem@saeem-Inspiron-3558:~/Desktop/college/sem2/Nad/Expts/B/EXP2$ ns ex2.tcl
 When configured, ns found the right version of tclsh in /usr/bin/tclsh8.6
but it doesn't seem to be there anymore, so ns will fall back on running the fir
st tclsh in your path. The wrong version of tclsh may break the test suites. Rec
onfigure and rebuild ns if this is a problem.
saeem@saeem-Inspiron-3558:~/Desktop/college/sem2/Nad/Expts/B/EXP2$ TCP packets s
ent : 1311
TCP packets recieved : 1308
TCP packets dropped: 3
UDP packets sent : 322
UDP packets recieved : 322
UDP packets dropped: 0
Total Sent: 1633
Total Dropped: 3
Cannot connect to existing nam instance. Starting a new one...
```



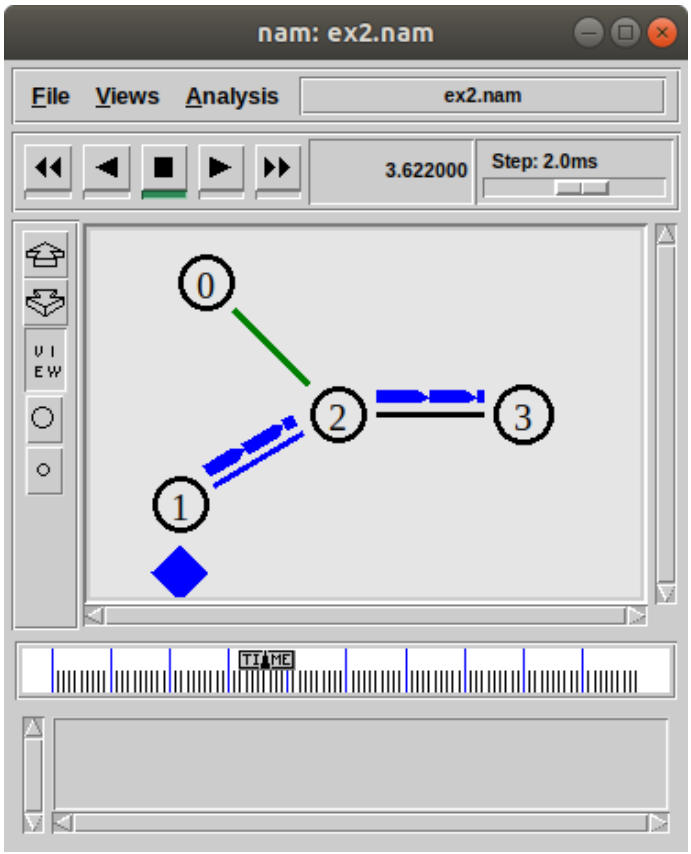
**Case 1:**

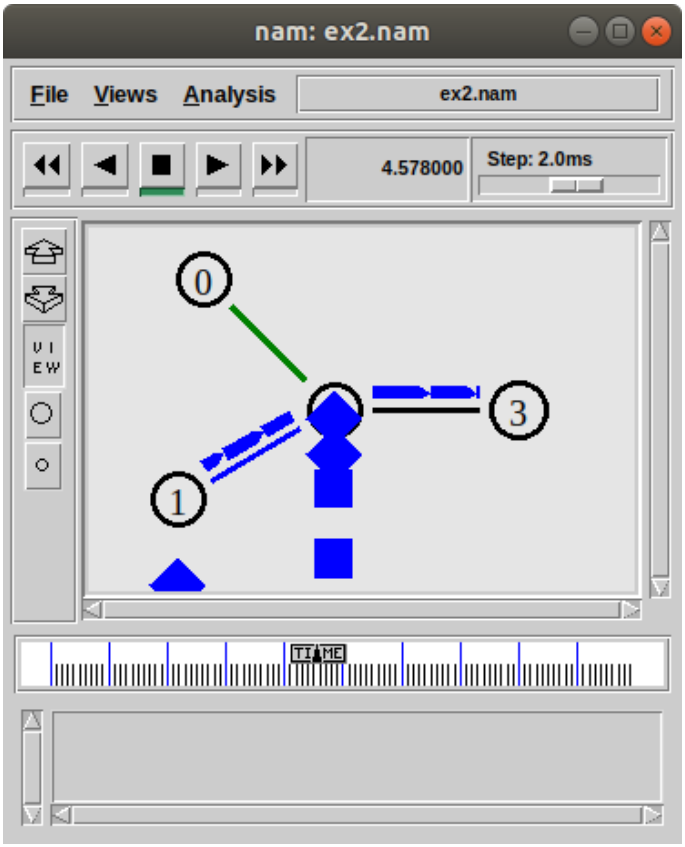
```
saeem@saeem-Inspiron-3558:~/Desktop/college/sem2/Nad/Expts/B/EXP2$ ns ex2.tcl
 When configured, ns found the right version of tclsh in /usr/bin/tclsh8.6
but it doesn't seem to be there anymore, so ns will fall back on running the fir
st tclsh in your path. The wrong version of tclsh may break the test suites. Rec
onfigure and rebuild ns if this is a problem.
TCP packets sent : 160
TCP packets recieved : 143
TCP packets dropped: 17
UDP packets sent : 322
UDP packets recieved : 260
UDP packets dropped: 62
Total Sent: 482
Total Dropped: 79
```



**Case 2 :**

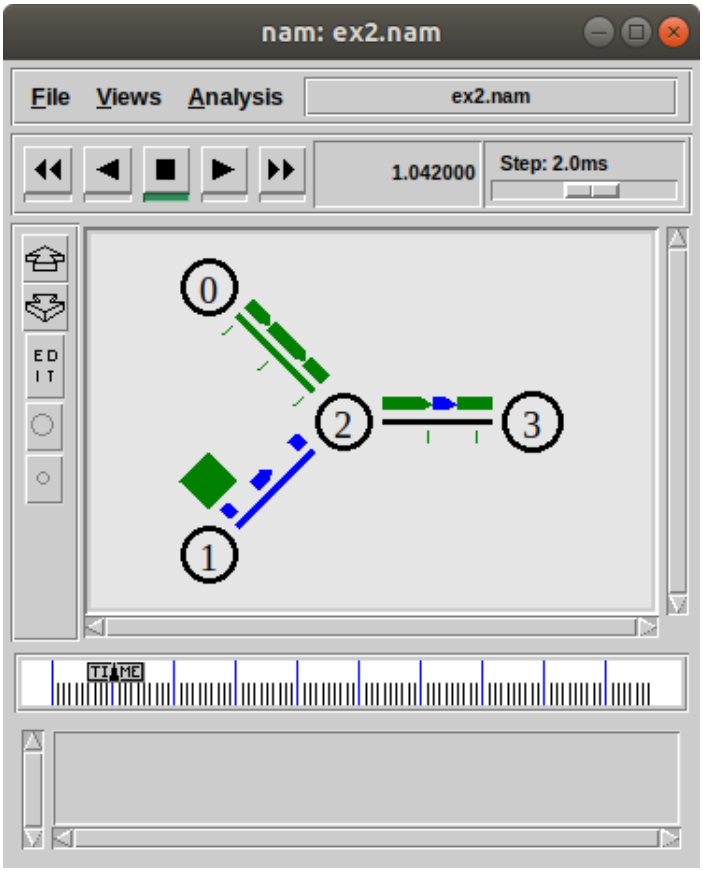
```
saeem@saeem-Inspiron-3558:~/Desktop/college/sem2/Nad/Expts/B/EXP2$ TCP packets s
ent : 247
TCP packets recieved : 242
TCP packets dropped: 5
UDP packets sent : 2077
UDP packets recieved : 1854
UDP packets dropped: 223
Total Sent: 2324
Total Dropped: 228
```



**Case 3:**

```
saeem@saeem-Inspiron-3558:~/Desktop/college/sem2/Nad/Expts/B/EXP2$ ns ex2.tcl
 When configured, ns found the right version of tclsh in /usr/bin/tclsh8.6
but it doesn't seem to be there anymore, so ns will fall back on running the fir
st tclsh in your path. The wrong version of tclsh may break the test suites. Rec
onfigure and rebuild ns if this is a problem.
saeem@saeem-Inspiron-3558:~/Desktop/college/sem2/Nad/Expts/B/EXP2$ TCP packets s
ent : 1135
TCP packets recieved : 1134
TCP packets dropped: 1
UDP packets sent : 1602
UDP packets recieved : 1602
UDP packets dropped: 0
Total Sent: 2737
Total Dropped: 1
```




**Conclusion:** We observe that when the bandwidth link among all the nodes is equal ,maximum number packets is transmitted and drop rate is also low.

• In case1 when TCP link having a relatively low bandwidth with respect to other links, the transmission rate of TCP packet is reduced and drop rate is also increased for both TCP/UDP.

• In case 2 when Node sending packets of relatively greater size, we can observe slightly improved transmission rate due to that lesser drop rate.

• In case 3 when nodes are sending packets at a higher rate, the TCP transmission results in highest number of TCP packets transmitted among all the test cases and a negligible drop rate and also UDP transmission witnesses zero packet drops.