MANIPAL INSTITUTE
OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

This is to certify that Ms/Mr. ……...……

Reg. No.: …..…… Section: …… Roll No.: ……...

has satisfactorily completed the laboratory exercises prescribed for **Communication Networks Lab** [ECE-3212] of VI Semester B. Tech. (E & C Engg.) Degree at MIT, Manipal, in the academic year 2016 - 2017.

Date: .....

Signature
Faculty in Charge

Signature
Head of the Department

CONTENTS

ECE 3212 COMMUNICATION NETWORK LAB [0 0 6 2]

Total Number of Lab Classes: 10

Course Objectives

CO1: To simulate the Wired and Wireless LANs and Wi-Max.
CO2: To Configure and test the various Data Link Layer protocols.
CO3: To simulate and verify the function of various Network Layer protocols.
CO4: To Demonstrate TCP, UDP Communication Protocols.
CO5: To Simulate the MANETs and WSNs and analyse their performance.

Course Outcomes

At the end of this course, student will be able to:

- Analyse the congestion in Point-to-Point networks and Wireless LANs.
- Configure and test the ALOHA, CSMA, CSMA/CD, and CSMA/CA protocols.
- Simulate and verify the functioning of Dijkstra's and Bellman-ford algorithms.
- Demonstrate the different applications using TCP, UDP Communication Protocols.
- Verify the performance of various Error control protocols in Data Link Layer.

Evaluation Plan

Communication Network Lab

- Internal Assessment Marks: **60 Marks**
  - ✓ Continuous evaluation component (for each experiment): **10 Marks**
  - ✓ Assessment is based on conduction of each experiment, exercise problems, answering the questions related to the experiment.
  - ✓ Total marks of the 10 experiments scaled to **60 Marks**
- End semester assessment: **40 Marks**

Communication Network Project Lab

- Internal Assessment: **60 Marks**
  - ✓ Continuous evaluation component (for each progress): **10 Marks**
  - ✓ Assessment is based on satisfactory progress in execution of project.
  - ✓ Total marks of the 6 evaluations is **60 Marks**
- End semester project demonstration: **40 Marks**

Note: Final Grading is based on the average of marks scored in Communication Networks Lab and Project Lab.

PART A

Experiment 1
Point-to-Point Networks

Objective:

A) To simulate a three point-to-point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.

B) To simulate the transmission of ping message over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

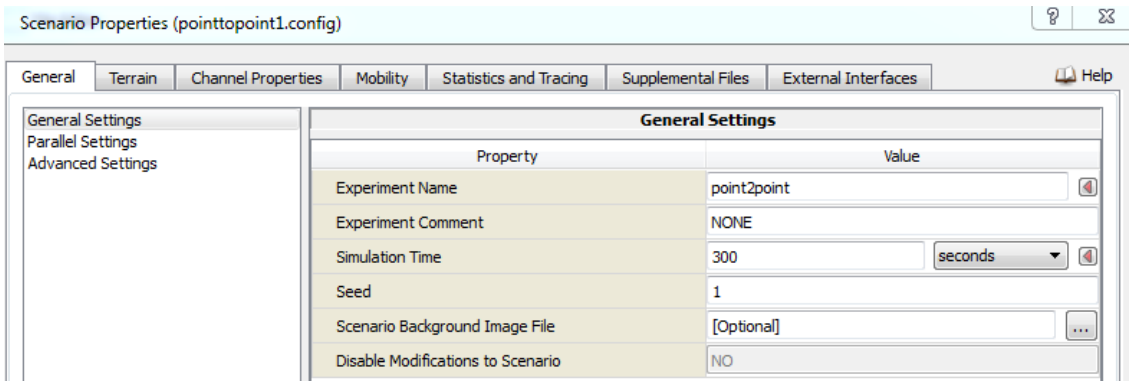
Procedure:

Create a folder with your registration number under"**C://qualnet/7.4/scenarios/user/**"

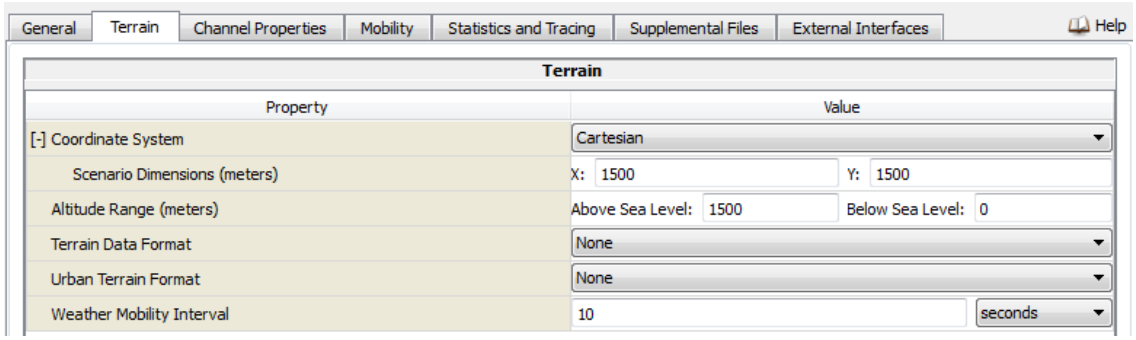
A) Go to File→new→save as→ point-to-point

Select Scenario Properties → General Settings → Give Experiment name, Simulation Time

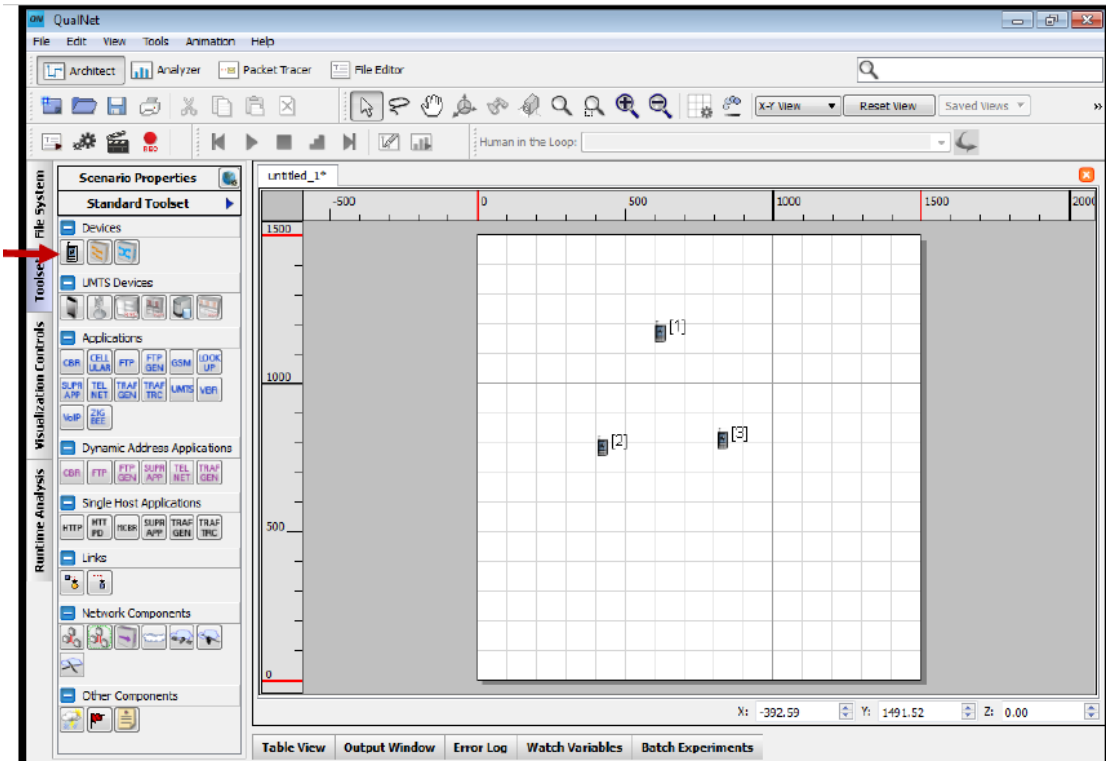
Click Apply, Ok



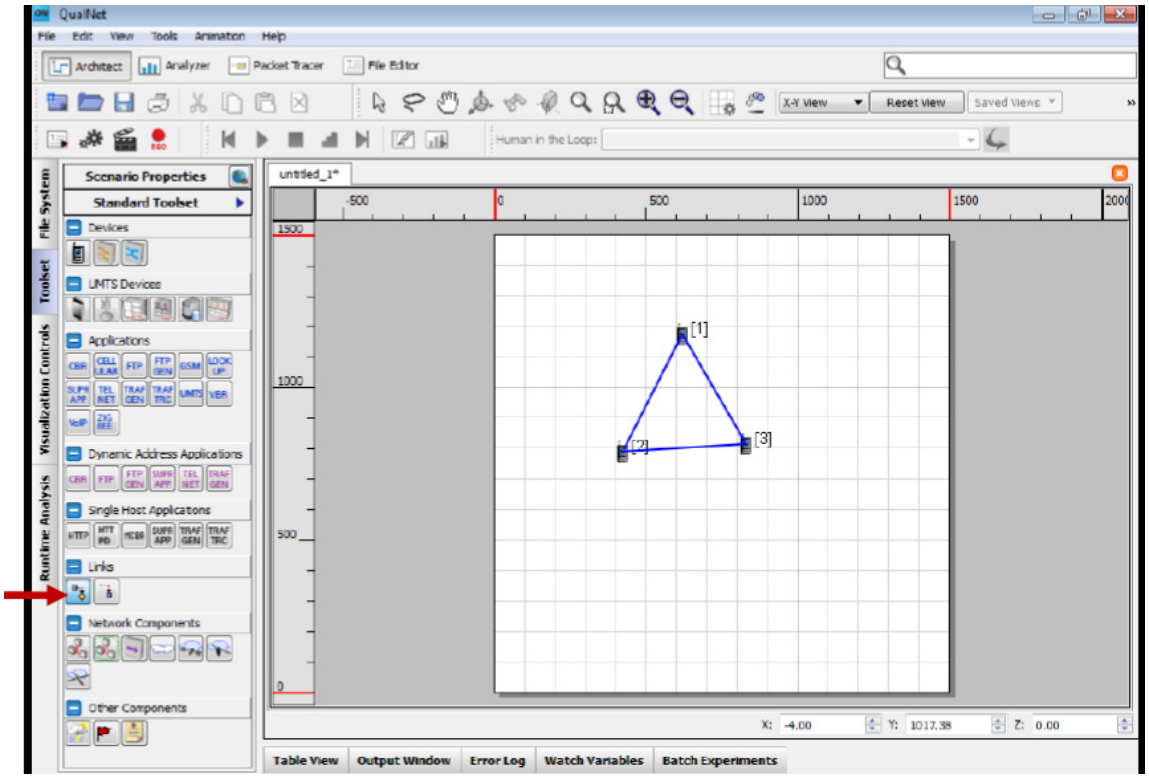
Set the Terrain Properties



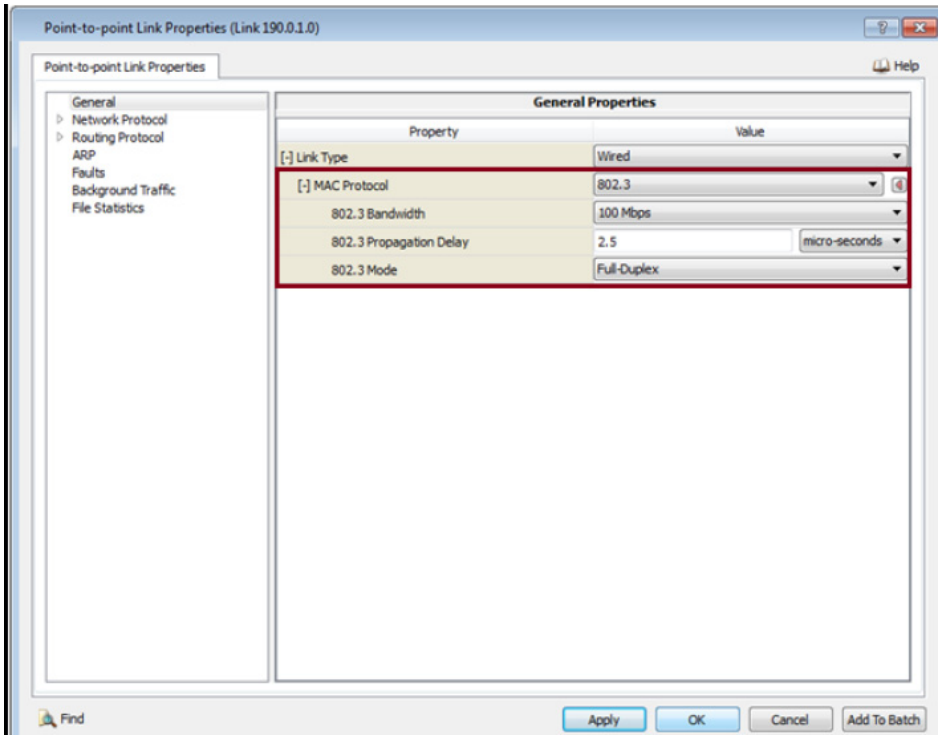
Step 1: Select Default icon from **Standard Toolset window→ Devices** and Place the three nodes on the canvas.



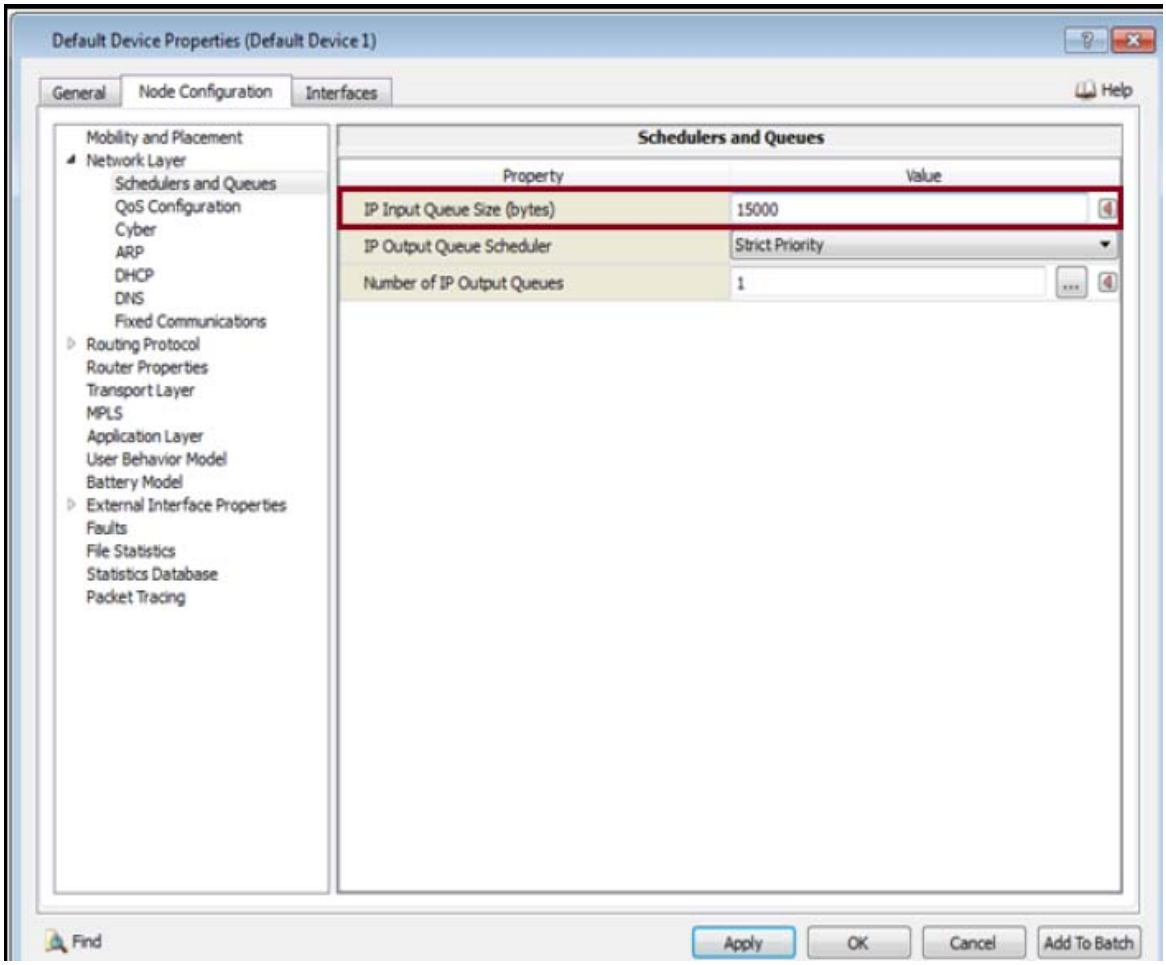
Step 2: Connect point-to-point link between three nodes using **link** from **Standard Toolset window.**



Step 3: Double click on the links to set duplex link and bandwidth between the nodes by configure 802.3 as MAC Protocol.

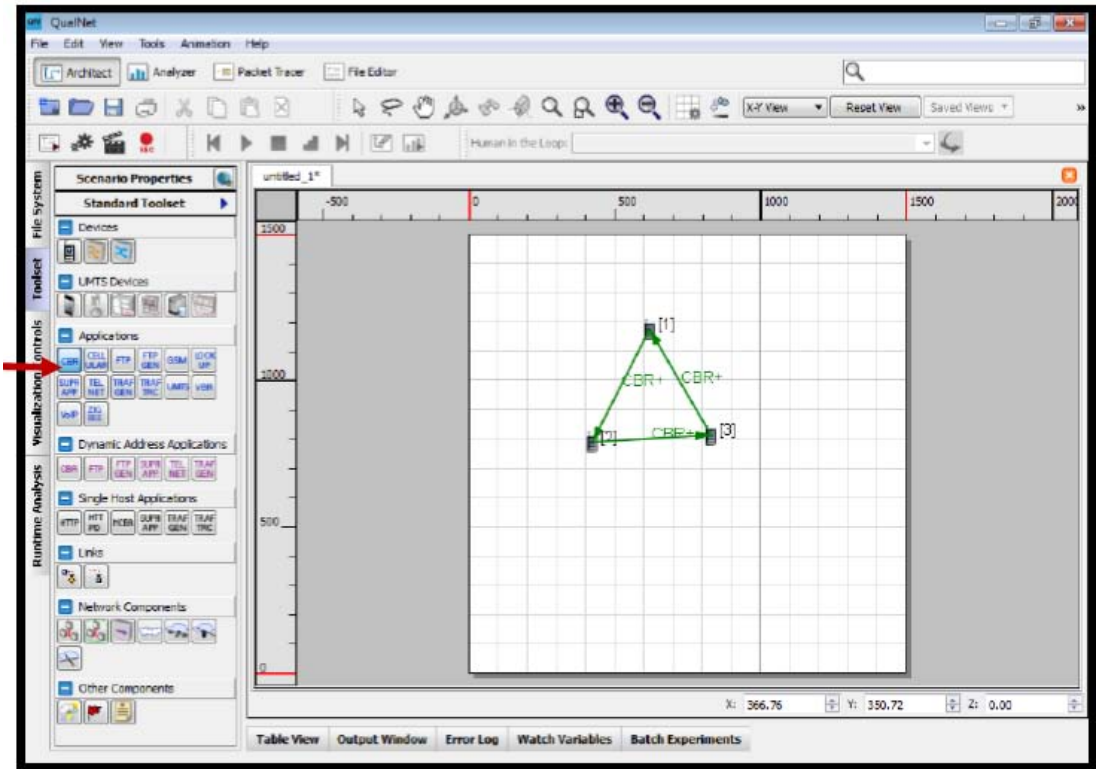


Step 4: To set queue size of each node in the scenario double click on the nodes, go to **Node Configuration tab→Network Layer→Schedulers and Queues.**



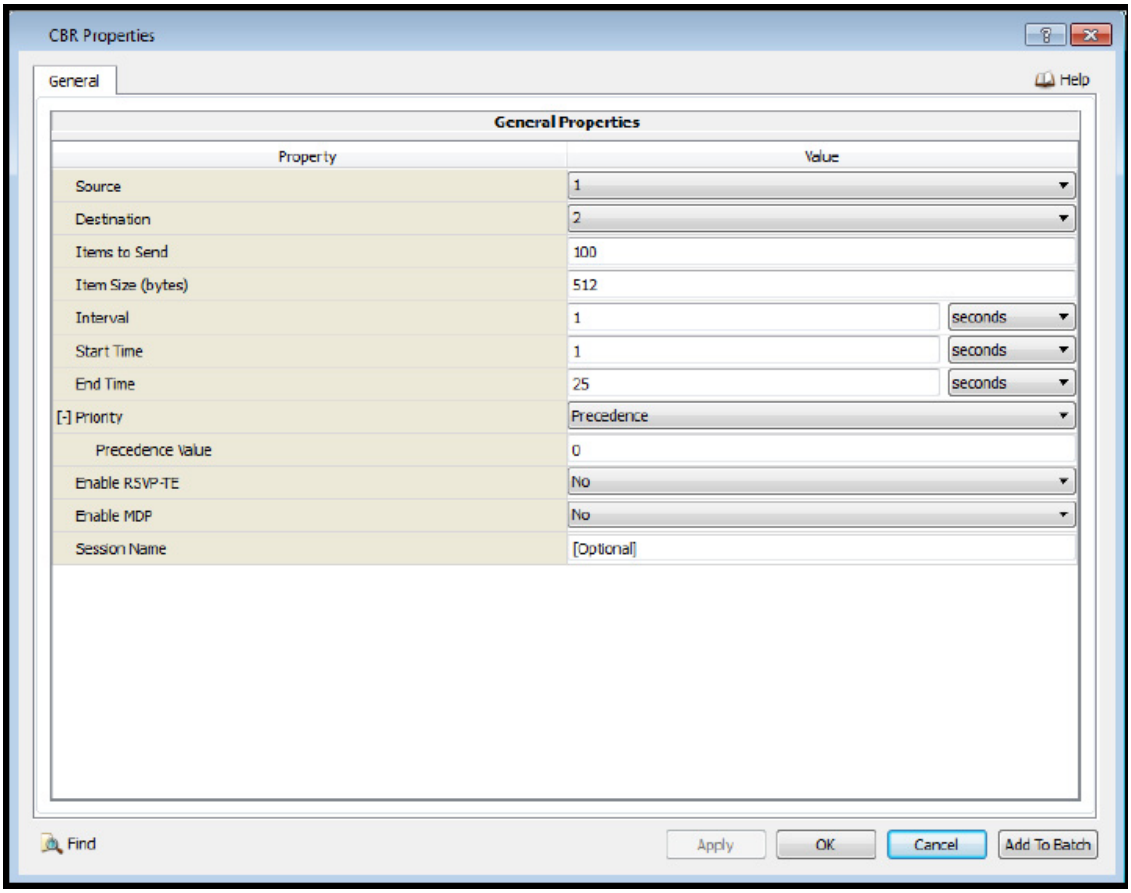
Step 5: Select the **Applications** tab of **Standard Toolset window**

Select **CBR** and draw the application between Node 1 and Node 2. Similarly Node 2 to Node 3 and Node 3 Node 1.



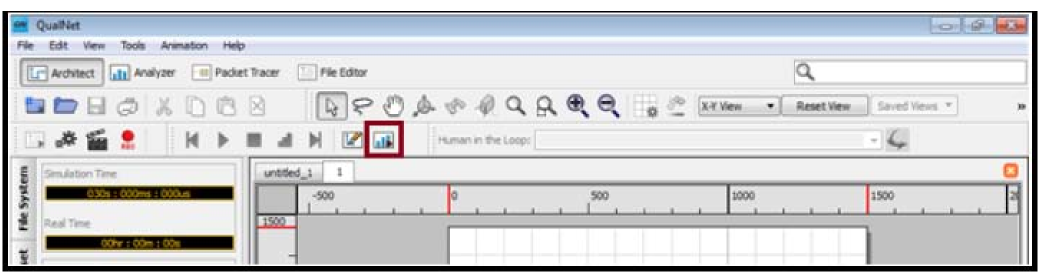
Step 6: To set CBR Application parameters, go to Table View (bottom panel of GUI) →Application Tab→double click on CBR Application

Set the number of CBR packets (Items to send) as per the user requirement.



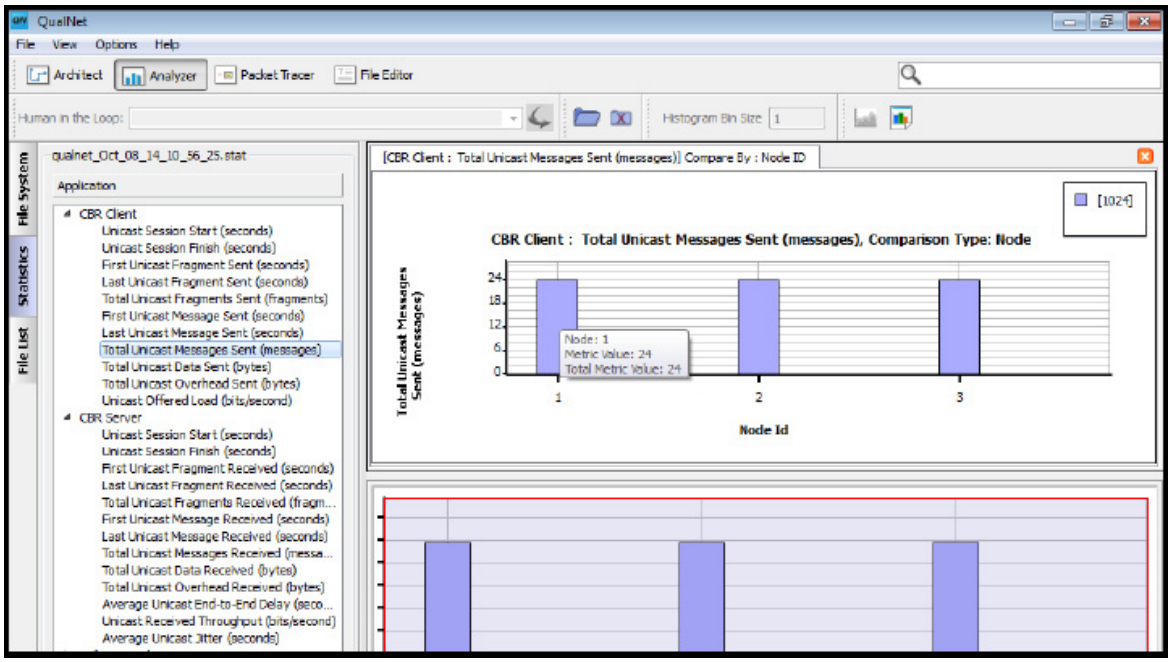
Step 7: Save the changes by clicking on the **Save** button. Click on the **Run** button. Click on the **Play** button to execute the scenario.

Step 8: On completion of the Scenario execution, check the corresponding Statistics for the desired results click on **Analyze Statistics of Current Scenario.**



Step 9: To check the no. of packets at sender, go to Application tab →CBR Client→Total Unicast Messages Sent

To check the no. of packets at receiver, go to Application tab→CBR Server →Total Unicast Messages Received



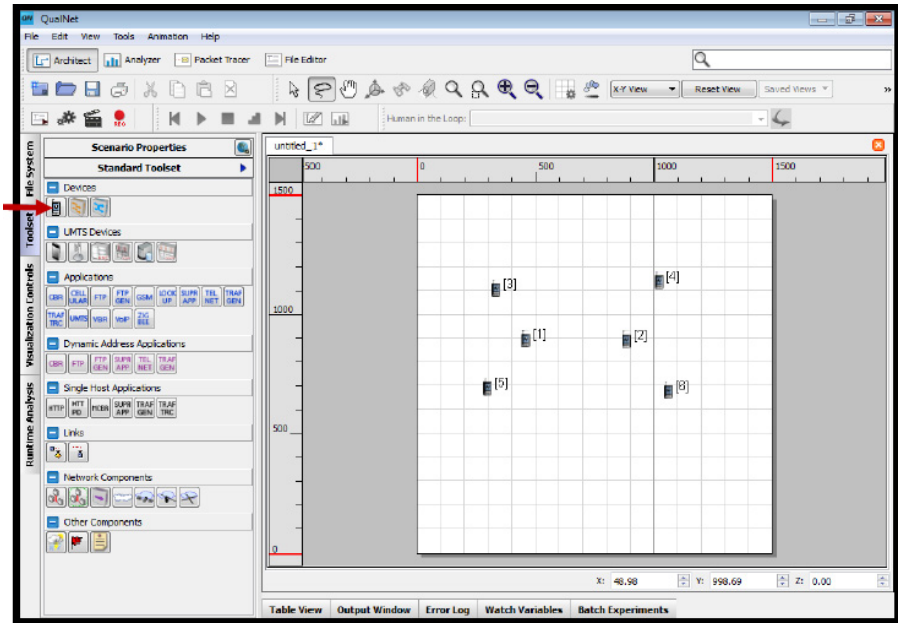
Note: The packet drop is calculated as follows:

Packet drop = Total no. of packets sent – Total no. of packets received

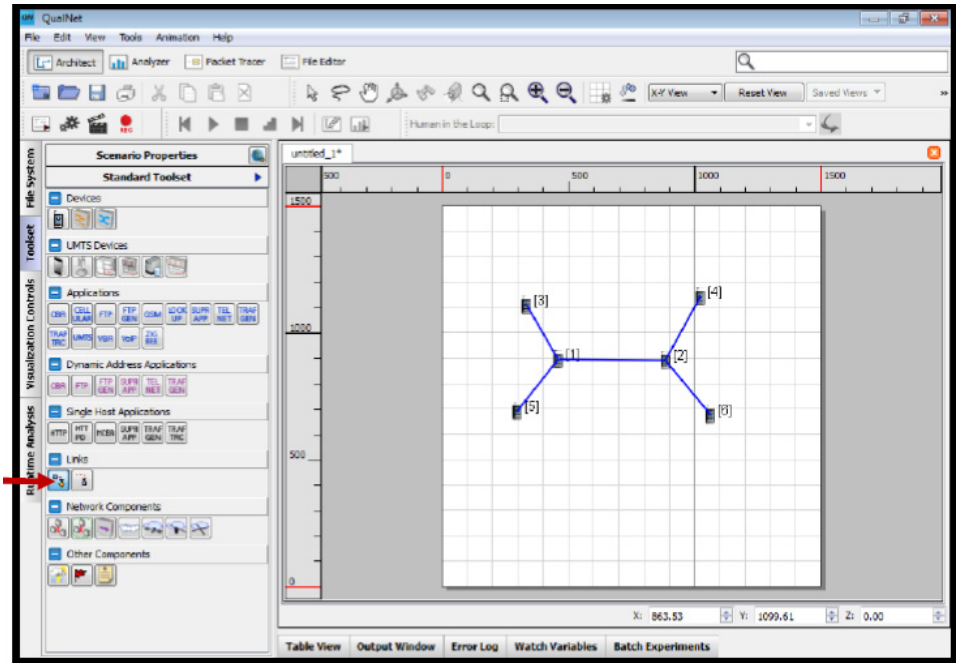
B) Procedure: Go to File→new→save as→congestion

Select Scenario Properties → General Settings → Give Experiment Name, Simulation Time Click Apply, Ok

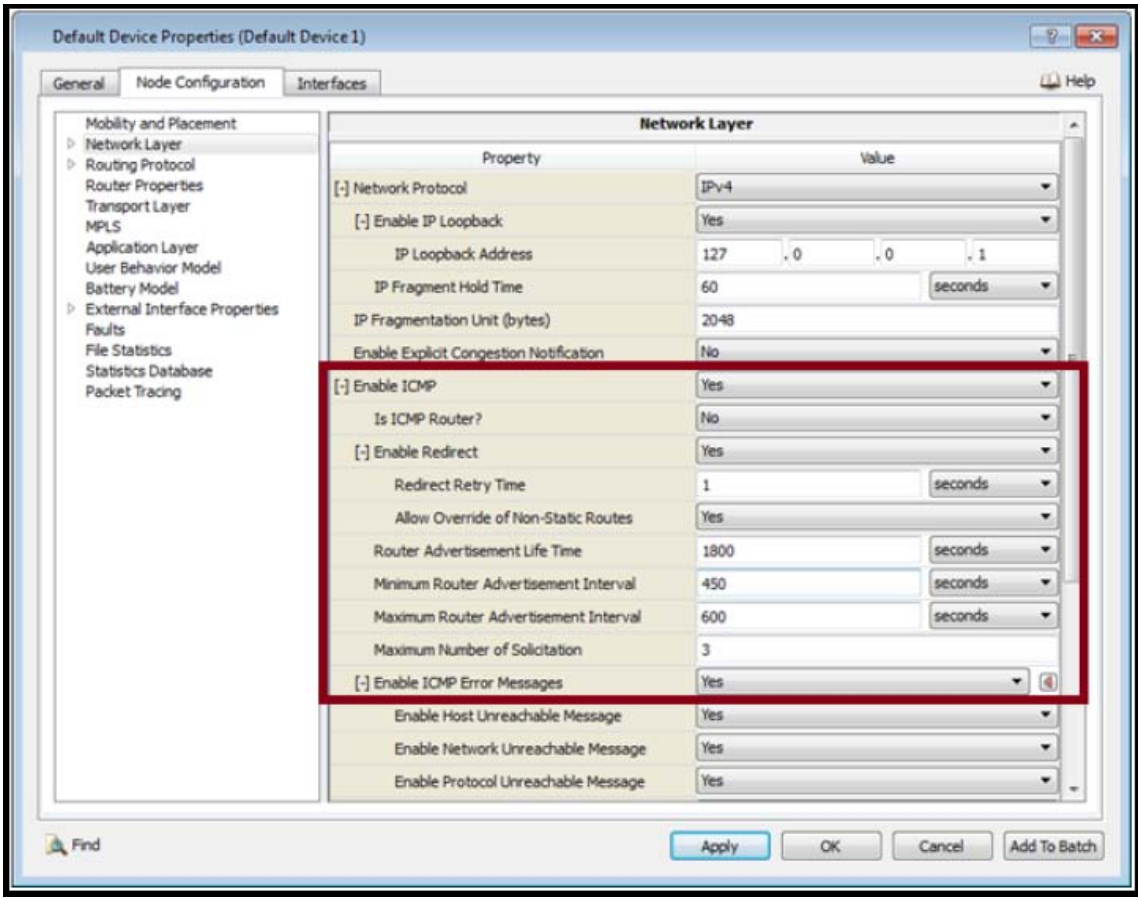
Step 1: Select Default icon from **Standard Toolset window** and Place the Six nodes on the canvas.



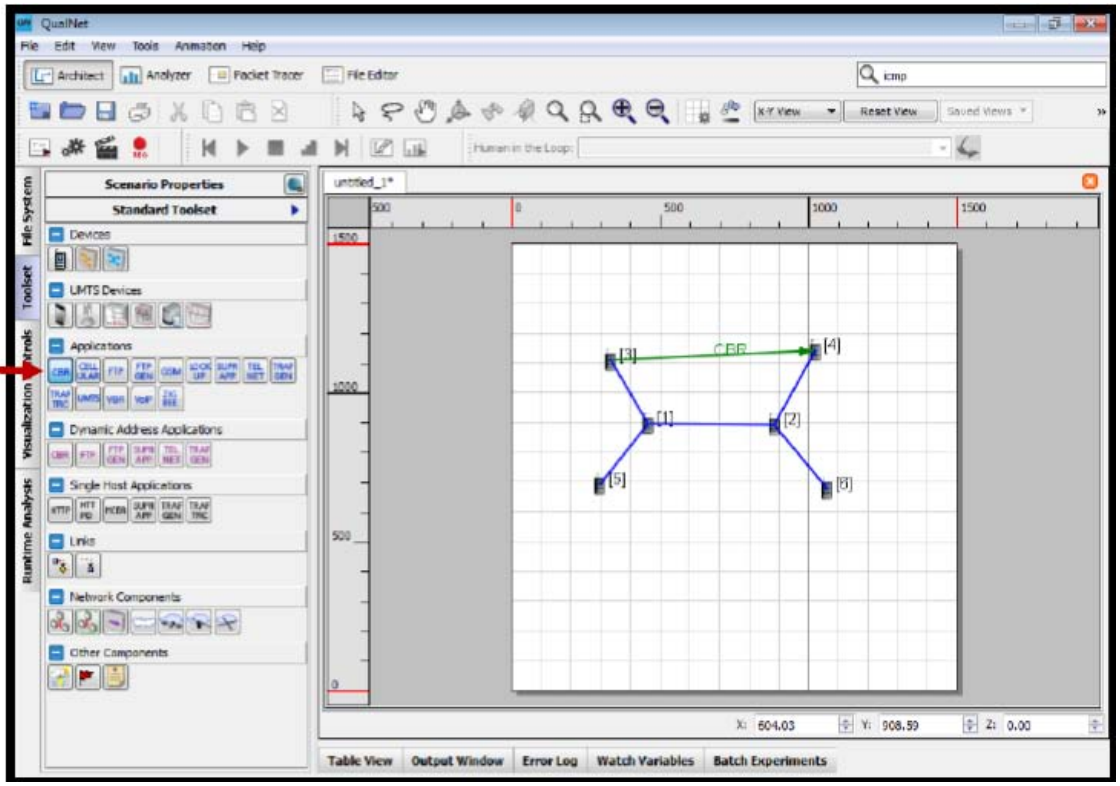
Step 2: Connect point-to-point link between three nodes using **link** from **Standard Toolset window.**



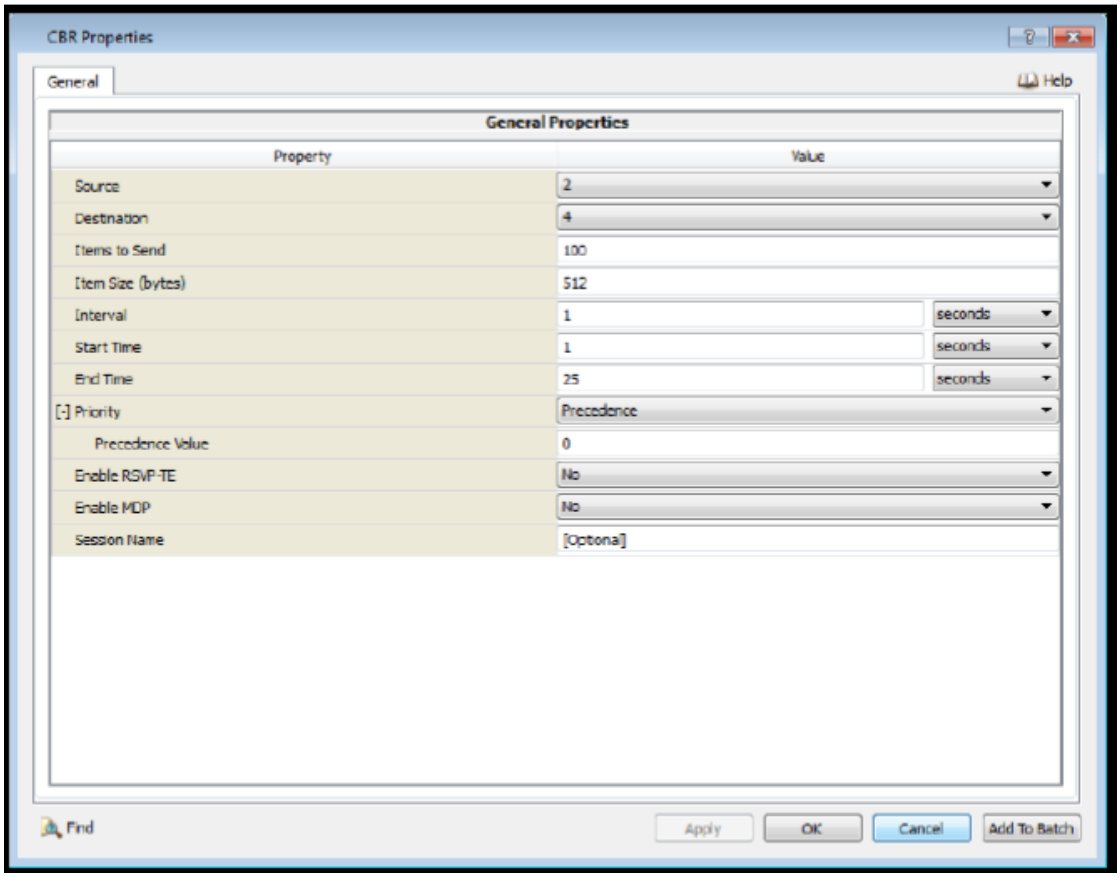
Step 3: To set ICMP of each node in the scenario double click on the nodes, go to Node Configuration tab→Network Layer→Enable ICMP.



Step 4: Select the **Applications** tab of **Standard Toolset window**
Select **CBR** and draw the application between Node 3 and Node 4.



Step 5: To set CBR Application parameters, go to Table View (bottom panel of GUI) →Application Tab→ double click on CBR Application.
Set the number of CBR packets (Items to send) as per the user requirement.



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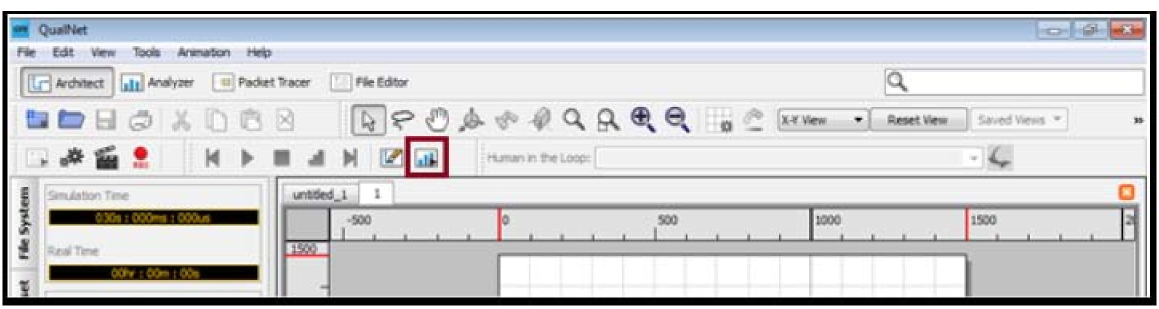
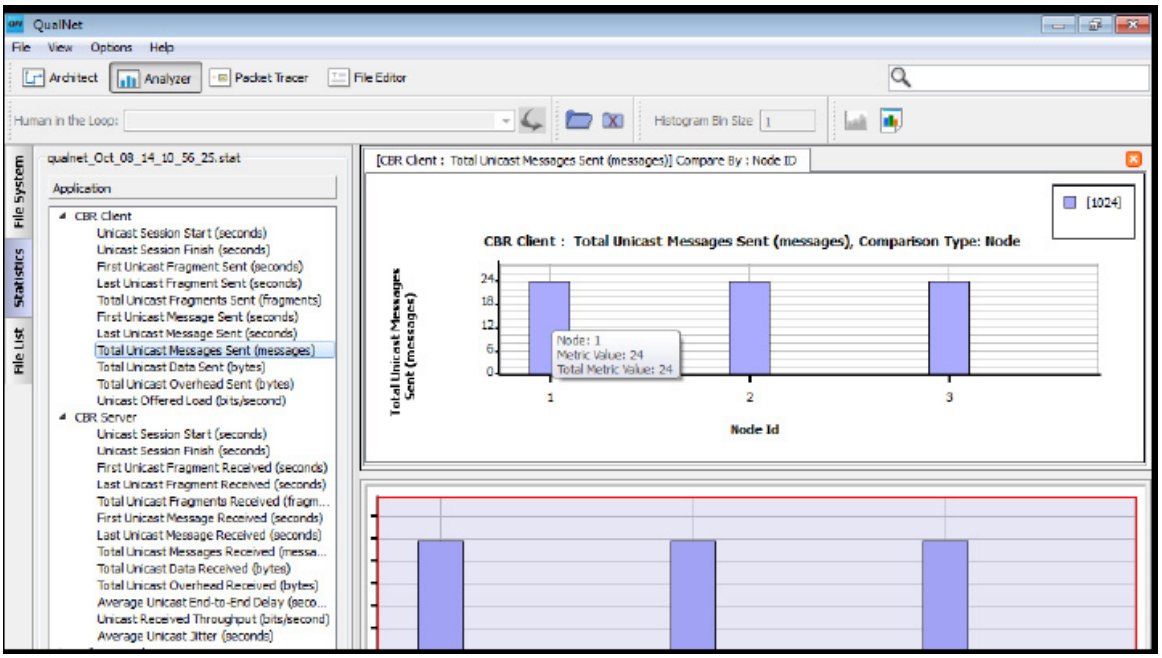
Step 7: On completion of the Scenario execution, check the corresponding Statistics for the desired results click on **Analyze statistics of Current Scenario.**



Step 8: To check the no. of packets at sender, go to Application tab→CBR Client →Total Unicast Messages Sent

To check the no. of packets at receiver, go to Application tab→CBR Server→Total Unicast Messages Received



Similarly, observe Average End-to-End Delay, Throughput, and Jitter.

Note: The packet drop is calculated as follows
Packet drop =Total no. of packets sent – Total no. of packets received

Exercise 1: Simulate a four node point-to-point network with the links connected as follows: n1-n3, n2-n3 and n3-n4, Apply TCP agent between n1-n4 and UDP between n2-n4. Apply relevant application over TCP and UDP agents changing the parameters and determine the number of packets sent by TCP/UDP.