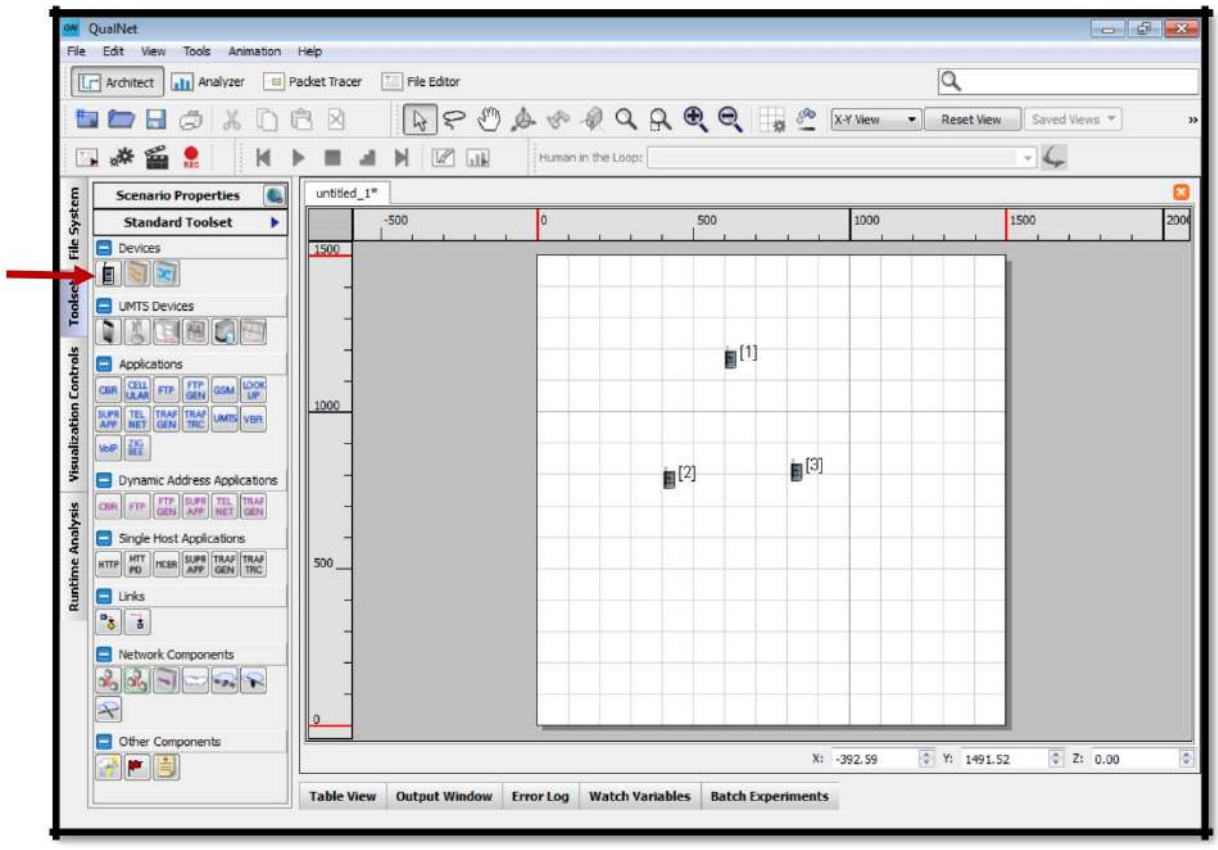
PART B

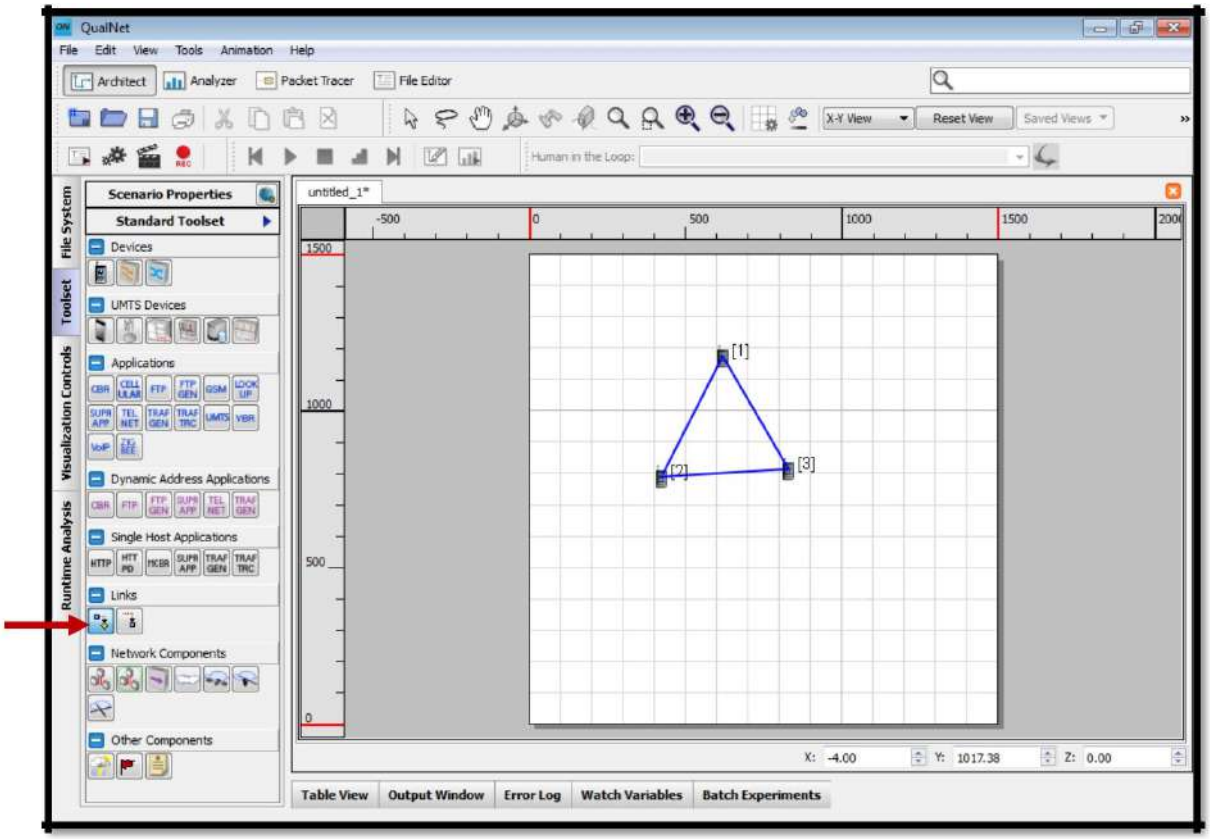
EXPERIMENT NO 1 .

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**.**

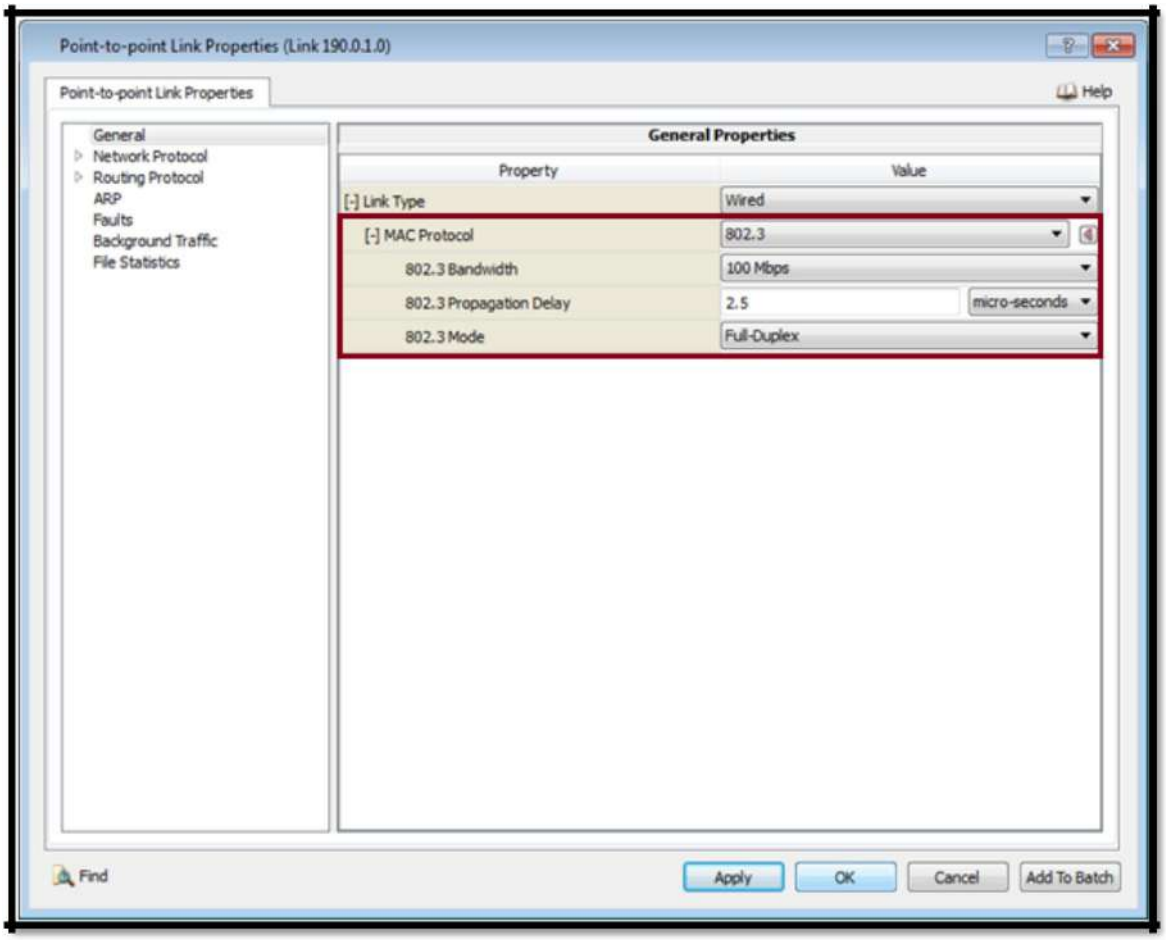
Step 1: Select Default icon from **Standard Toolset window** and Place the three nodes on the canvas.



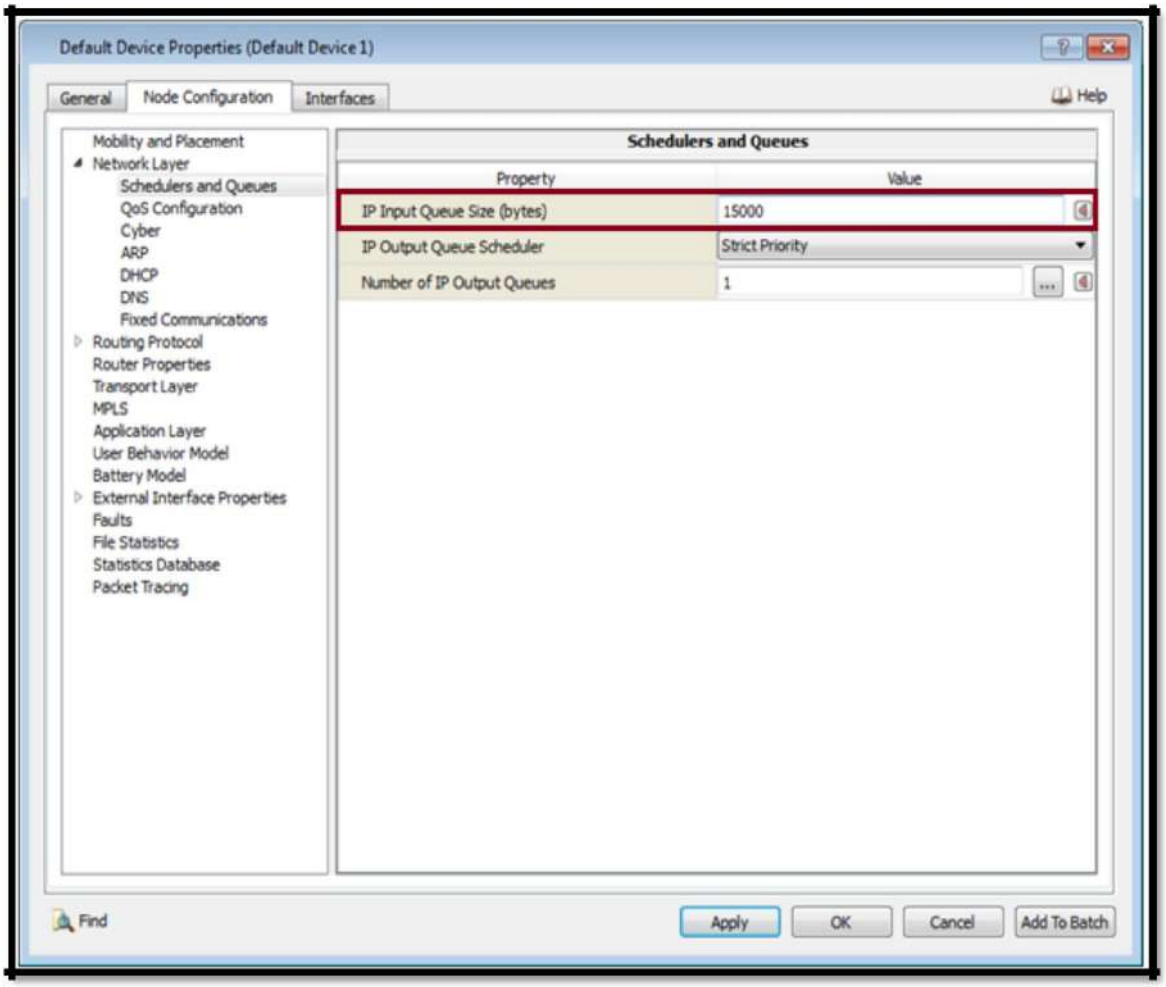
Step 2: Connect point-to-point link between three nodes using **link** from **Standard Toolset window**



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

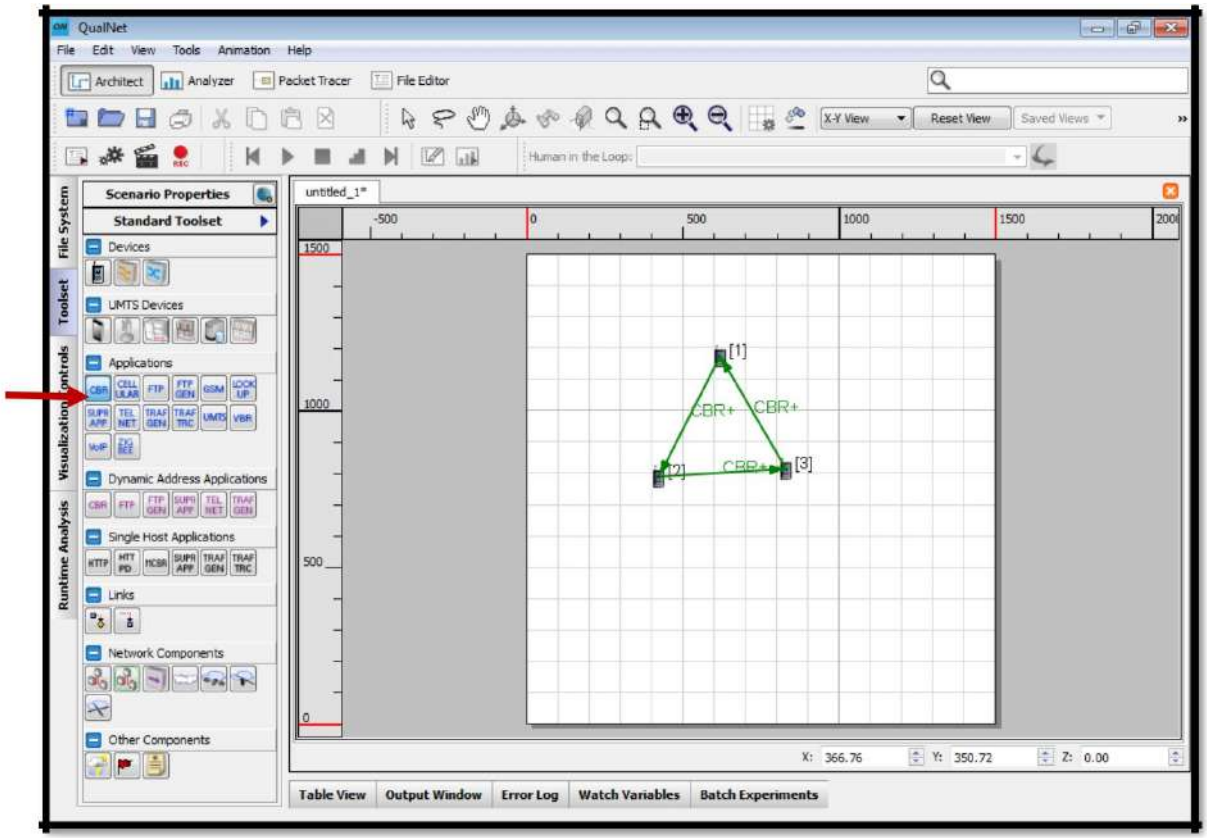


Step 4: To set queue size of each node in the scenario double click on the nodes, go to Node Configuration tab->Network Layer-> Schedulers and Queues.



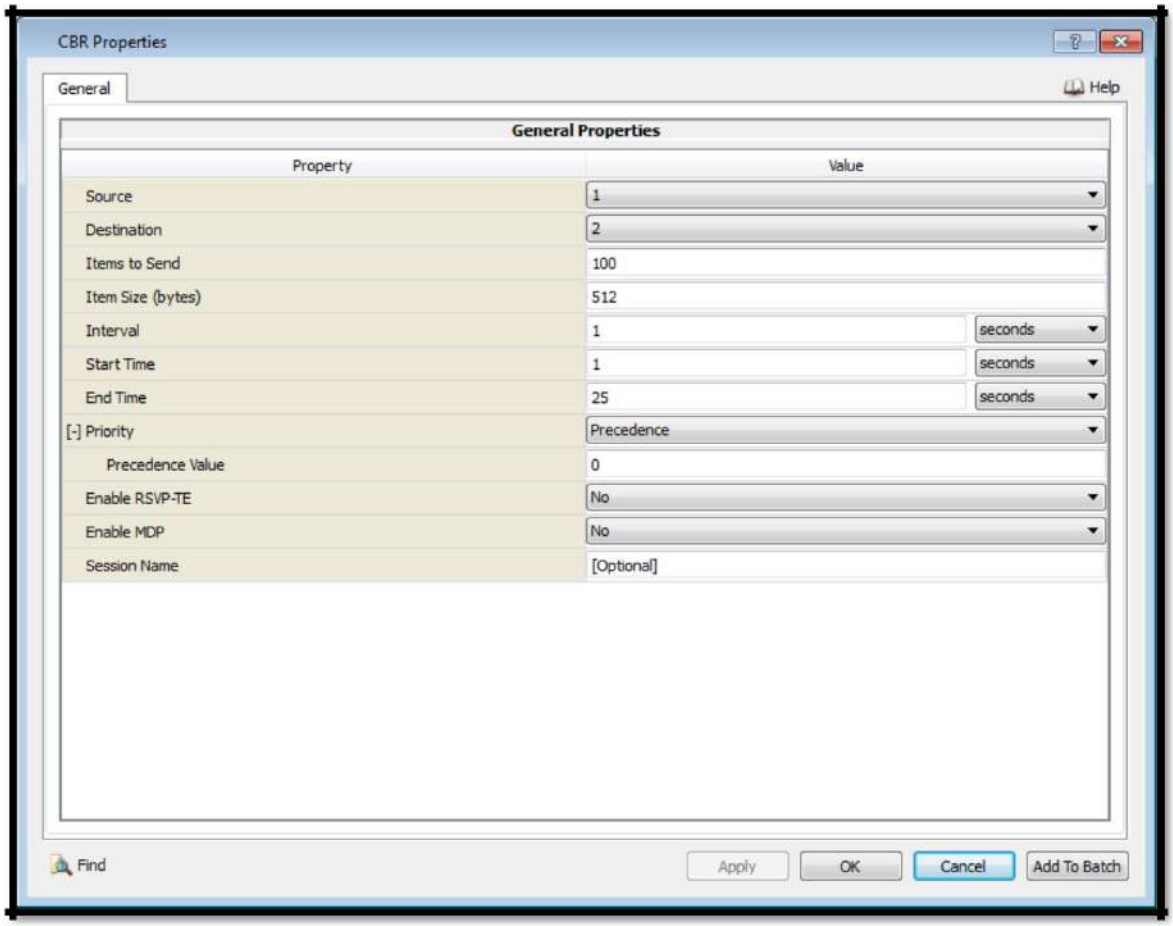
Step 5: Select the **Applications** tab of **Standard Toolset window**

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



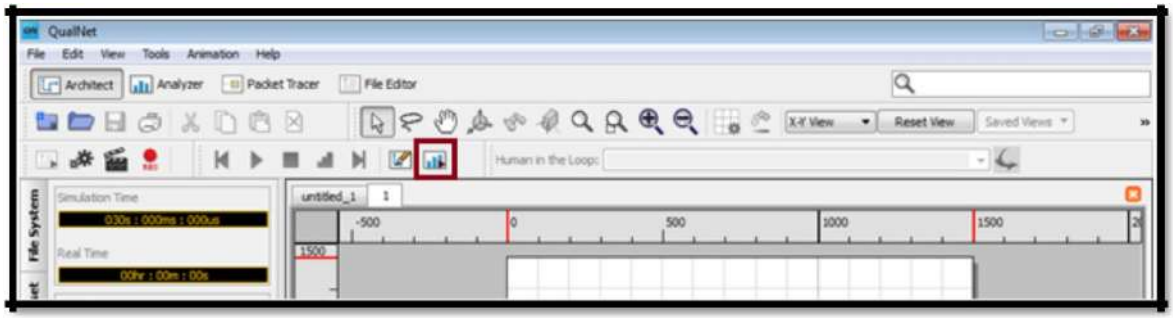
Step 6: To set CBR Application parameters, go to Table View (bottom panel of GUI) ->Application Tab-> double click on CBR Application

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



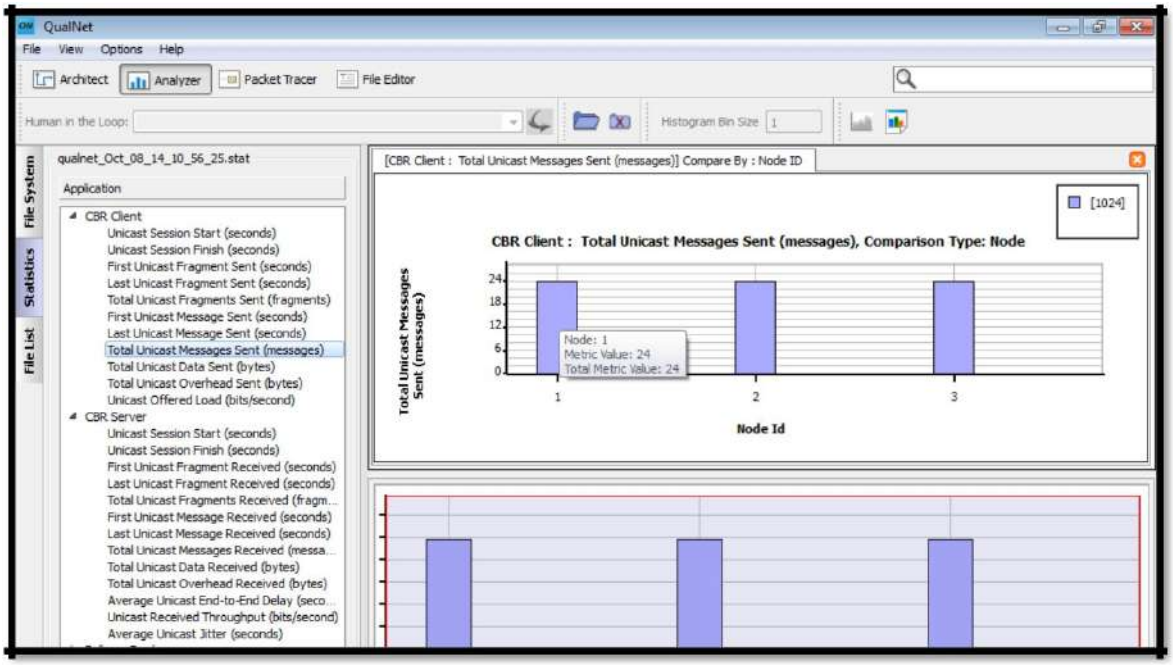
Step 7: Save the changes by clicking on the **Save** button. Click on the **Run** button. Click on the **Play** button to execute the scenario.

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



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



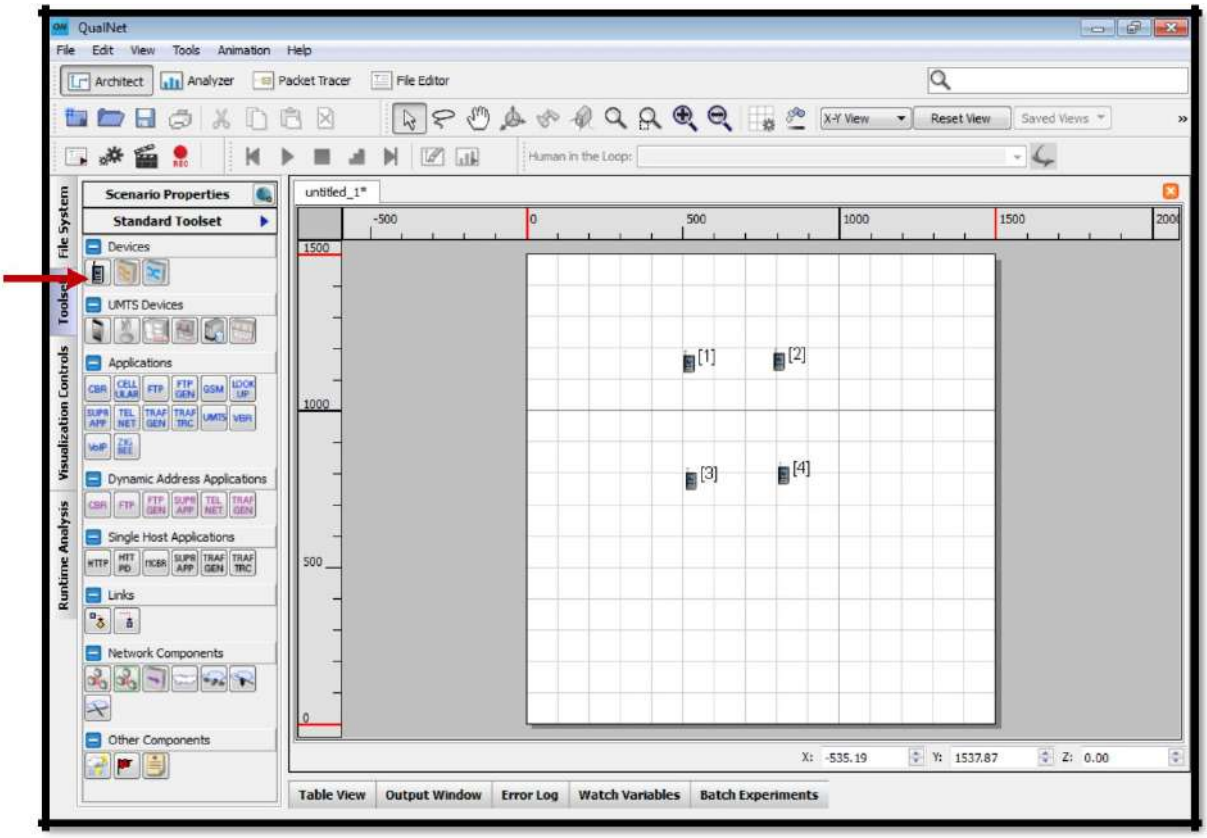
Note: The packet drop is calculated as follows:

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

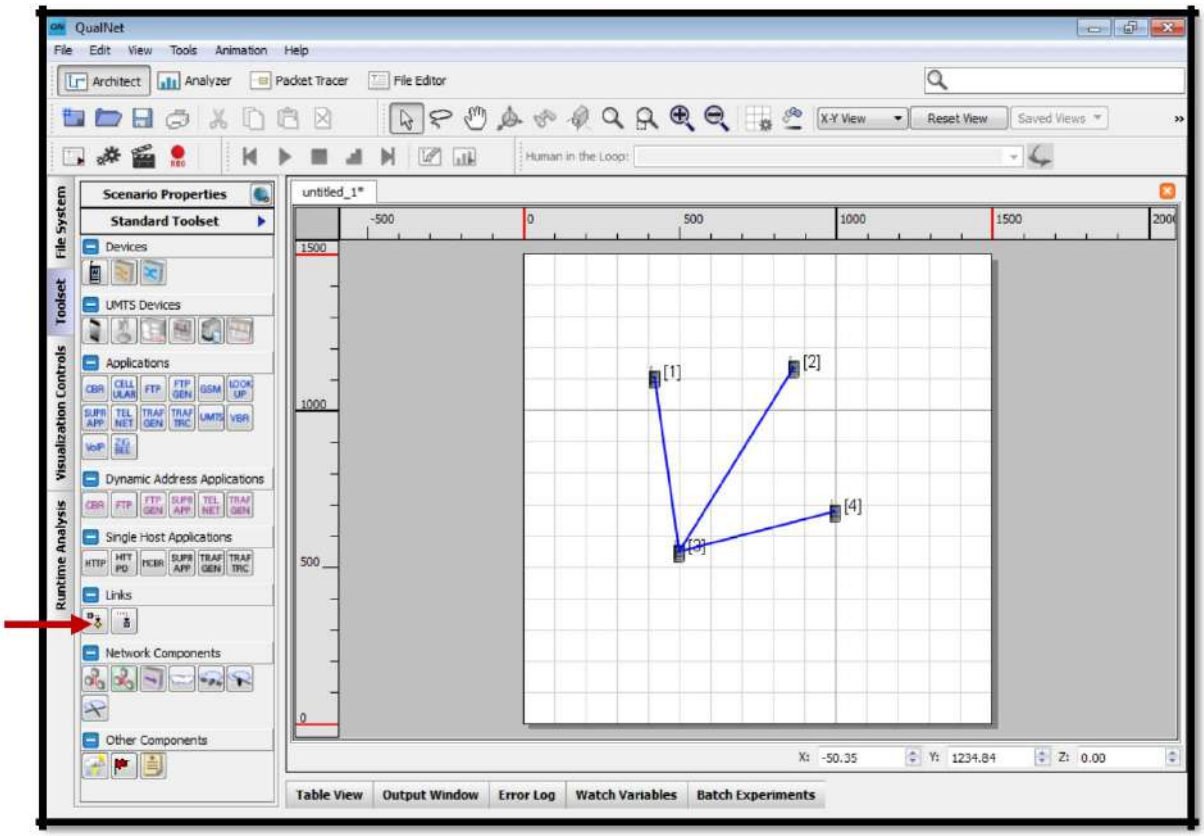
EXPERIMENT NO 2

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.

Step1: Select Default icon from **Standard Toolset window** and Place the four nodes on the canvas.



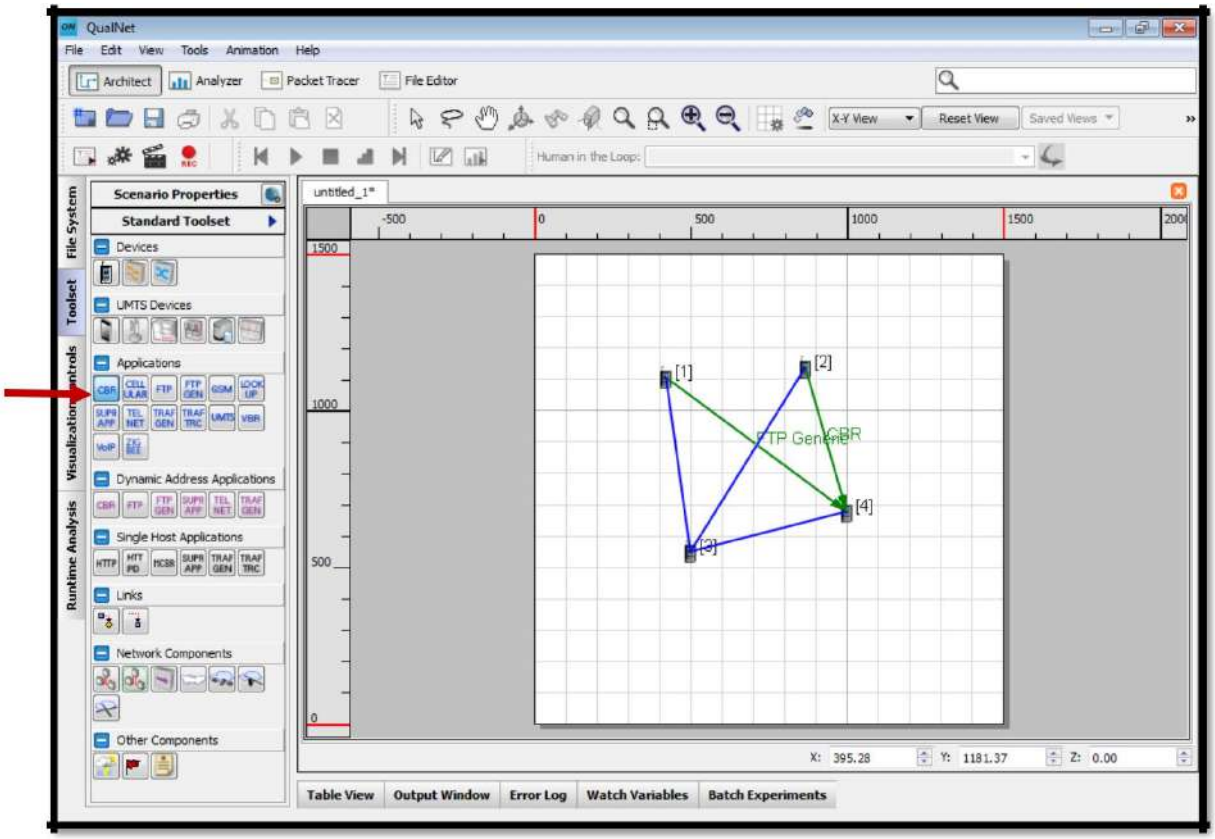
Step 2: Connect point-to-point link between four nodes using **link** from **Standard Toolset window**



Step 3: Select the **Applications** tab of **Standard Toolset window**

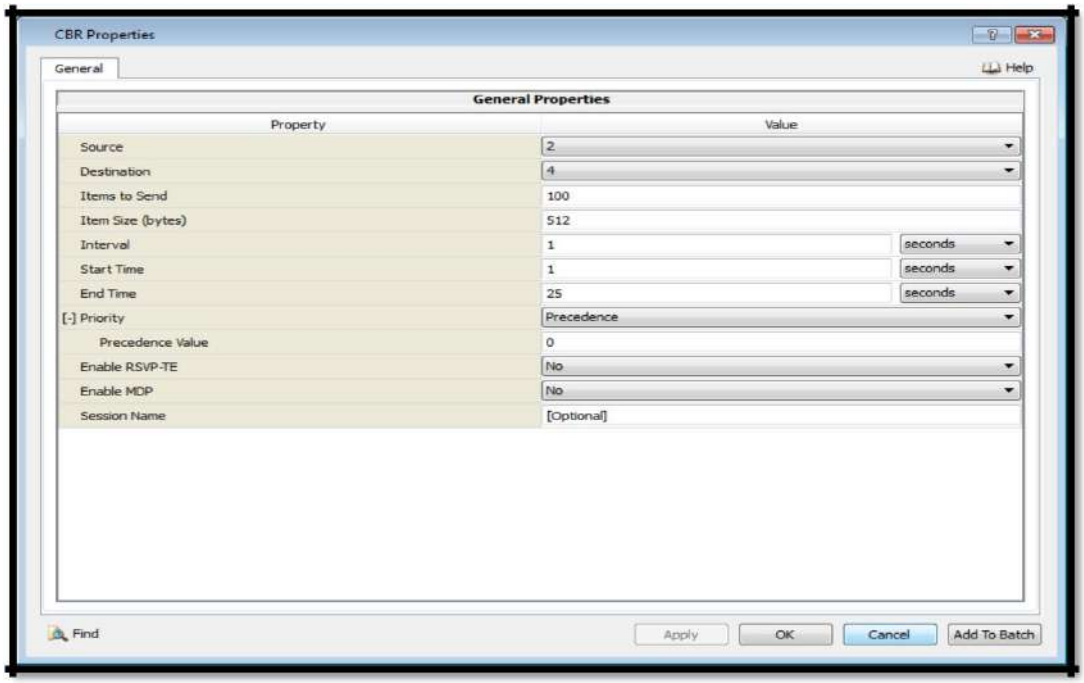
Select **CBR** and set the application between Node 2 and Node 4.

Similarly Select **FTP Generic** and set the application between Node 1 and Node 4



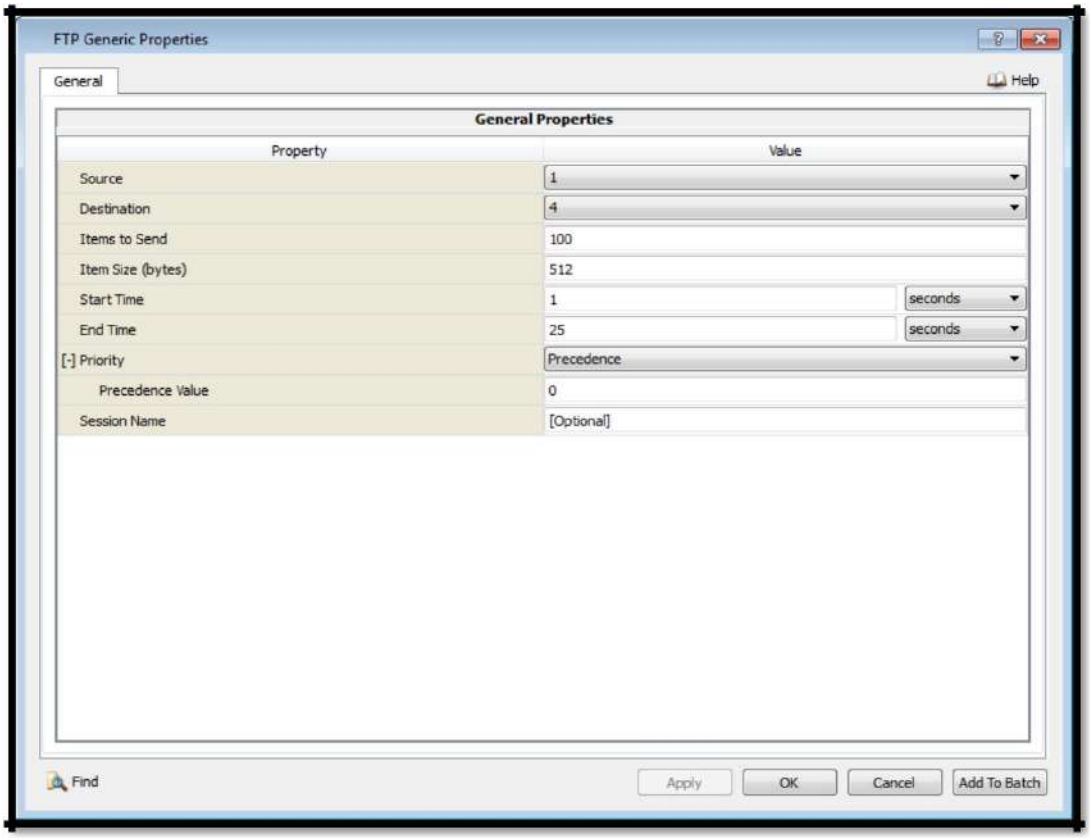
Step 4: To set CBR Application parameters, go to Table View (bottom panel of GUI) ->Application Tab-> double click on CBR Application

Set the Number Of CBR packets (Items to send) as per the user requirement

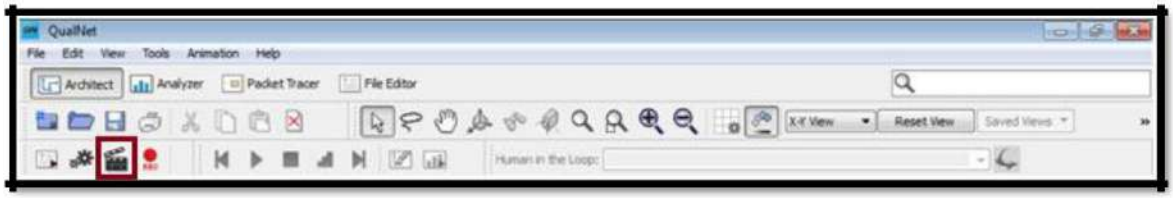


Step 5: To set **FTP Generic** Application parameters, go to Table View (bottom panel of GUI) ->Application Tab-> double click on FTP Generic Application

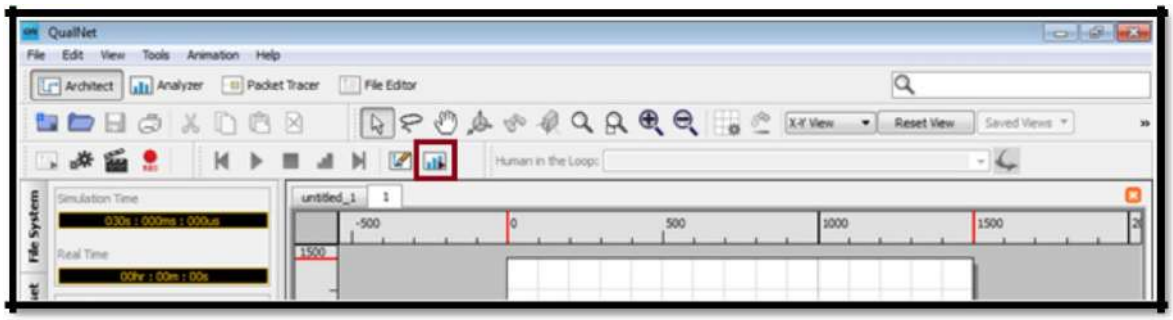
Set the no. of **FTP Generic** packets(Items to Send) as per the user requirement



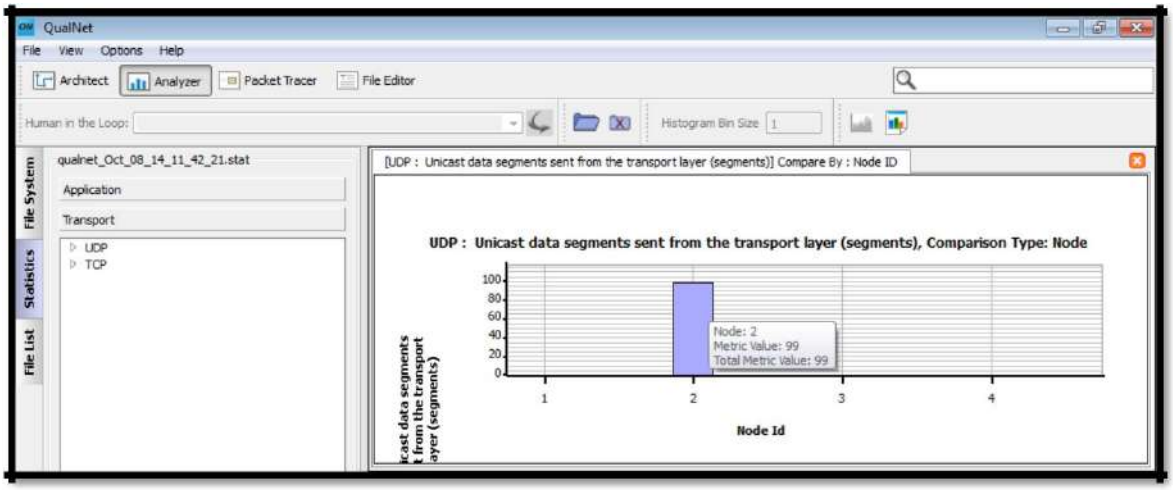
Step 6: Save the changes by clicking on the **Save** button. Click on the **Run** button. Click on the **Play** button to execute the scenario.



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



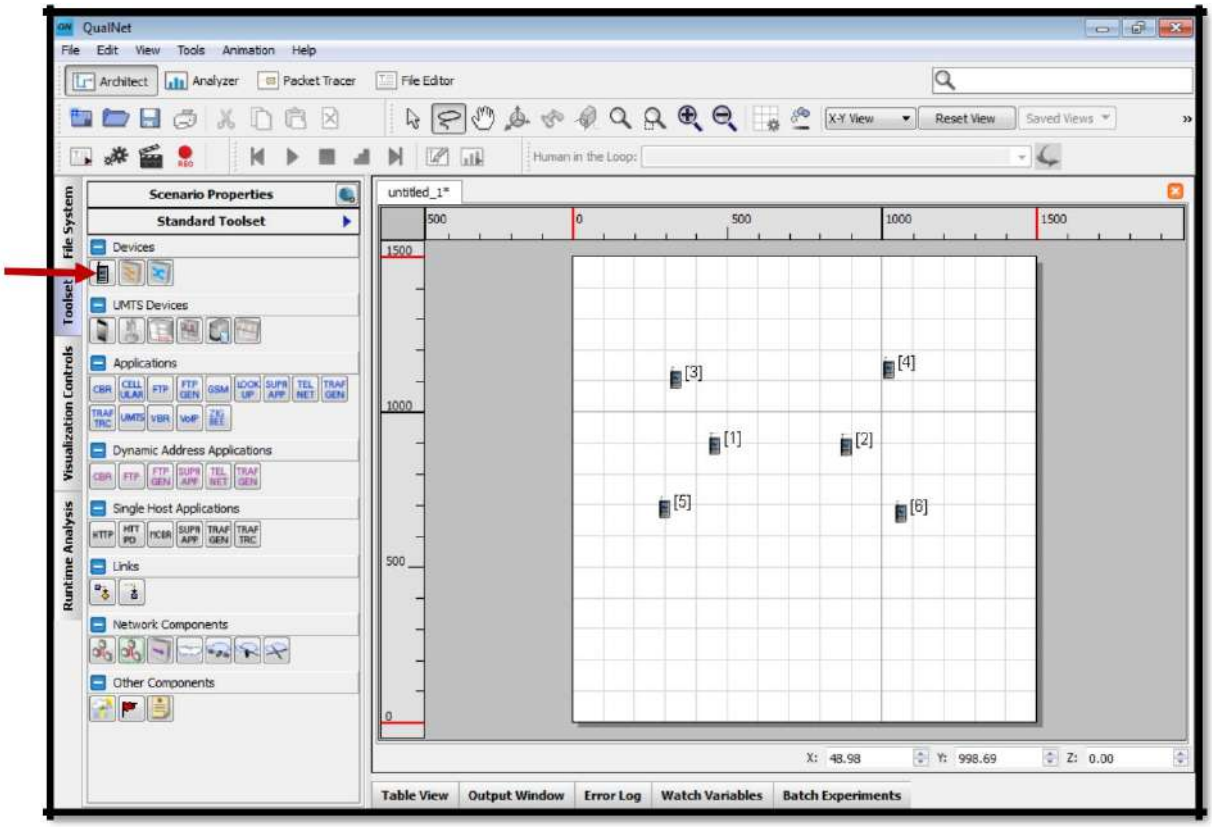
Step 8: To check the no. of packets at UDP, go to Transport tab->UDP
To check the no. of packets at TCP, go to Transport tab->TCP



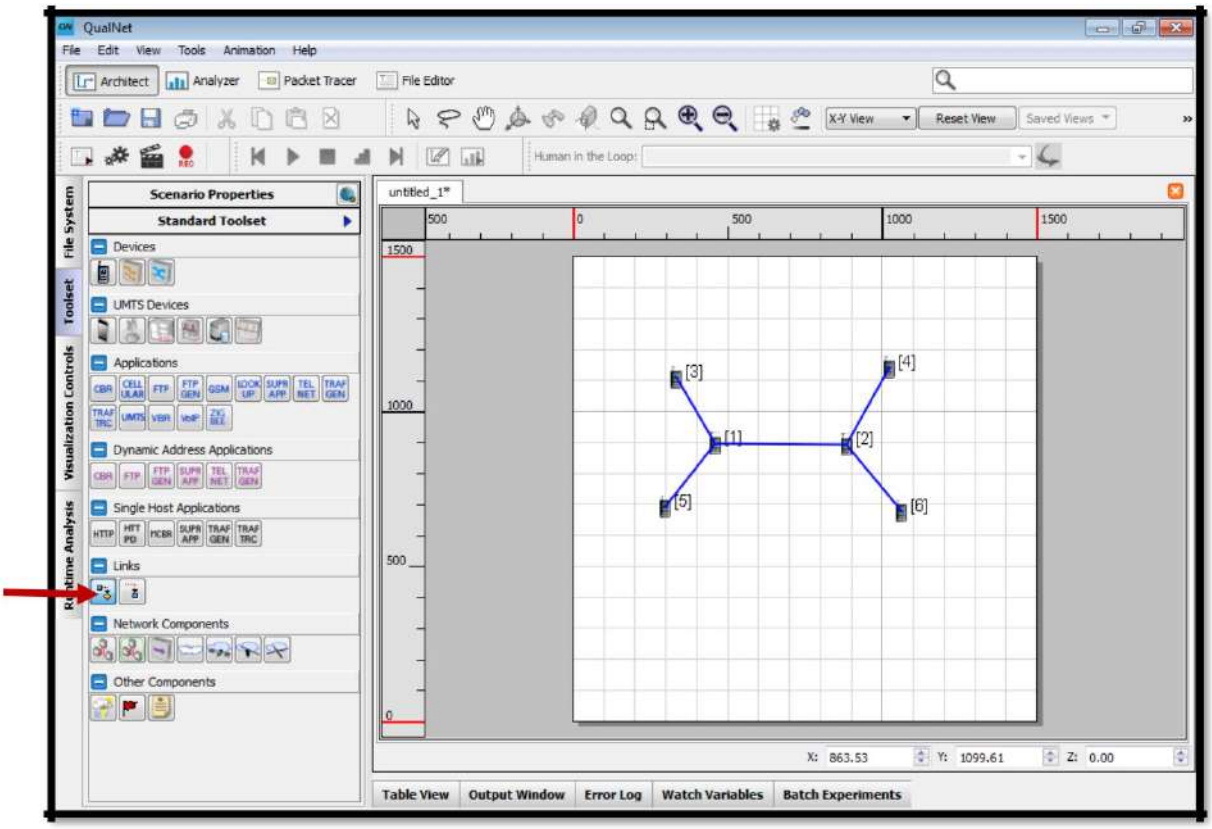
EXPERIMENT NO 3

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

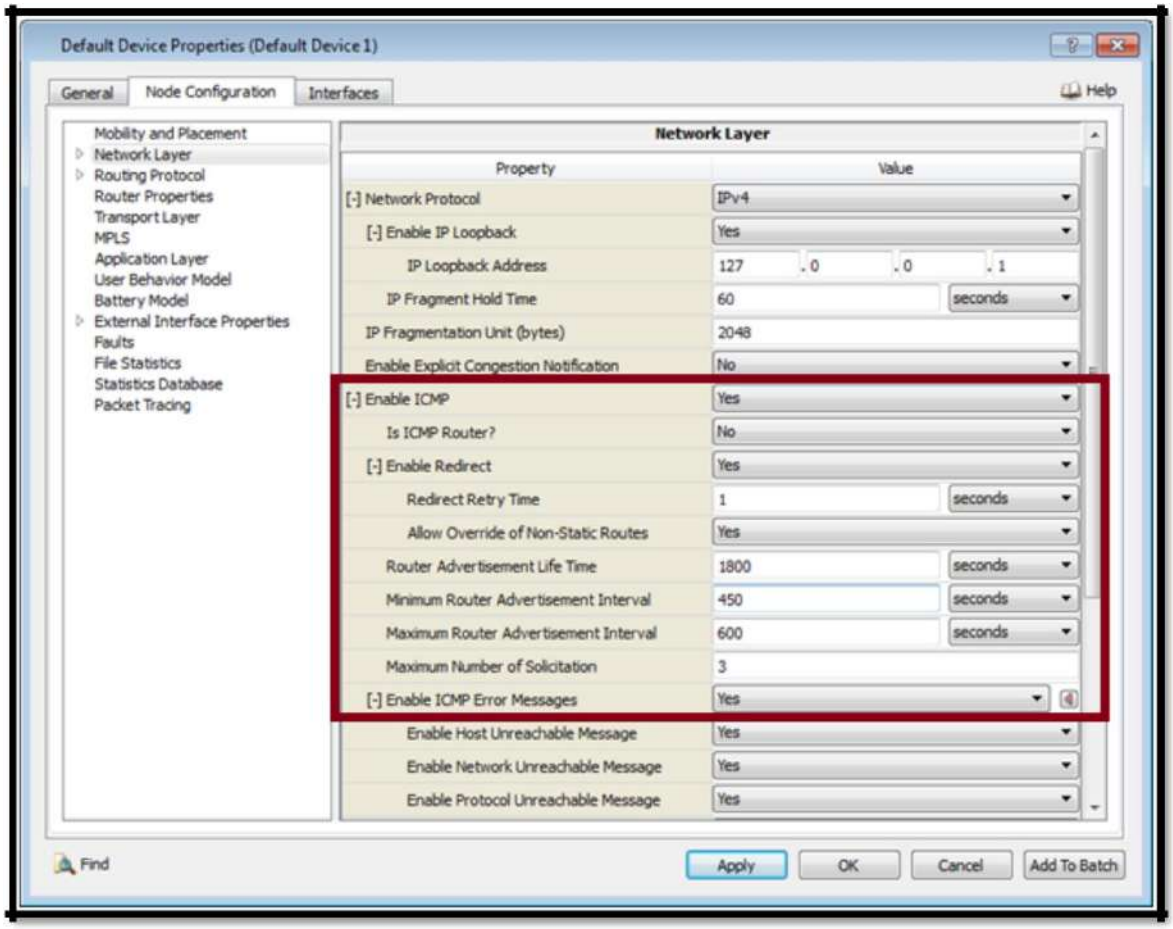
Step 1: Select Default icon from **Standard Toolset window** and Place the Six nodes on the canvas.



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

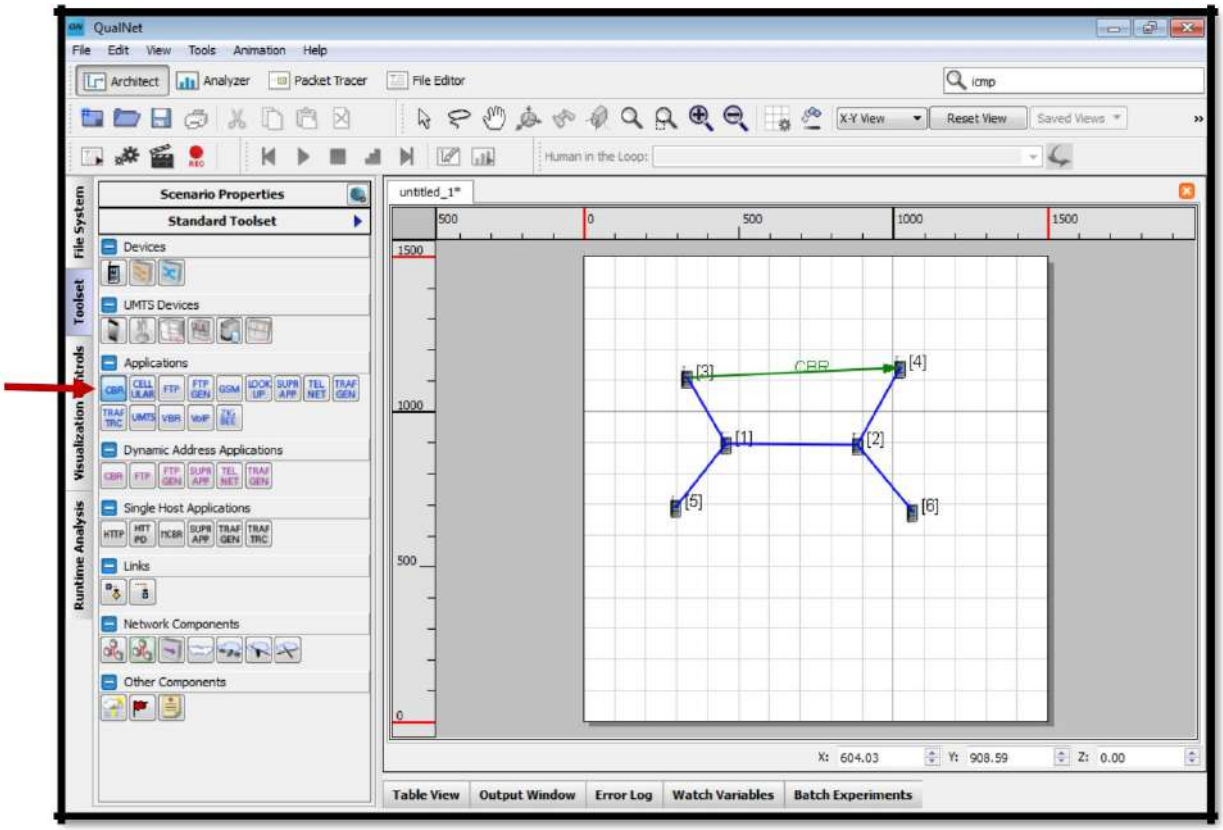


Step 3: To set ICMP of each node in the scenario double click on the nodes, go to Node Configuration tab->Network Layer-> Enable ICMP.



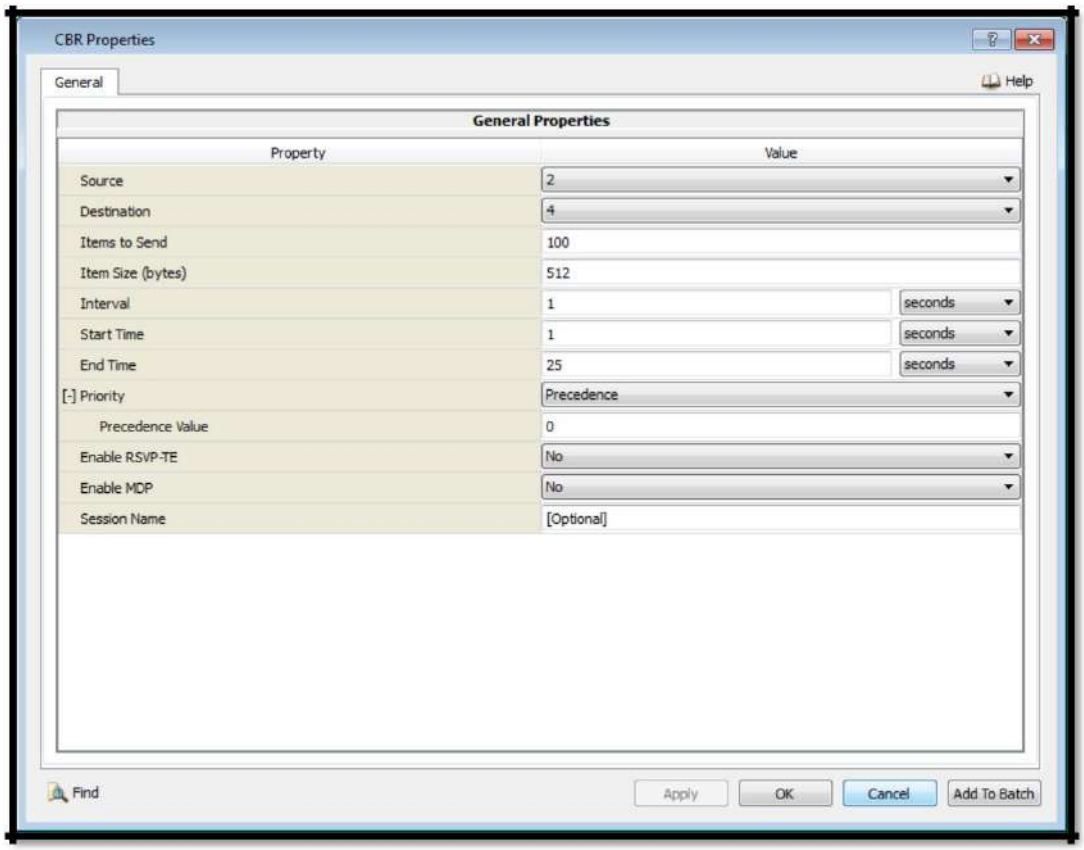
Step 4: Select the **Applications** tab of **Standard Toolset window**

Select **CBR** and draw the application between Node 3 and Node 4.



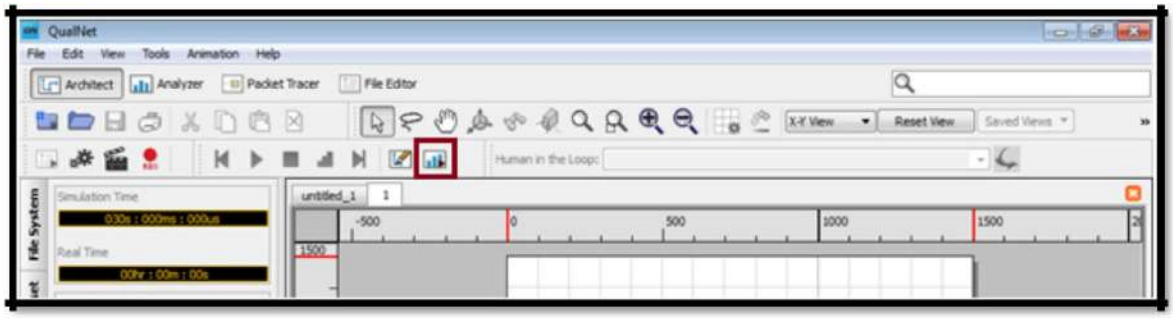
Step 6: To set CBR Application parameters, go to Table View (bottom panel of GUI) ->Application Tab-> double click on CBR Application

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



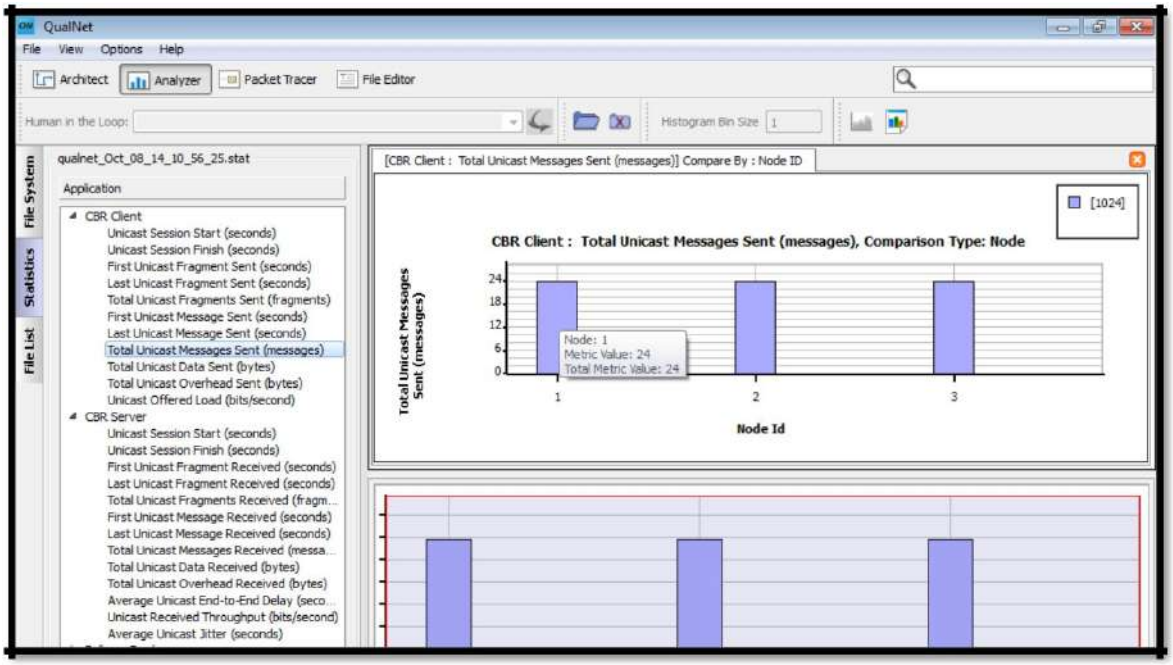
Step 7: Save the changes by clicking on the **Save** button. Click on the **Run** button. Click on the **Play** button to execute the scenario.

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



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

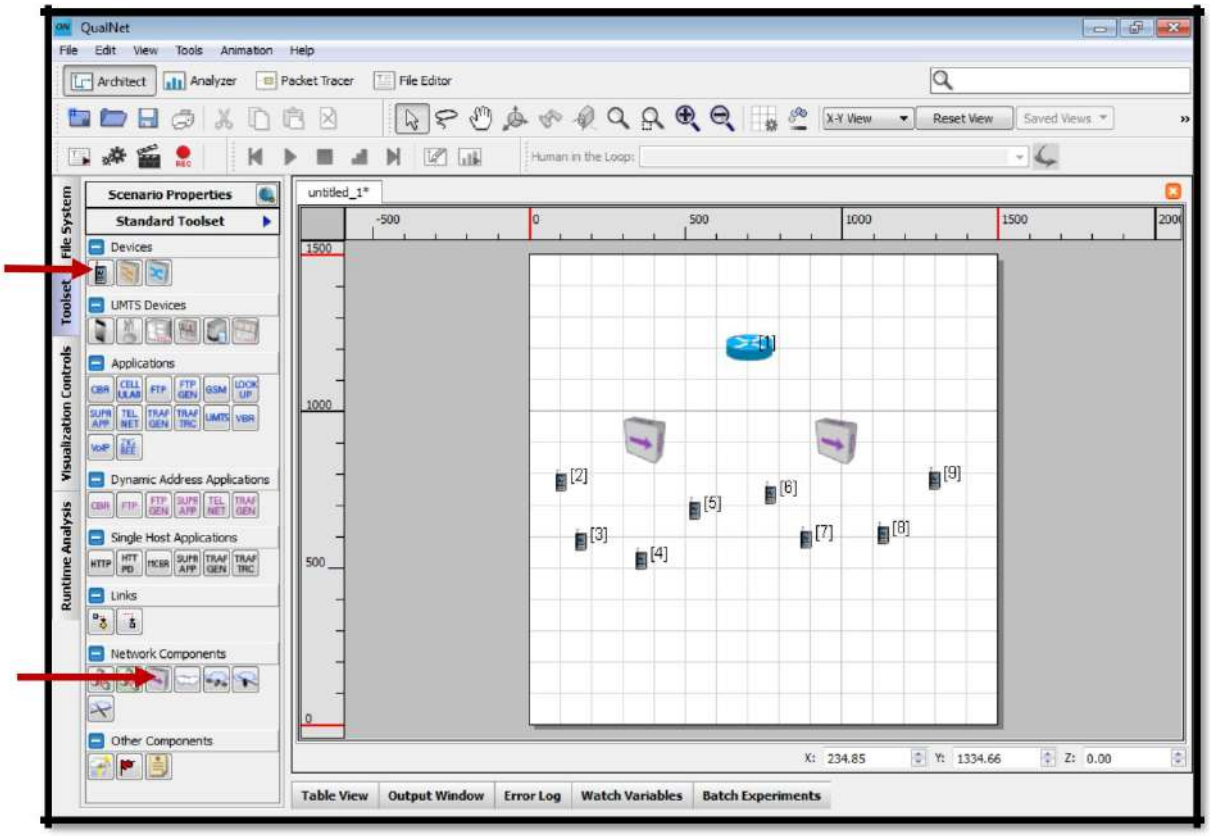
Packet drop =Total no. of packets sent – Total no. of packets received

EXPERIMENT NO 4

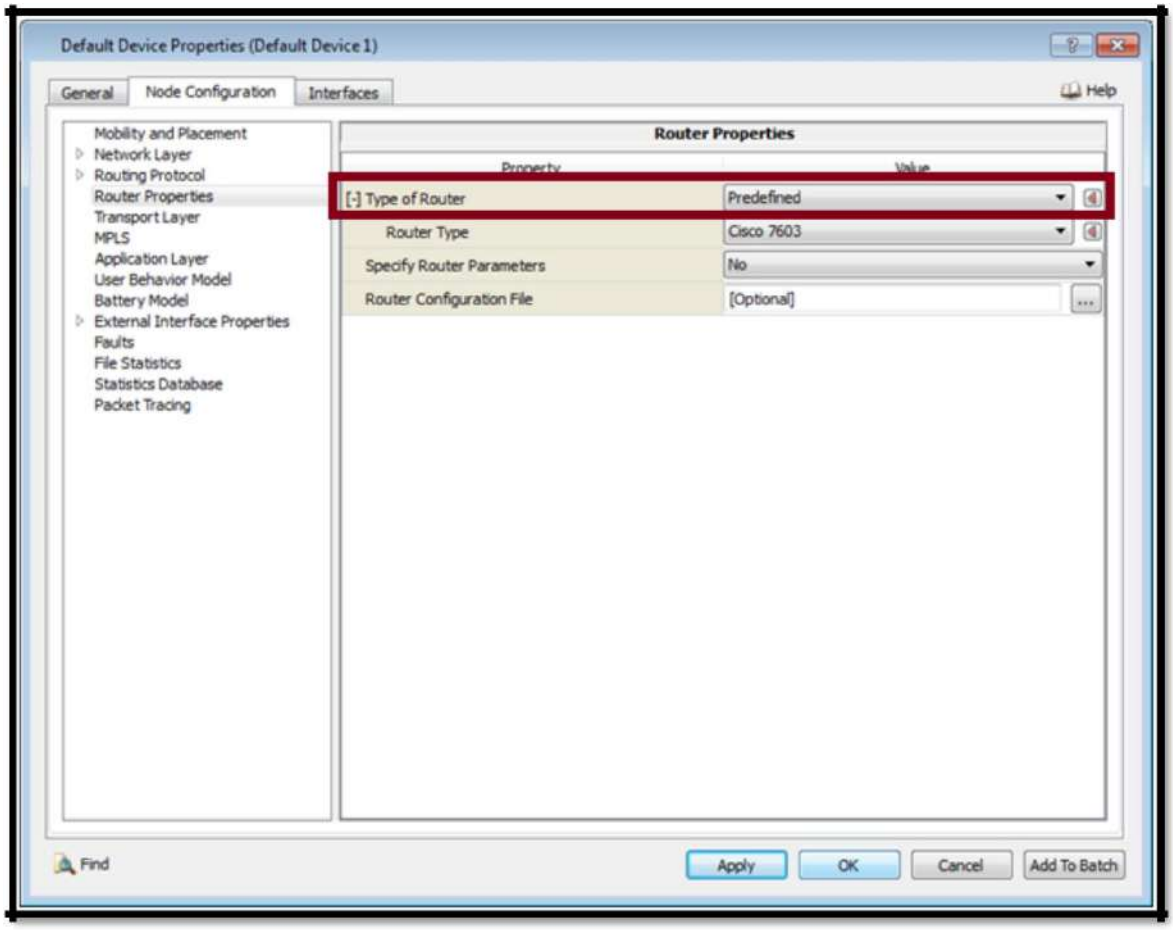
Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.

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

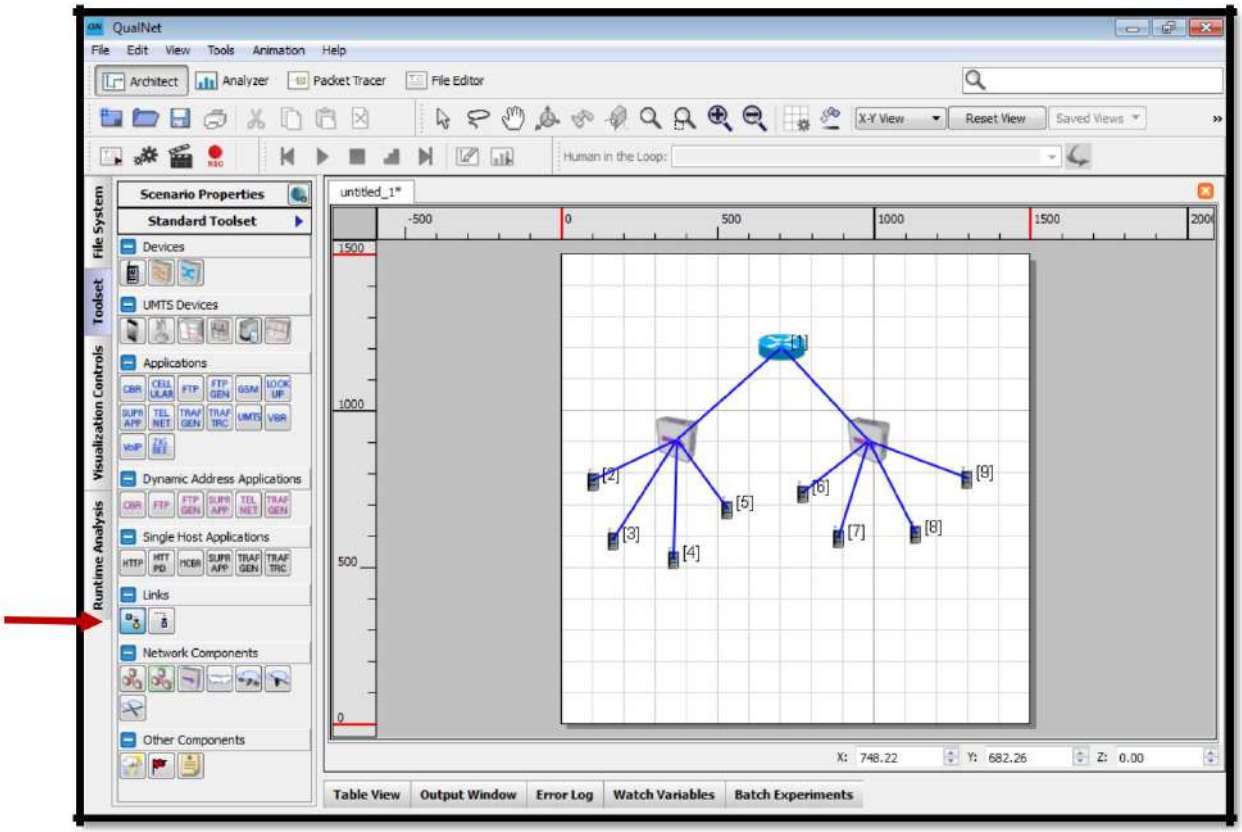
Select hubs from **Standard Toolset window** and Place the two hubs on the canvas.



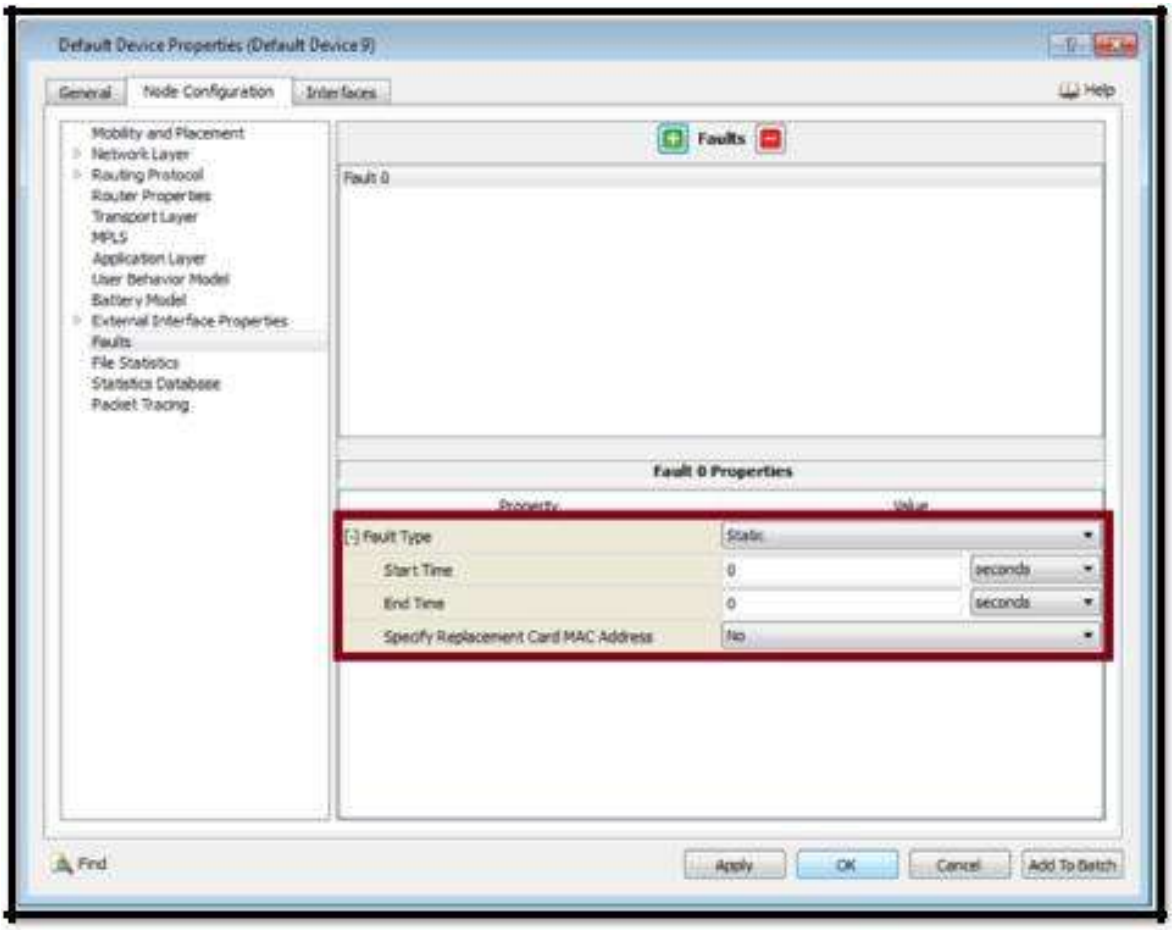
Step 2: To configure node as router double click on the node 1, go to Node Configuration tab->Router Properties->Change Type of Router as predefined.



Step 3: Connect point-to-point link between three nodes using **link** from **Standard Toolset window**



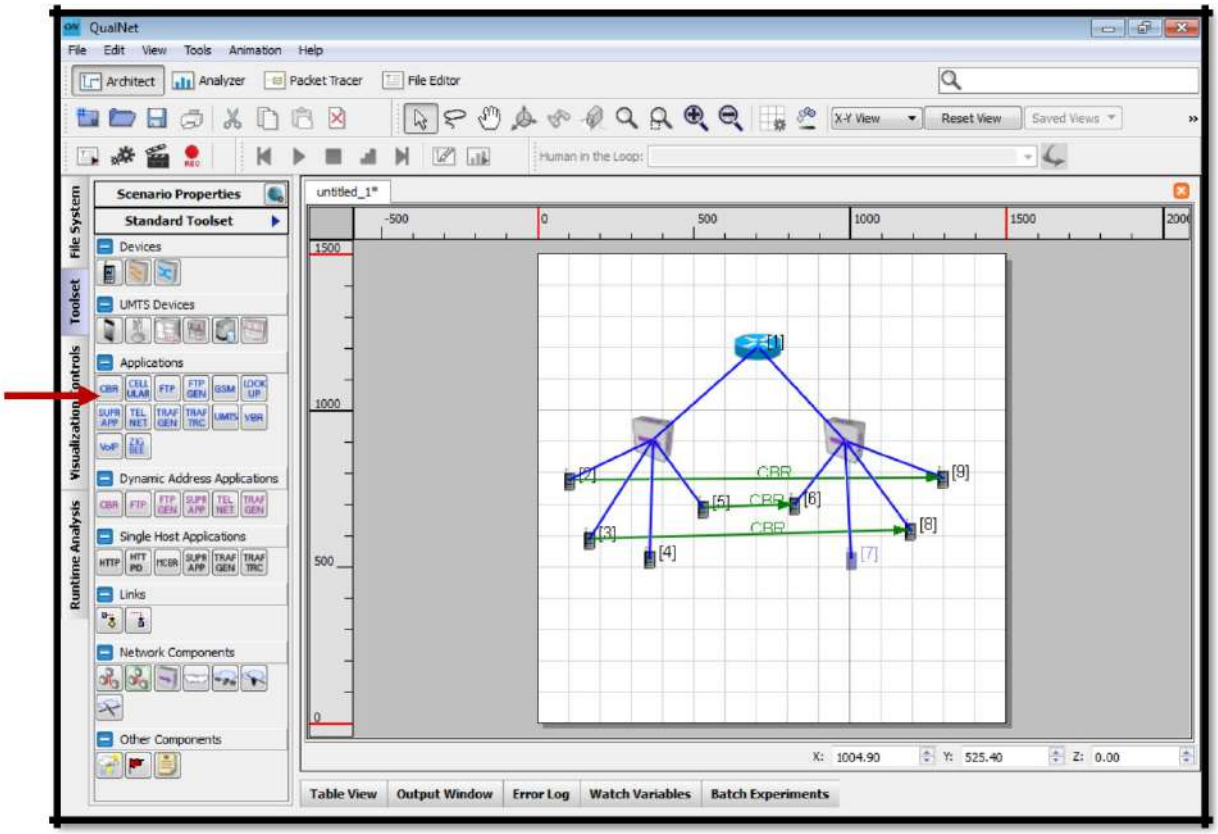
Step 4: To set error rate of the nodes double click on the nodes, go to Node Configuration tab->Faults->configure start time and end time.



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

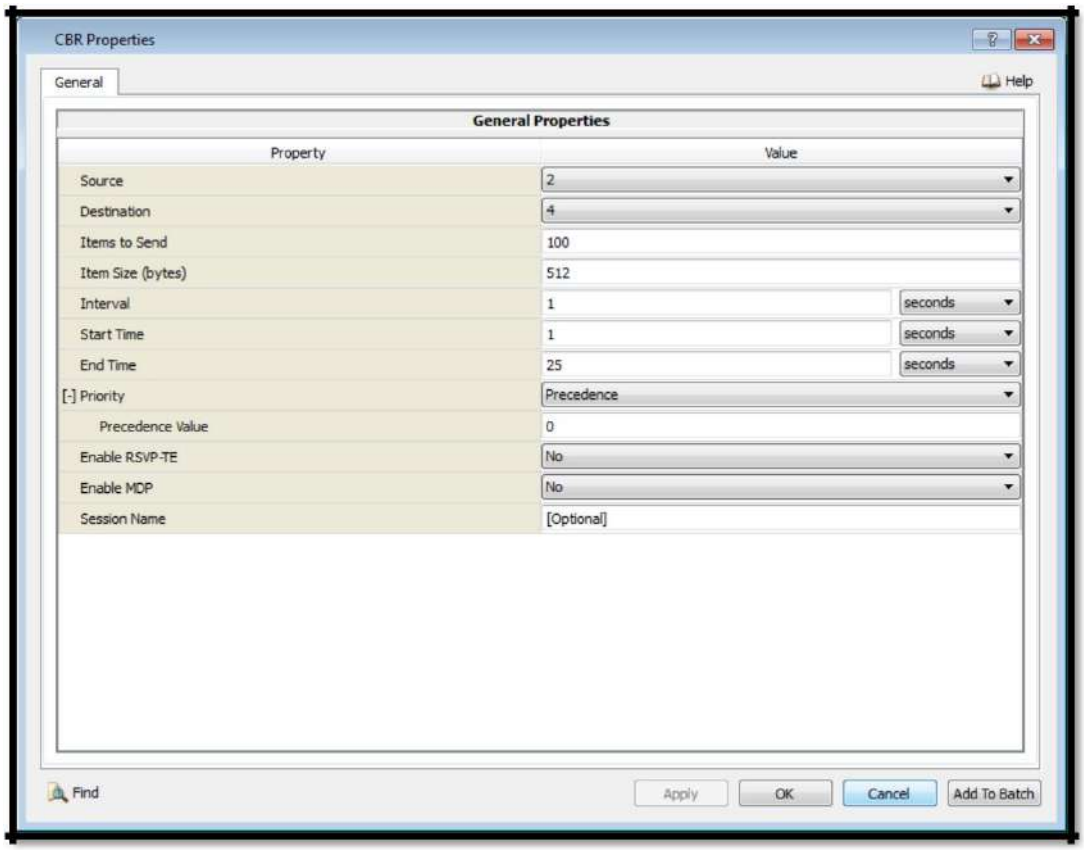
Select **CBR** and draw the application between Node 2 and Node 9.Similarly node 5 to node 6 and node 3 to node 8.

To set date rate of the nodes, change item to send packets and time intervals.



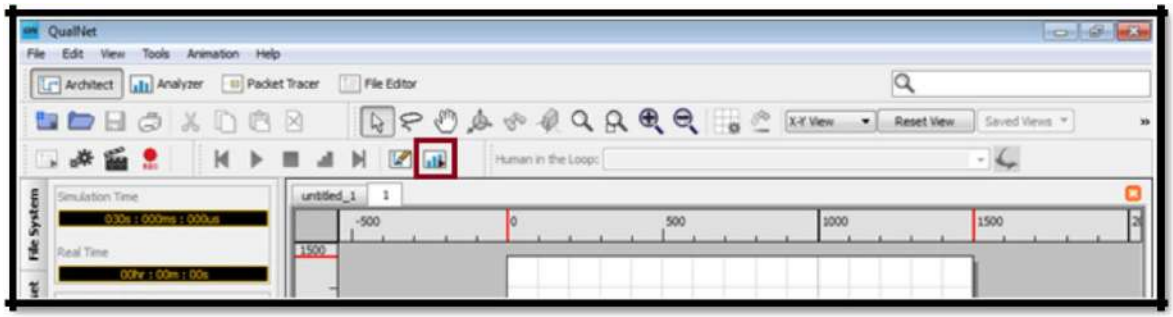
Step 6: To set CBR Application parameters, go to Table View (bottom panel of GUI) ->Application Tab-> double click on CBR Application

Set the no. of CBR packet as per the user requirement

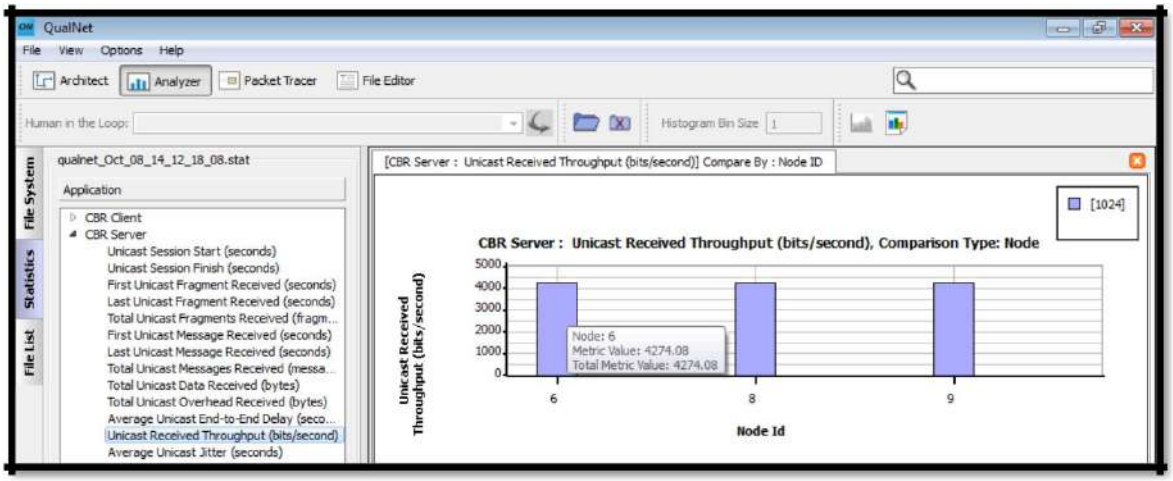


Step 7: Save the changes by clicking on the **Save** button. Click on the **Run** button. Click on the **Play** button to execute the scenario.

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



Step 9: To check the throughput, go to Application tab-> CBR Server->Unicast Received Throughput

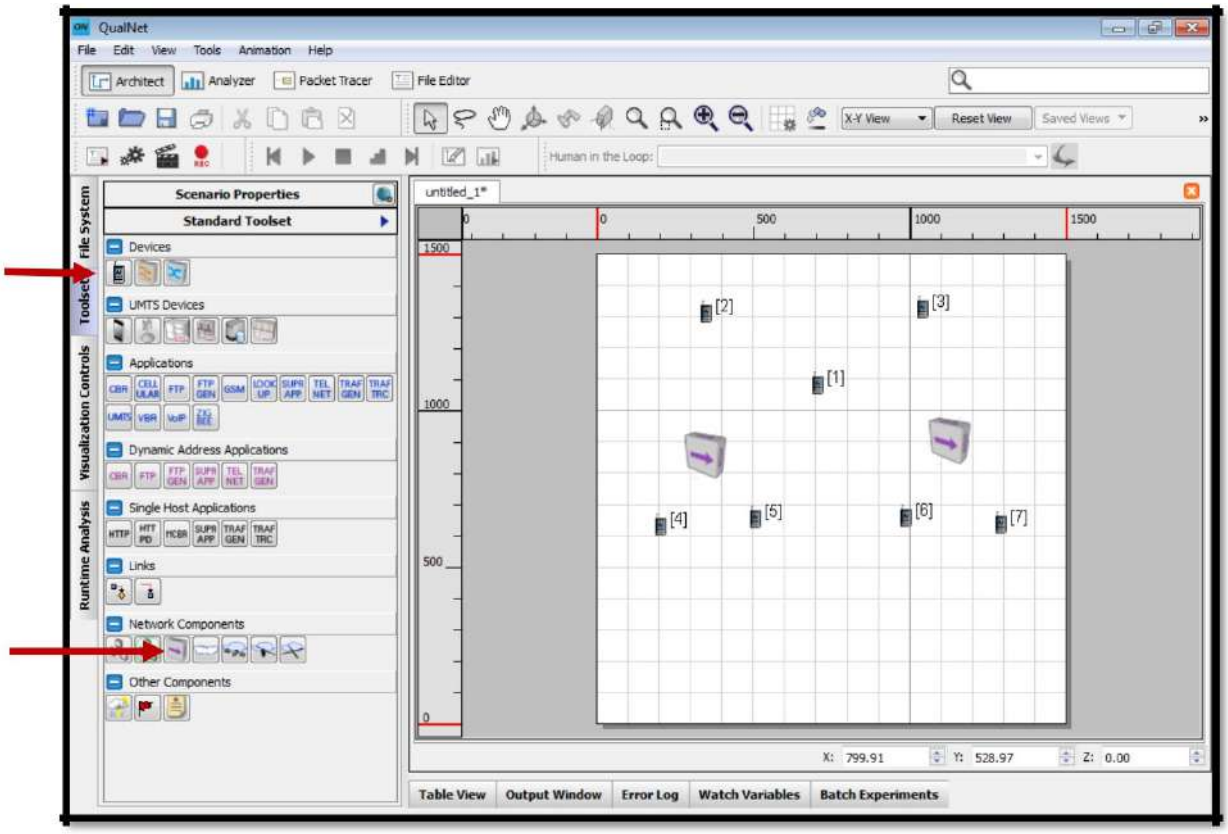


EXPERIMENT NO 5

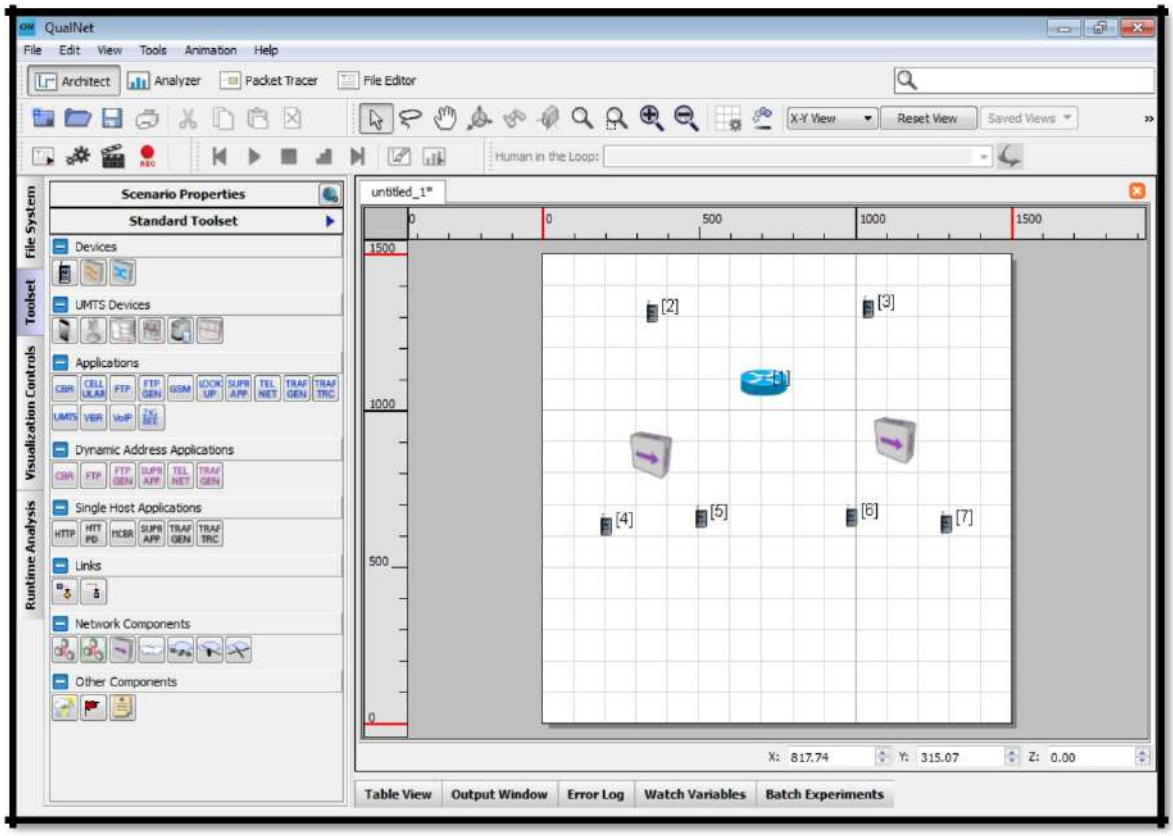
Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source/destination.

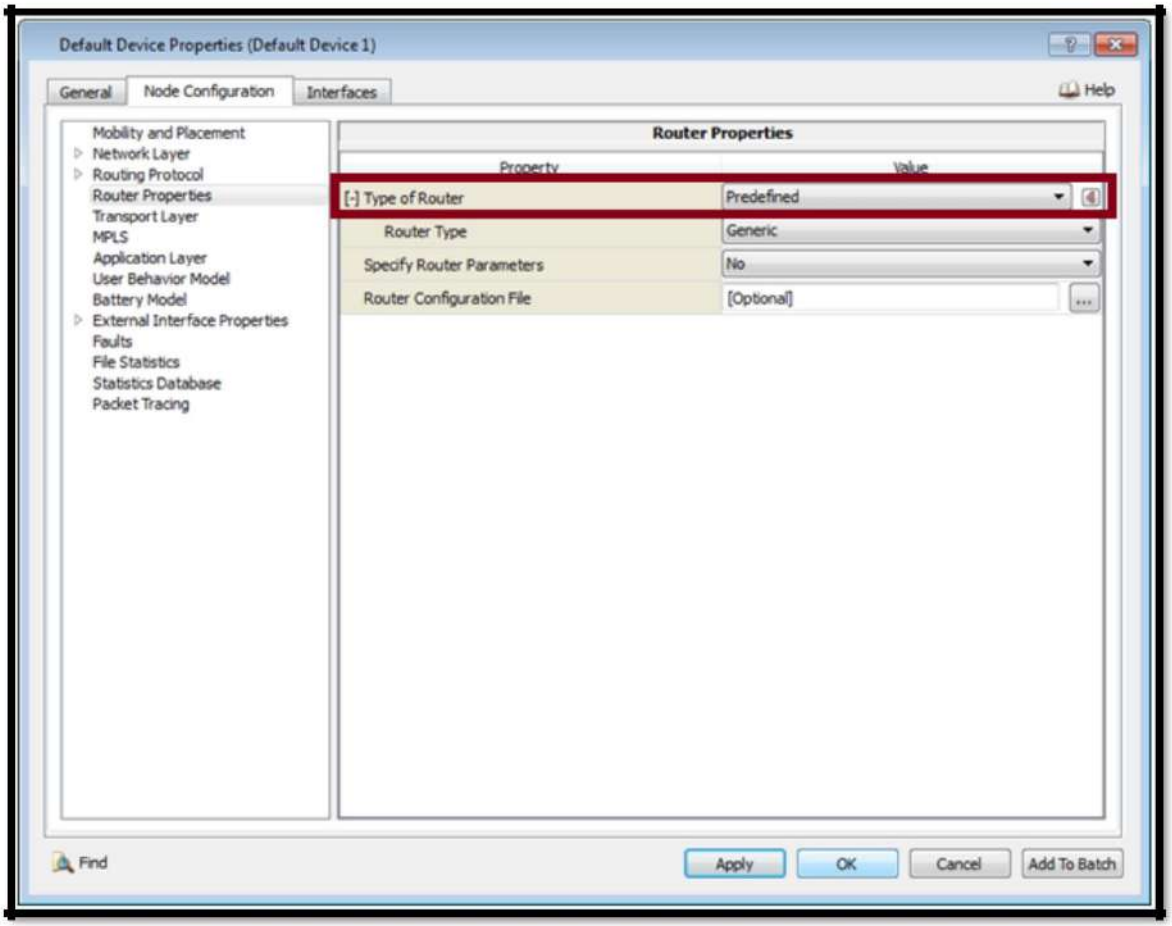
Step 1: Select Default icon from **Standard Toolset window** and Place the seven nodes on the canvas.

Select hubs from **Standard Toolset window** and Place the two hubs on the canvas.

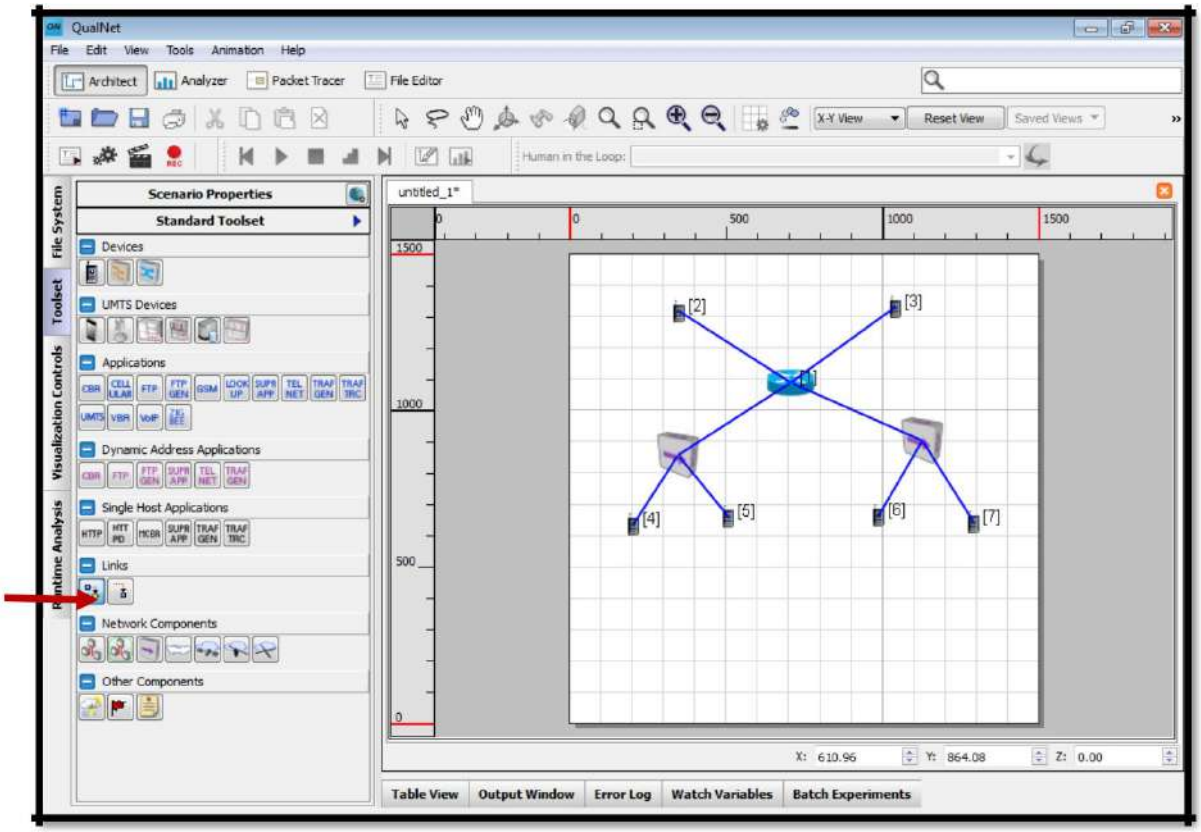


Step 2: To configure node as router double click on the node 1, go to Node Configuration tab->Router Properties->Change Type of Router as predefined.

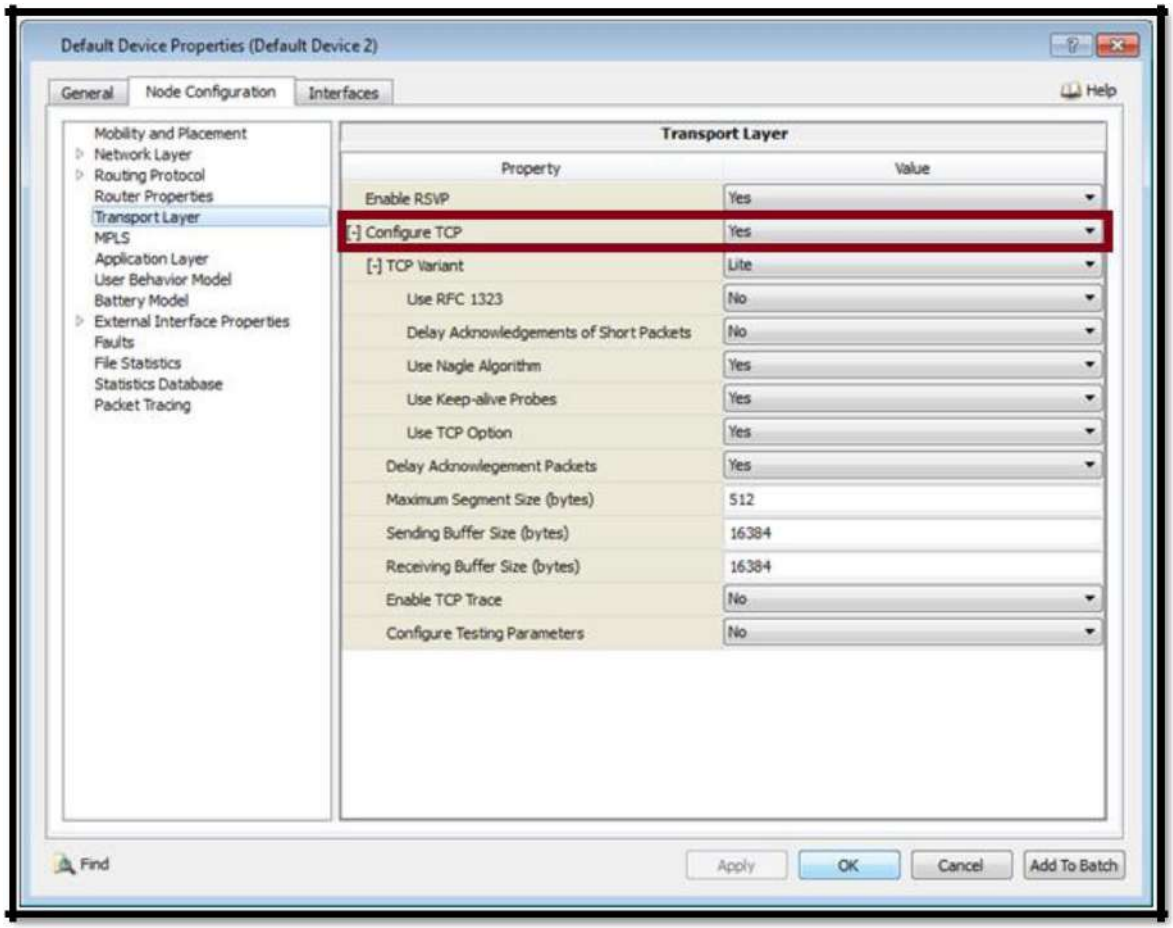



Default Device Properties (Default Device 1)
General
Node Configuration
Interfaces
Help
Mobility and Placement
Network Layer
Routing Protocol
Router Properties
Transport Layer
MPLS
Application Layer
User Behavior Model
Battery Model
External Interface Properties
Faults
File Statistics
Statistics Database
Packet Tracing
Router Properties
Property
Value
[-] Type of Router
Predefined
Router Type
Generic
Specify Router Parameters
No
Router Configuration File
[Optional]
Find
Apply
OK
Cancel
Add To Batch

Step 3: Connect point-to-point link between three nodes using **link** from **Standard Toolset window**

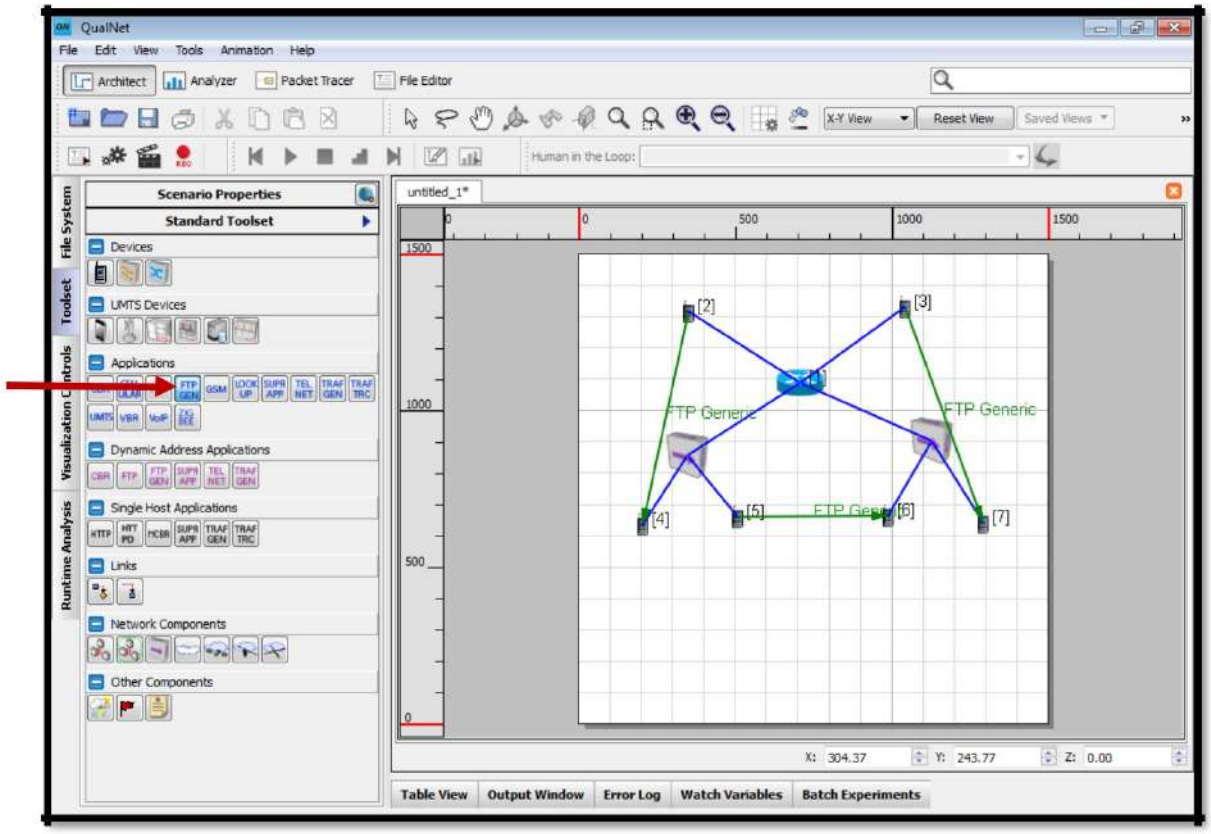


Step 4: To set TCP protocol double click on the nodes, go to Node Configuration tab->Transport Layer->configure TCP as YES.



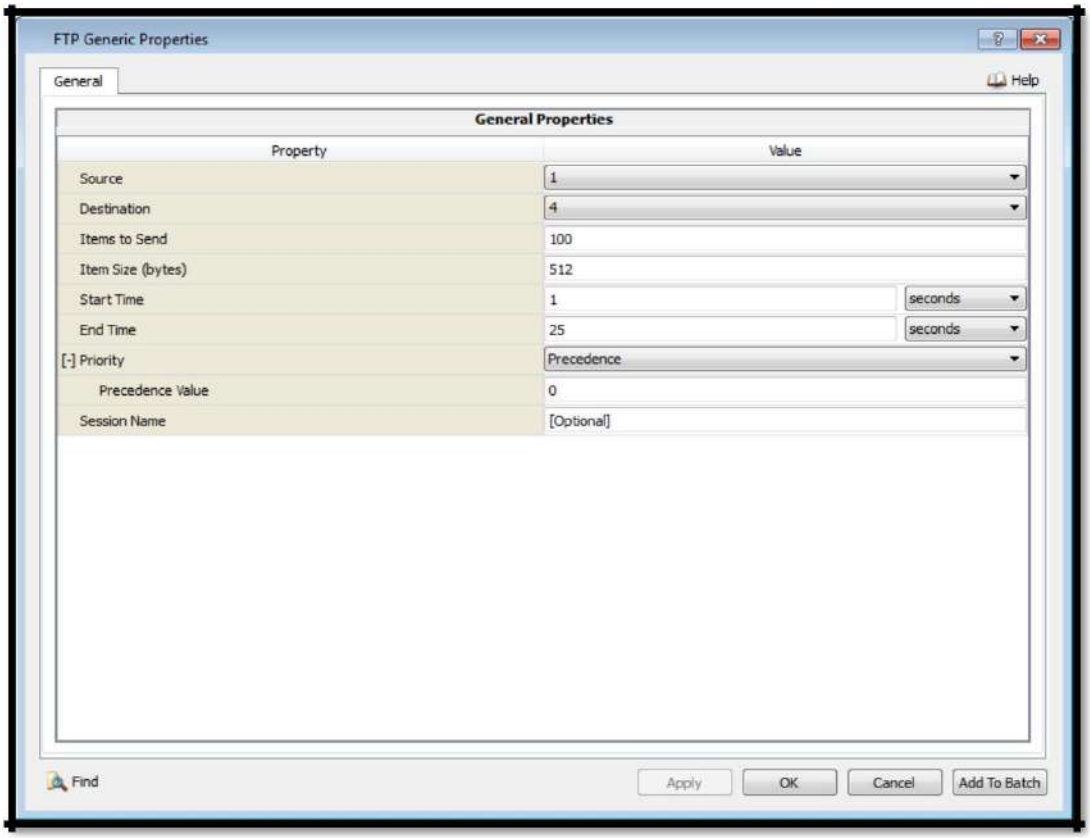
Step 5: Select the **FTP Generic** tab of **Standard Toolset window**

Select **FTP Generic** and set the application between Node 2 to Node 4, Node 3 to Node 7 and Node 5 to Node 6.



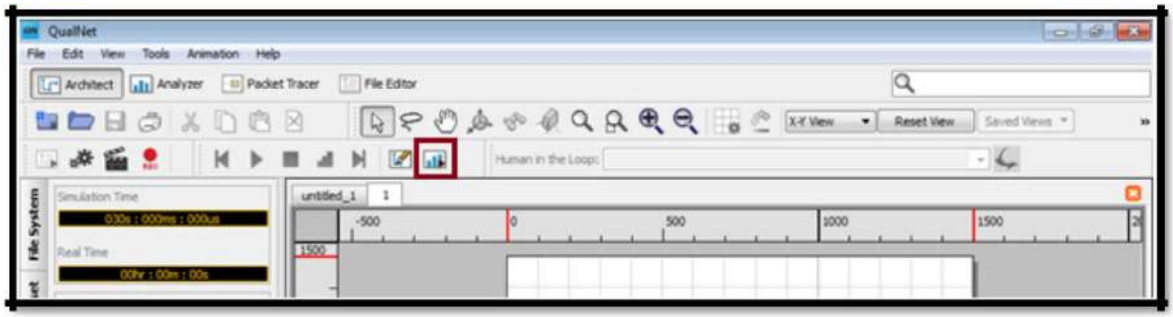
Step 6: To set FTP Generic Application parameters, go to Table View (bottom panel of GUI) ->Application Tab-> double click on FTP Generic Application

Set the no. of **FTP Generic** packets as per the user requirement

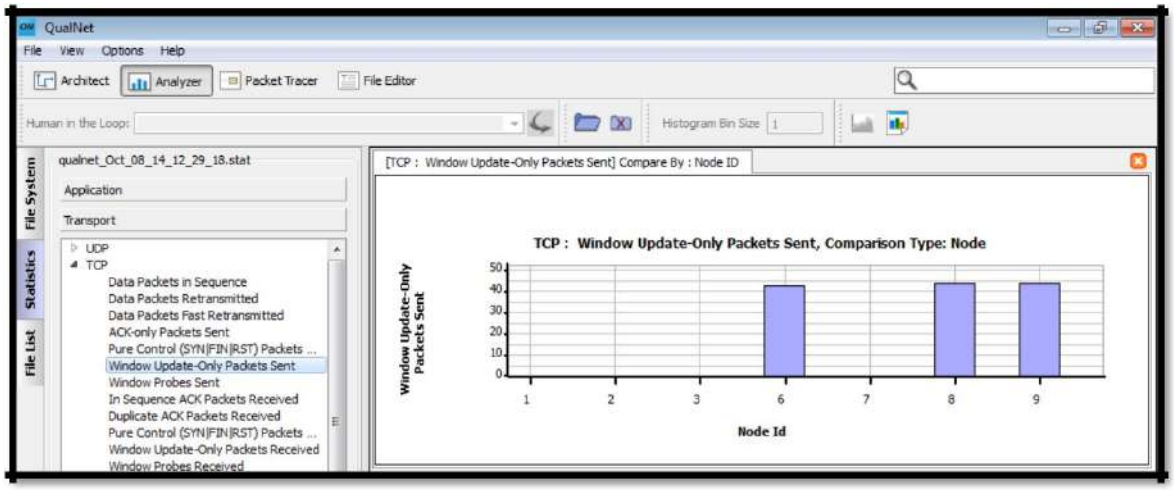


Step 7: Save the changes by clicking on the **Save** button. Click on the **Run** button. Click on the **Play** button to execute the scenario.

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



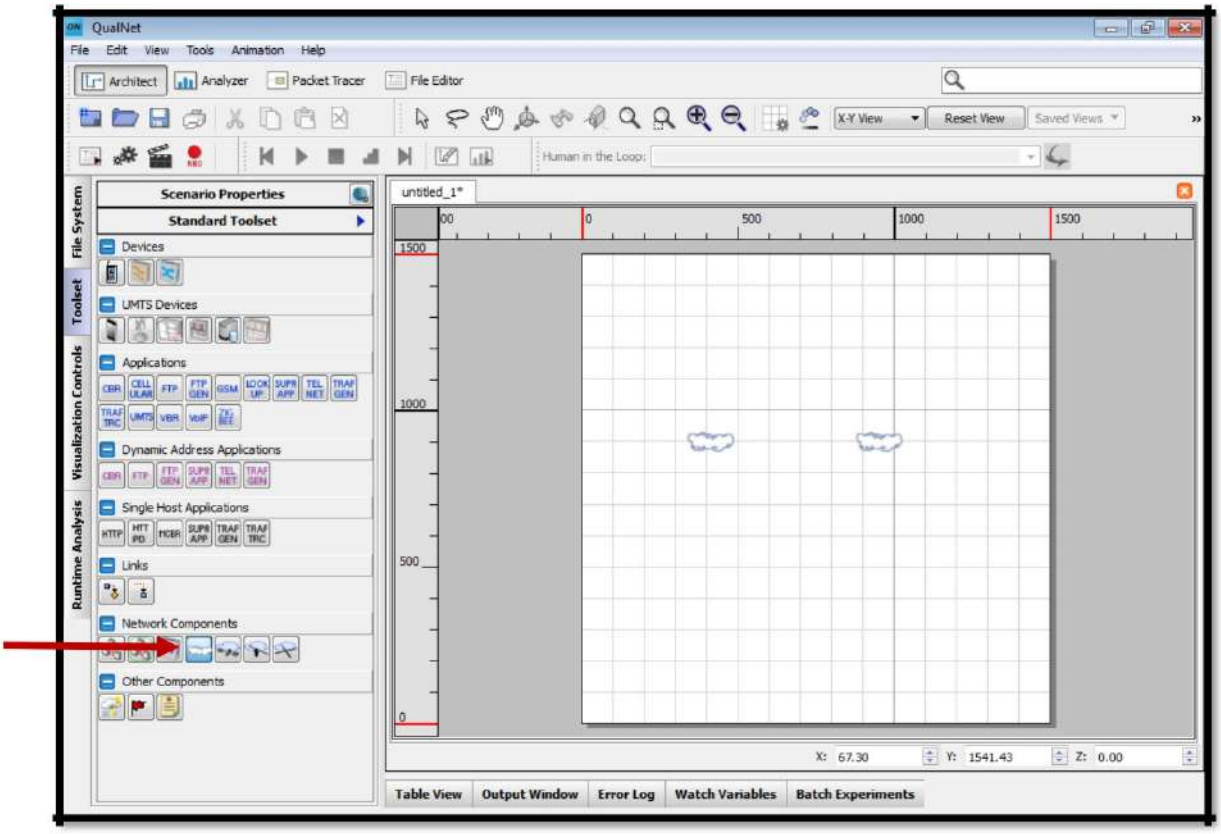
Step 9: To check the Congestion Window at TCP, go to Transport tab->TCP



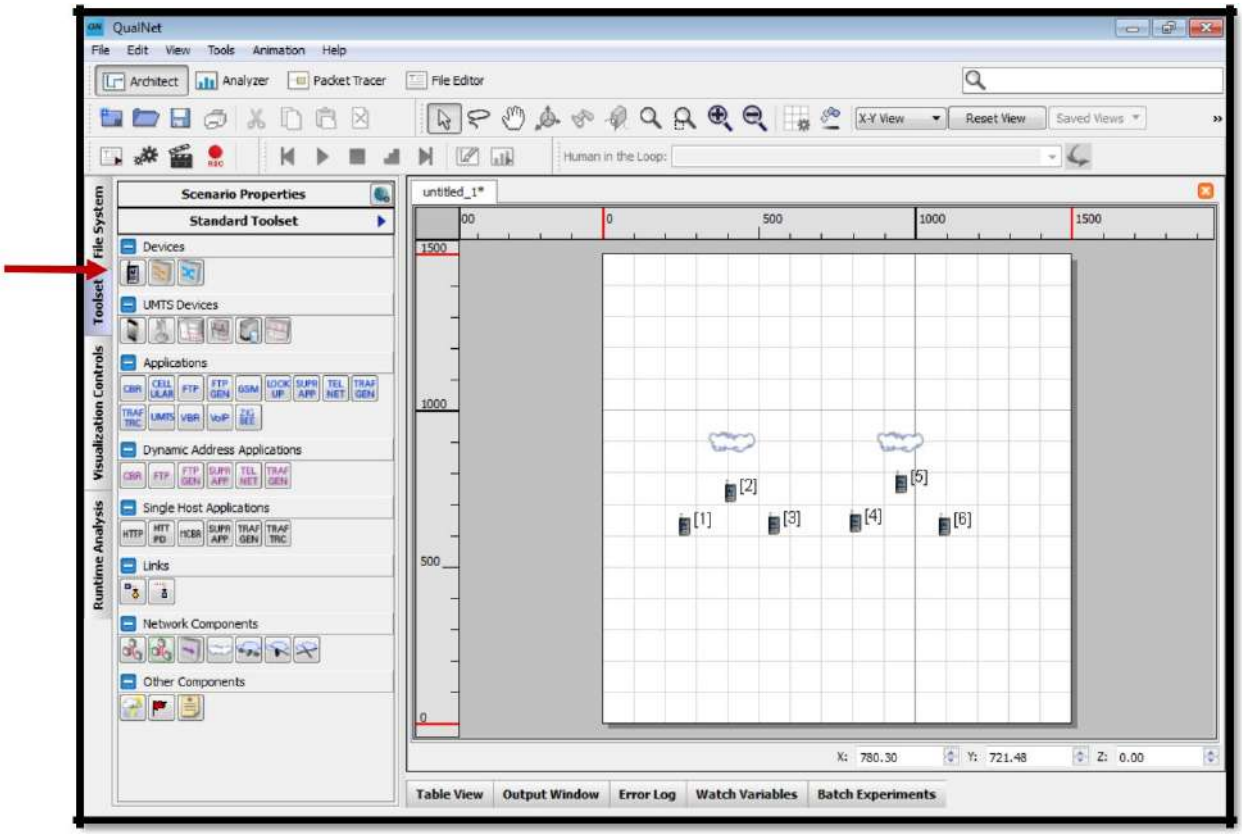
EXPERIMENT NO 6

Simulate simple ESS and with transmitting nodes in wireless LAN by simulation and determine the performance with respect to transmission of packets.

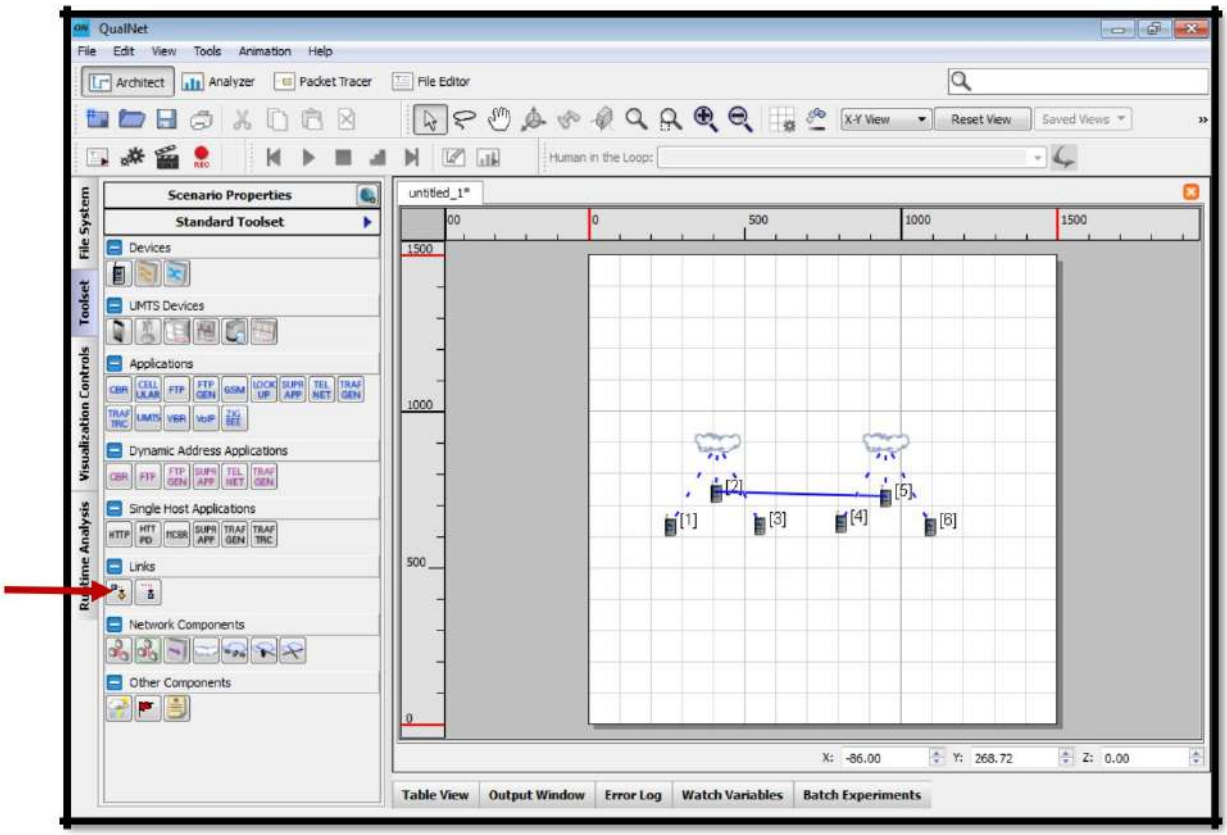
Step 1: Select "Network Components" tab of Standard Toolset window Select "Wireless Network" icon and place 2 subnets for the desired coverage areas



Step 2: Select "Devices" tab of Scenario Designer window
Select "Default" icon and place 3 nodes for each of the Wireless Subnets

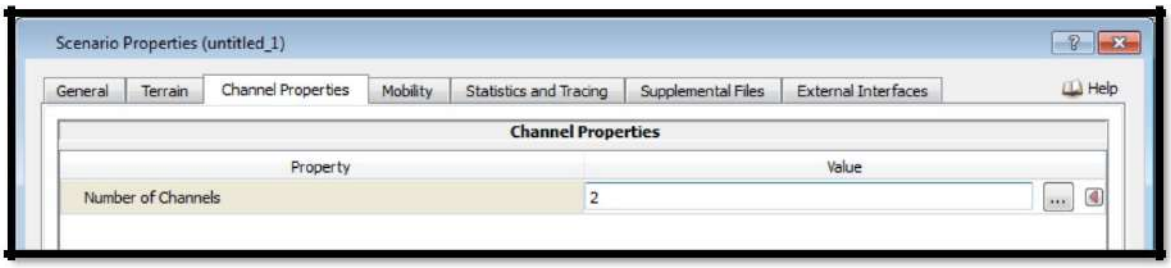


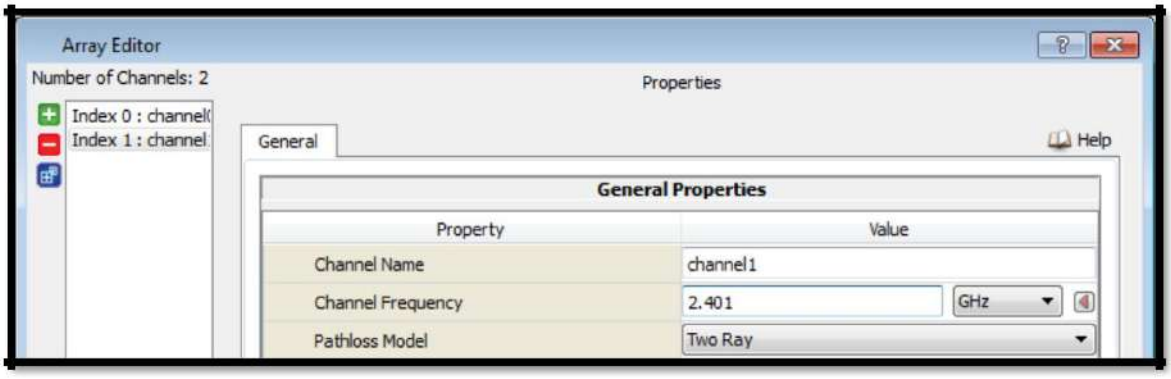
Step 3: Select "Links" tab from standard Toolset.
Select "Link" icon and connect all nodes to their appropriate "Wireless Subnet" cloud.
And also using link icon connect point-to-point link between node 2 and node 5(access points)



Step 4: To configure channel frequency of each network go to Scenario Properties->Channel Properties -> Number of Channels -> 2.
Set channel frequencies 1 Channels for each network
Select "Channel Frequency" and type in desired frequencies for each channel

- Channel0- Frequency = **2.4 GHz**
- Channel1- Frequency = **2.401 GHz**





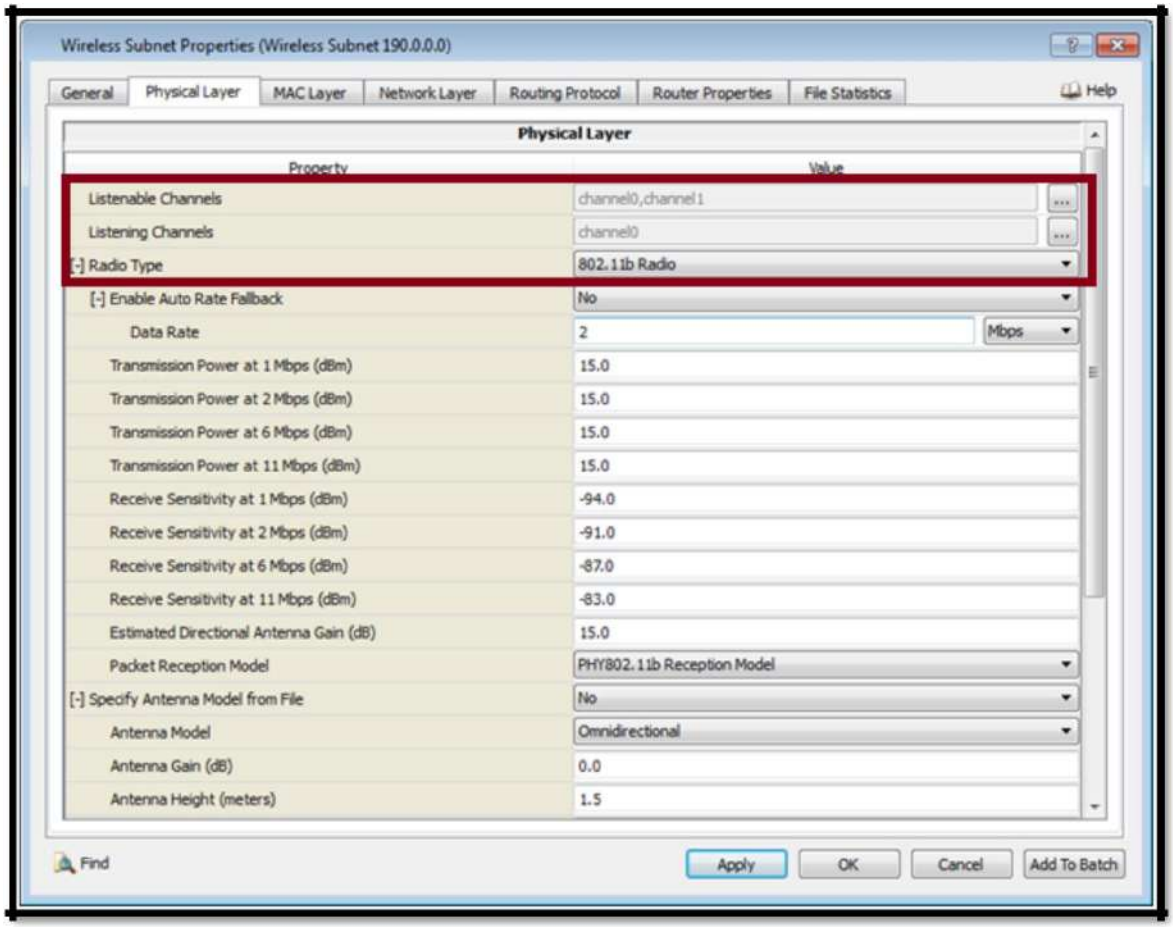
Step 5: To configure wireless physical layer and Mac Layer double click on first **wireless subnet1** and go to Wireless Subnet Properties->Physical Layer

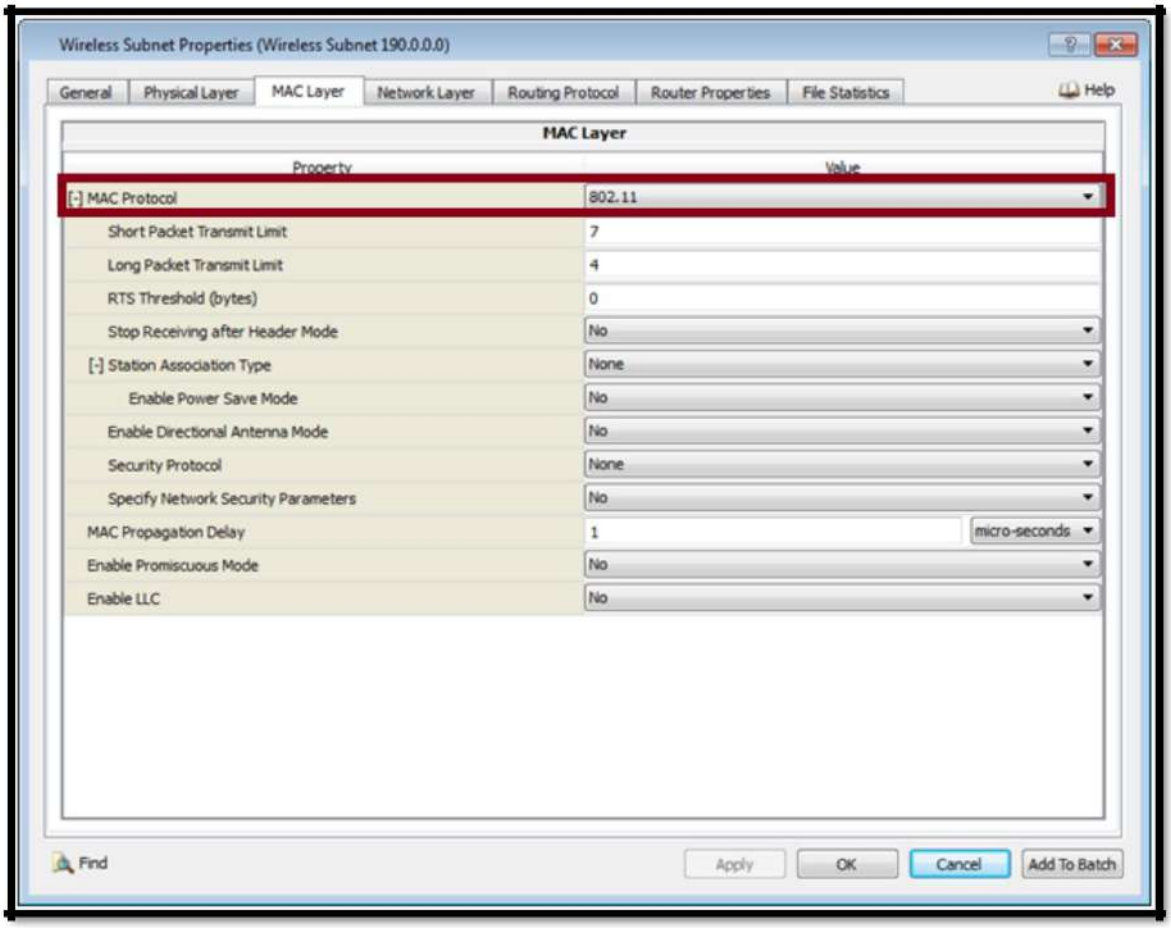
Set "Listenable Channel Mask" as **channel0, channnel1**

Set "Listening Channel Mask" as **channnel0**

Set "Radio Type" as 802.11b Radio under Physical Layer

Set "Mac Protocol" as 802.11 Radio under Mac Layer




Wireless Subnet Properties (Wireless Subnet 190.0.0.0)
General
Physical Layer
MAC Layer
Network Layer
Routing Protocol
Router Properties
File Statistics
Help
MAC Layer
Property
Value
[-] MAC Protocol
802.11
Short Packet Transmit Limit
7
Long Packet Transmit Limit
4
RTS Threshold (bytes)
0
Stop Receiving after Header Mode
No
[-] Station Association Type
None
Enable Power Save Mode
No
Enable Directional Antenna Mode
No
Security Protocol
None
Specify Network Security Parameters
No
MAC Propagation Delay
1
micro-seconds
Enable Promiscuous Mode
No
Enable LLC
No
Find
Apply
OK
Cancel
Add To Batch

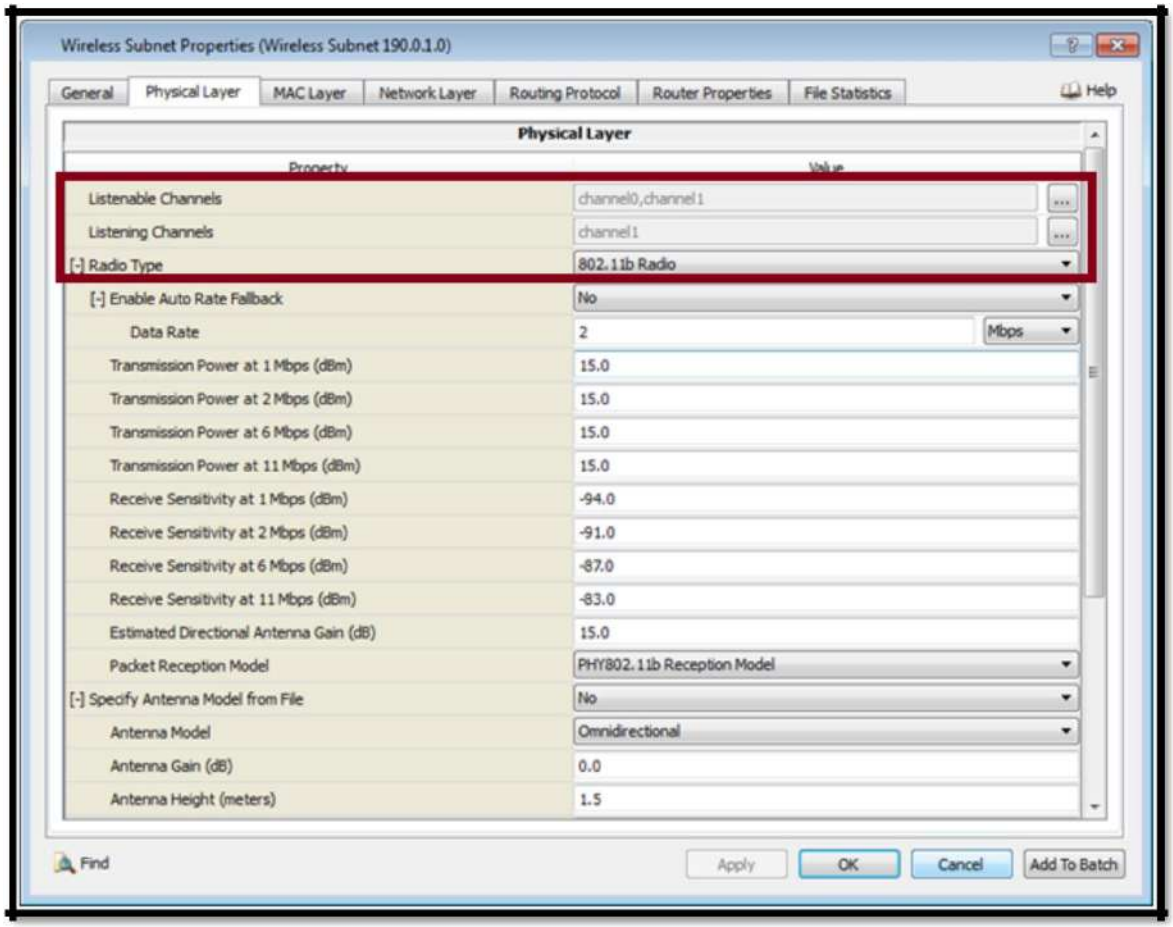
Step 6: To configure wireless physical layer and Mac Layer double click on first **wireless subnet2** and go to Wireless Subnet Properties->Physical Layer

Set "Listenable Channel Mask" as **channel0, channnel1**

Set "Listening Channel Mask" as **channnel1**

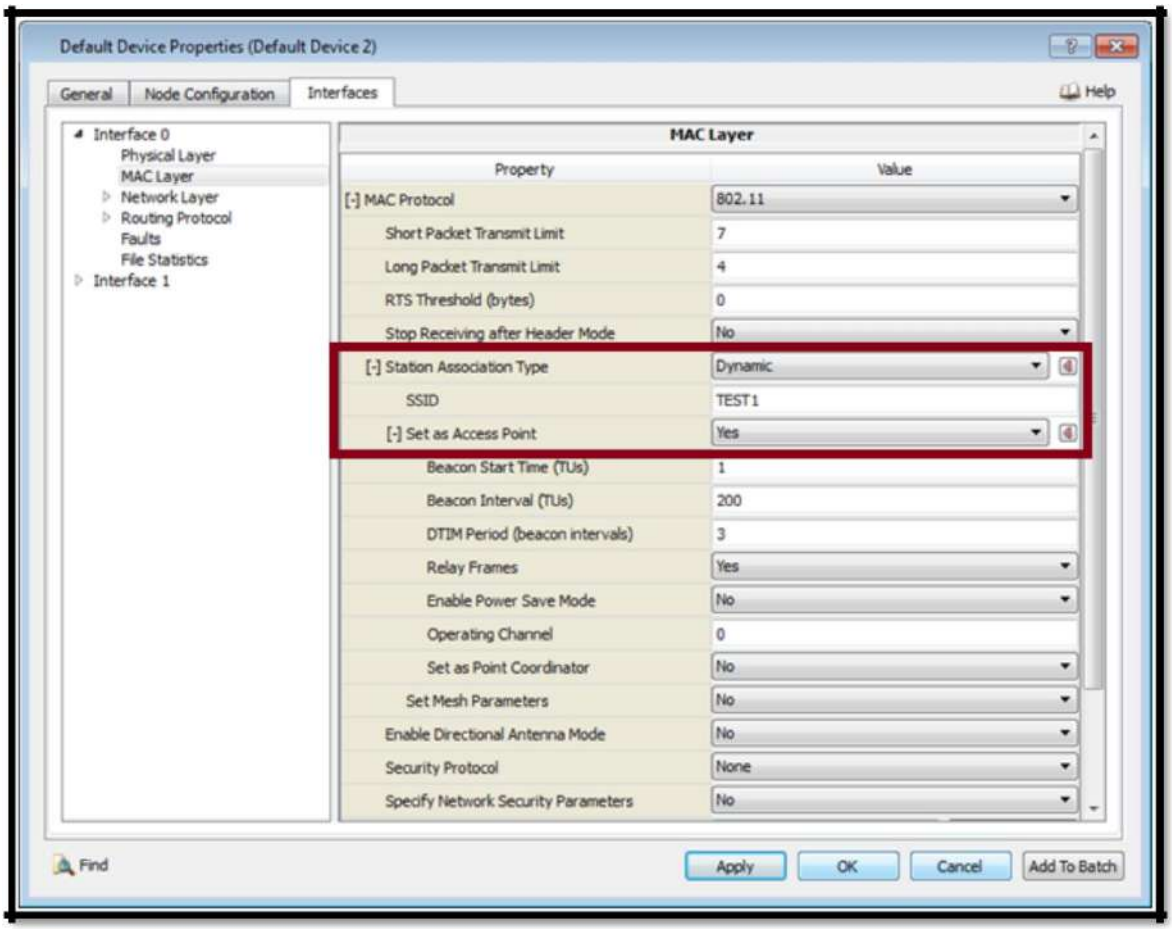
Set "Radio Type" as 802.11b Radio under Physical Layer

Set "Mac Protocol" as 802.11 Radio under Mac Layer



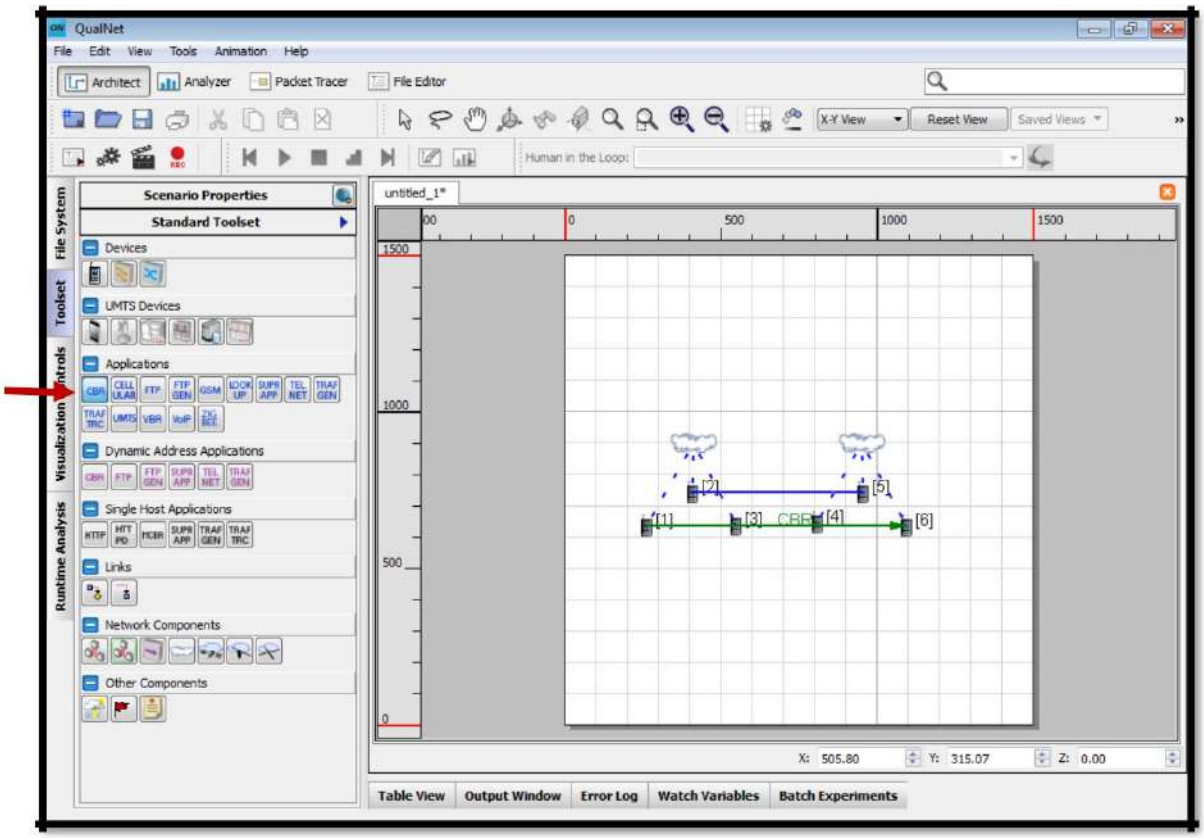
Step 7: To set node 2 as **Access Point**, double click on node 2 go to interfaces tab-> Interface 0-> Mac Layer
Select "Station Association Type" as **Dynamic**
Select "Set as Access Point" as **Yes**

Similarly configure node 5 as **Access Point**



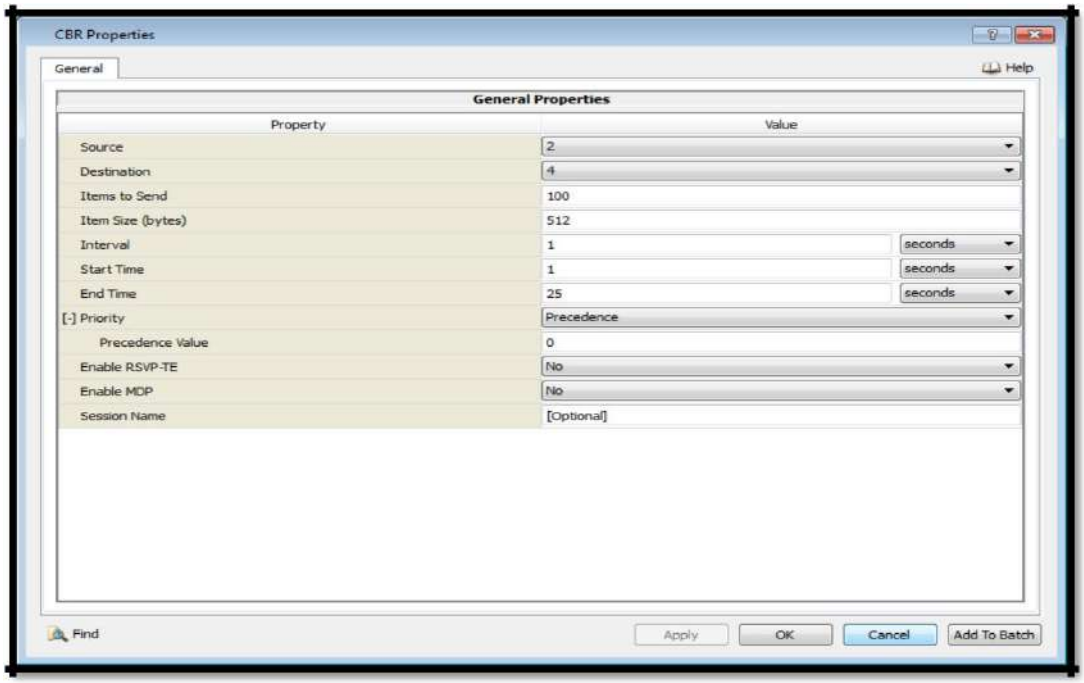
Step 8: Select the **Applications** tab of **Standard Toolset window**

Select **CBR** and draw the application between Node 1 and Node 6.

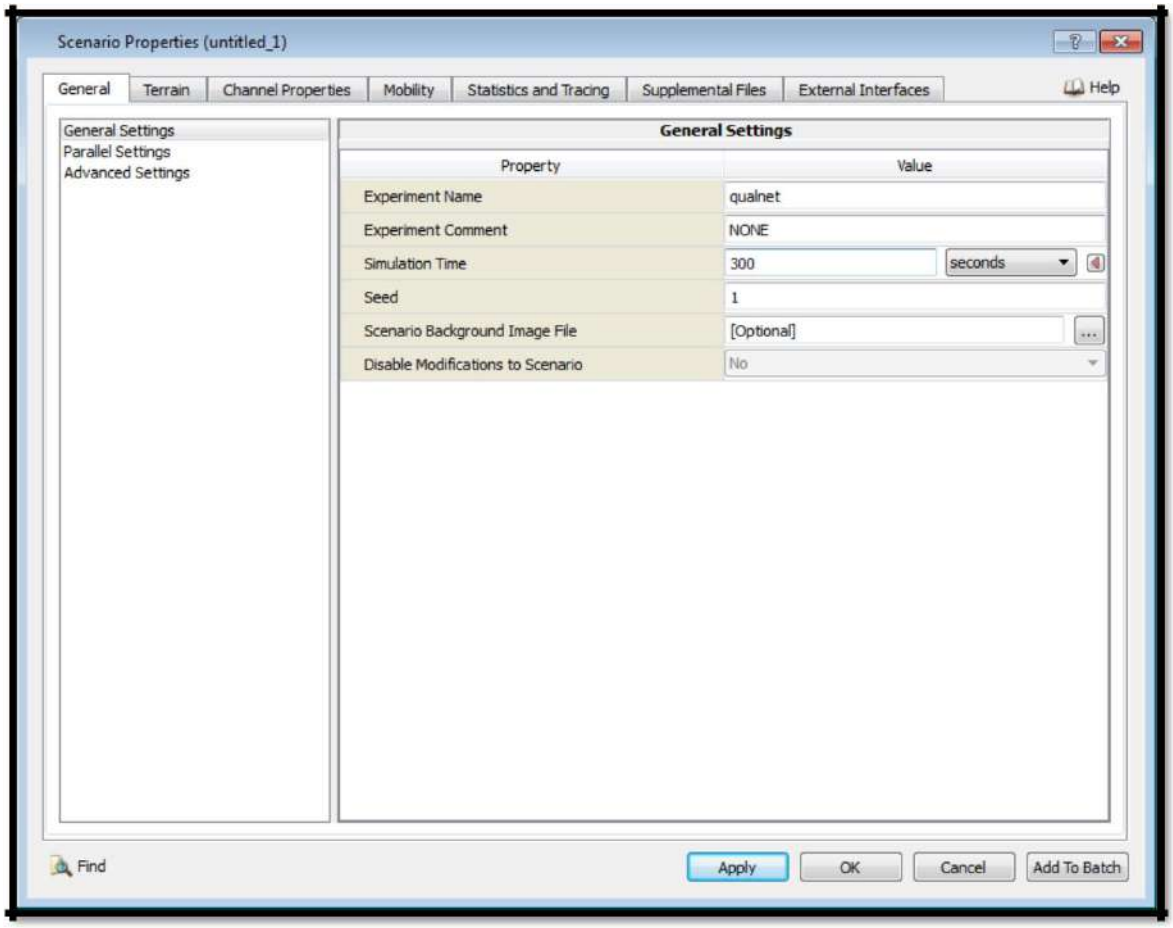


Step 9: To set **CBR Application** parameters, go to Table View (bottom panel of GUI) ->Application Tab-> double click on CBR Application

Set the no. of **CBR Application** packets (Items to send)as per the user requirement

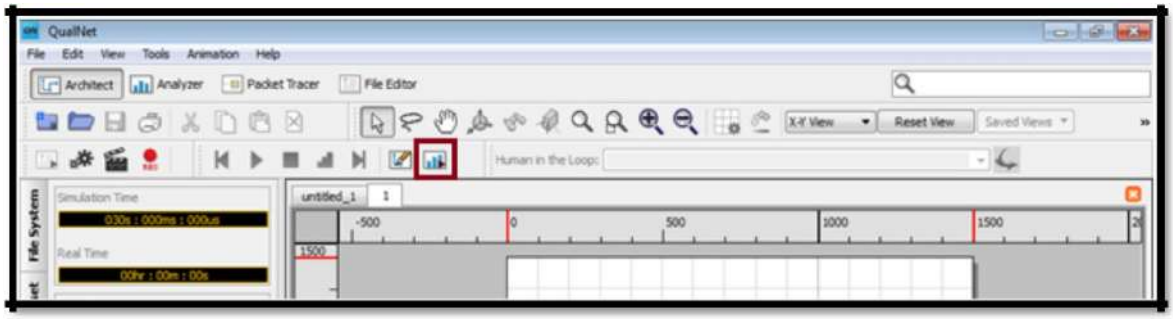


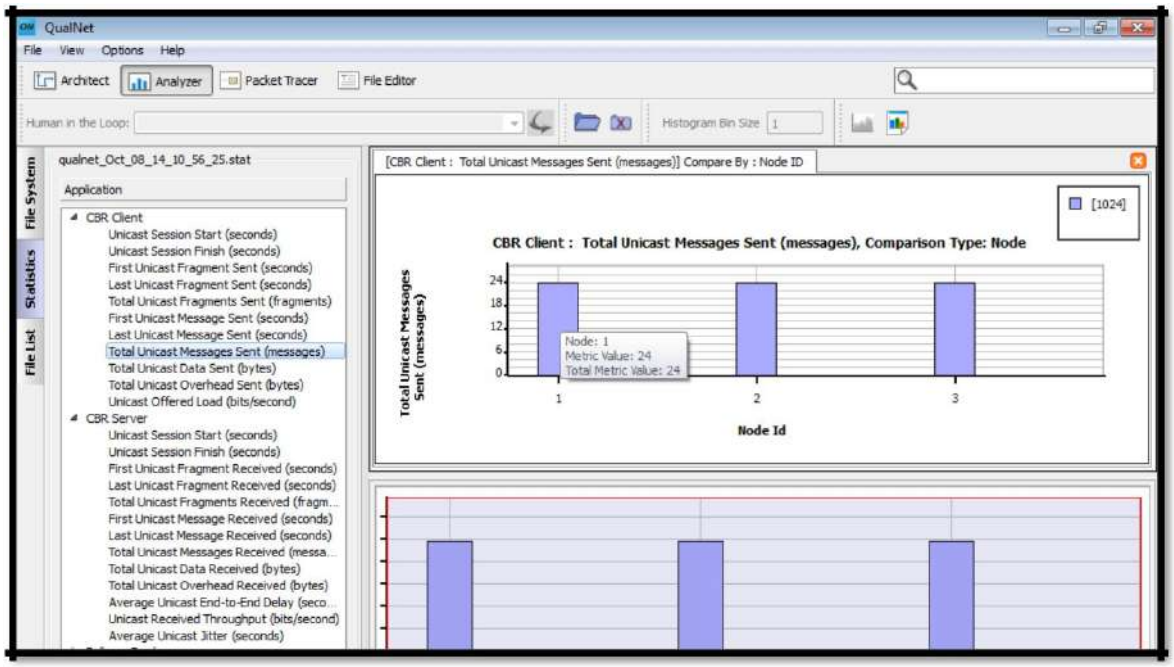
Step 10: To set **Simulation Time** of the scenario, go to Scenario Properties->General->Simulation Time



Step 11: Save the changes by clicking on the **Save** button. Click on the **Run** button. Click on the **Play** button to execute the scenario.

Step 12: On completion of the Scenario execution, check the corresponding Statistics for the desired results click on **Analyze statistic.**



Step 13: 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