CCN Lab experiments

1. Configure network with the following topologies and analyze i) BUS ii) RING iii) Fully connected mesh topology, disable a node in each of the topologies and find the changes.

2. Simulate Ethernet LAN with 4 nodes , apply relevant TCP and UDP applications and determine
   i) the number of data packets sent by UDP and TCP
   ii)Average jitter of UDP and TCP
   iii)Number of periodic updates sent by the routing algorithm
   iv)number of ACK packets sent

3. Simulate a network of N nodes with point to point connection; apply TCP and UDP applications vary the queue size and bandwidth and find
   i) Number of packets dropped due to queue overflow
   ii) Average hop count for data packets
   iii) Average delay and jitter.
   iv)apply FTP and TELNET traffic between the nodes of the above network and analyze the throughput.

4. Simulate Ethernet LAN with N nodes , configure multicast traffic and Determine
   i)the total multicast data bytes received
   ii)Total multicast data bytes transmitted
   iii)Multicast average delay at the transport layer for UDP
   iv)Packets sent by DVMRP
   v)Neighbors for every node as determined by DVMRP
   vi)packets dropped due to expired TTL
   vii)Packets dropped due to no route.

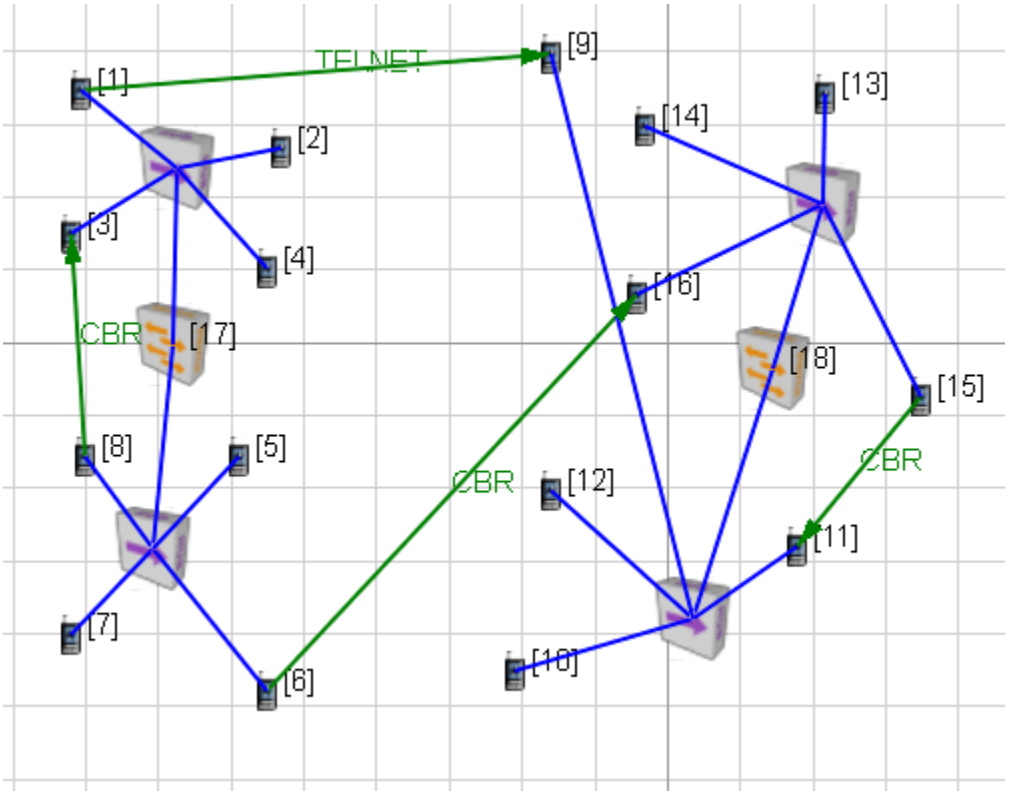
5. Apply multiple UDP and TCP applications between any 2 nodes of N (N=4)node Ethernet LAN and compare it with experiment number 4.(compare multiple unicast with multicast)

6. Simulate a wireless ad hoc network apply relevant TCP and UDP applications between any 2 nodes and determine
   i) Number of packets dropped due to retransmission limit
   ii) Number of CTS packets sent by the node
   iii) Number of RTS packets sent and ACK packets sent by the node
   iv) Determine the number of RTS retransmission due to timeout

v) Packet retransmission due to ACK time out
vi) Signals received with error

7. Simulate a network having 2 LANs connected by a switch. Apply relevant TCP and UDP applications between nodes across the LANS (send data from a node in one LAN to a node in another LAN) and determine application layer, transport layer, network layer and MAC layer parameters.

8. Simulate a network with the topology as shown in the figure, apply TCP and UDP applications between nodes shown in the figure. Modify the network to make communication happen between node 1 and 9 and node 6 and 16

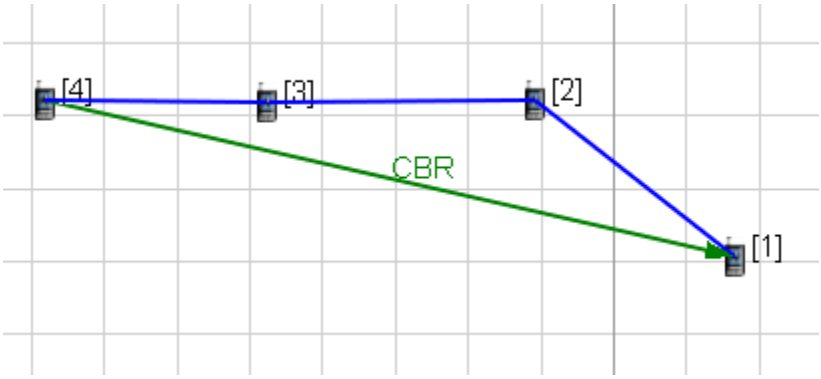


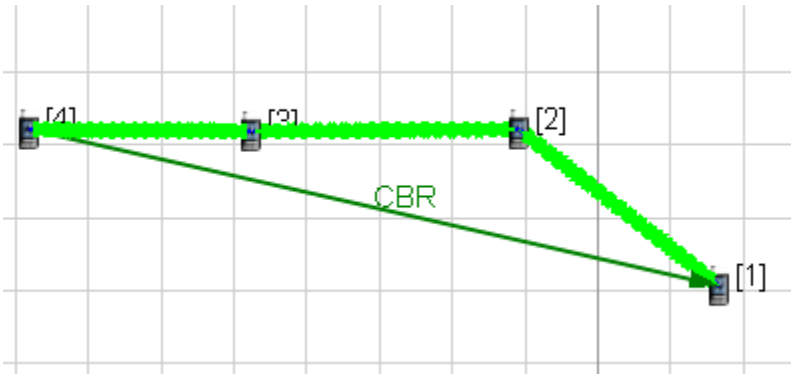
9. Configure a network of 5 routers with point to point connection. Apply RIP and OSPF routing algorithms and compare.
10. Simulate a wireless infrastructure network with 6 nodes and analyze

11. Configure a wired network with 4 nodes and wireless infrastructure network with 4 nodes apply relevant TCP and UDP applications from a node in wired network to a node in wireless network and analyze
12. a. Simulate wireless ad hoc network with 6 nodes give mobility to a node and analyze
    b. give mobility to all the nodes.

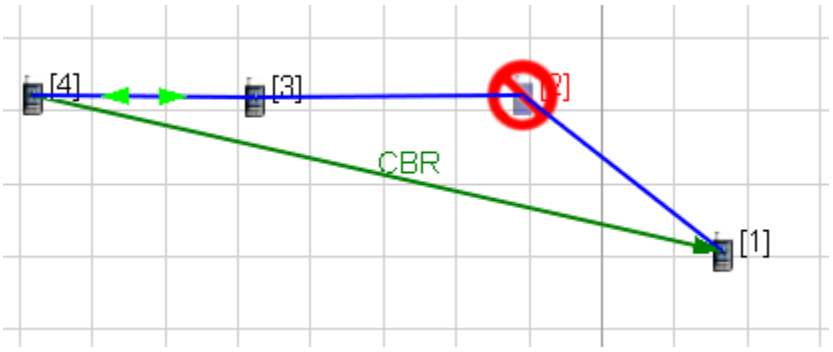
1. Configure network with the following topologies and analyze i) BUS ii) RING iii) Fully connected mesh topology, disable a node in each of the topologies and find the changes.

BUS topology

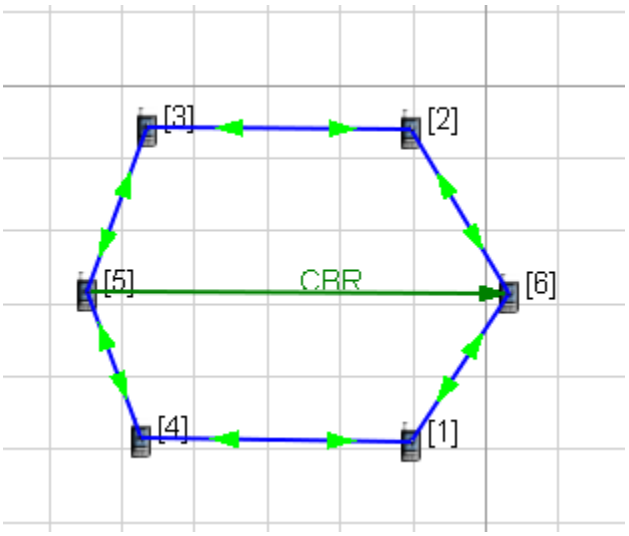




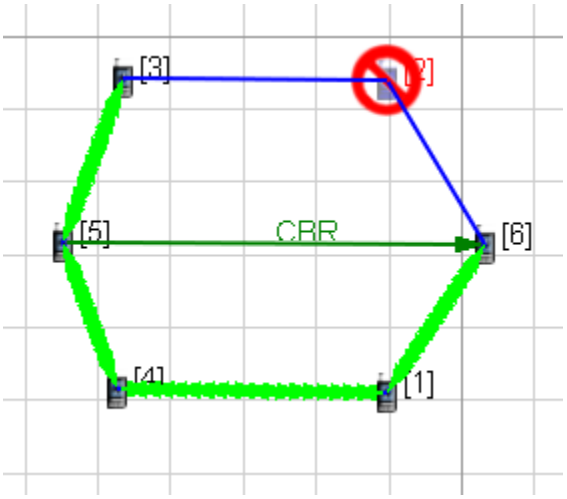
Transmission scenario when node 2 is deactivated



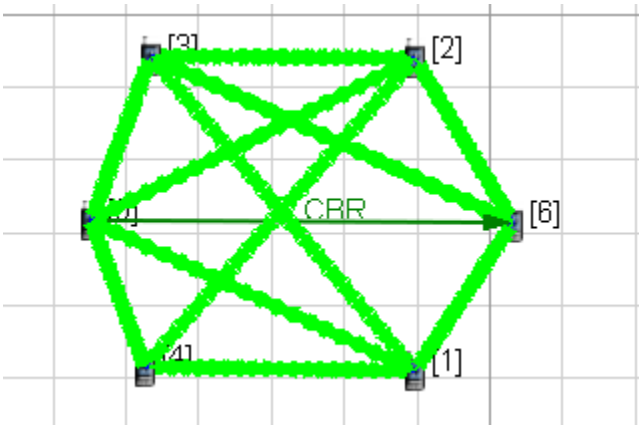
Ring topology



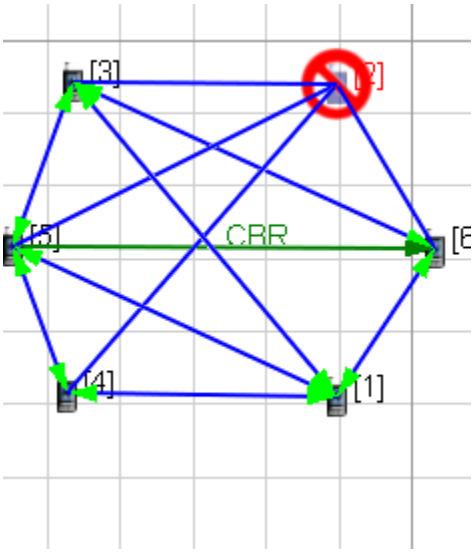
Ring topology with node 2 deactivated



Mesh topology



Node 2 deactivated



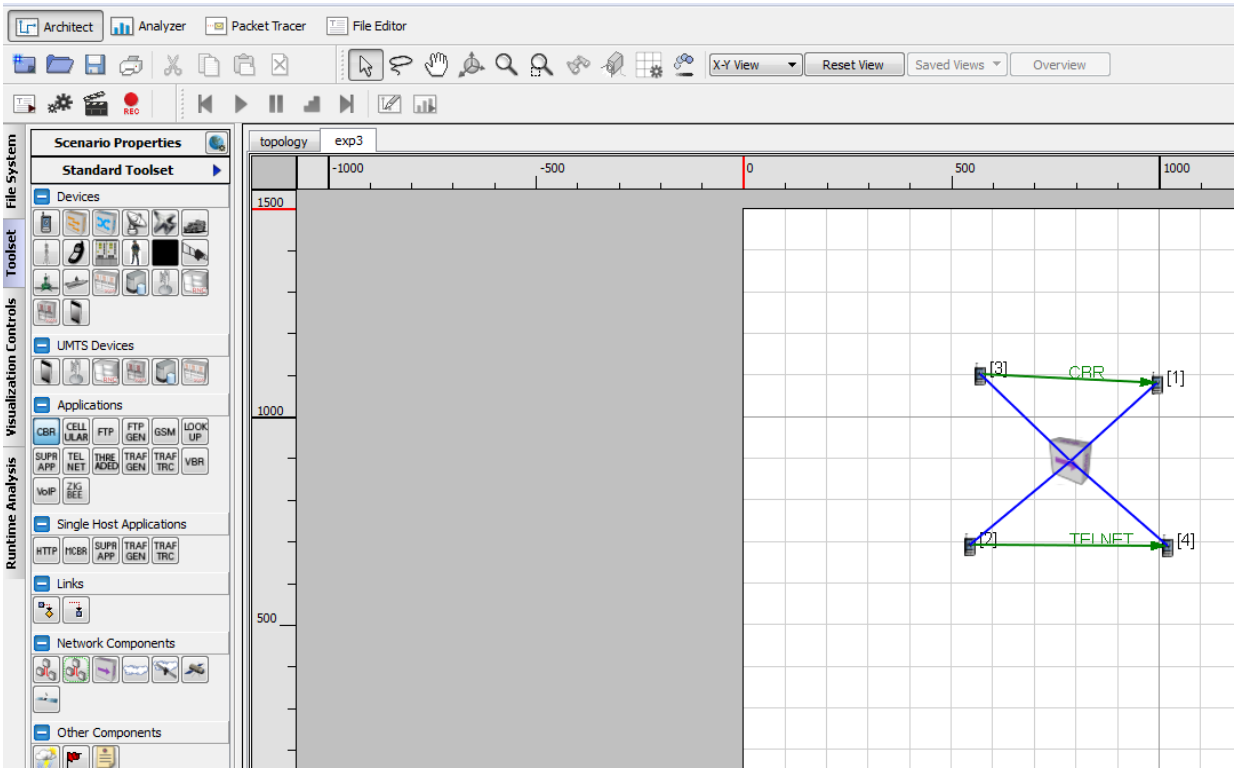
2. Simulate Ethernet LAN with 4 nodes , apply relevant TCP and UDP applications and determine

i) the number of data packets sent by UDP and TCP

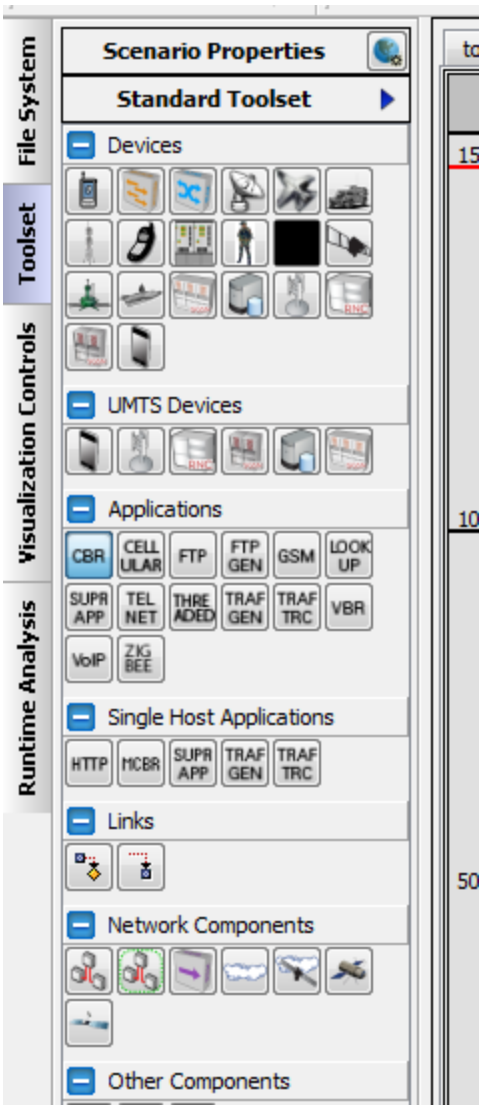
ii)Average jitter of UDP and TCP

iii)Number of periodic updates sent by the routing algorithm

iv)number of ACK packets sent



To configure UDP application between 2 nodes , select CBR from from applications in the standard tool set similarly select TCP application (FTP or TELNET)



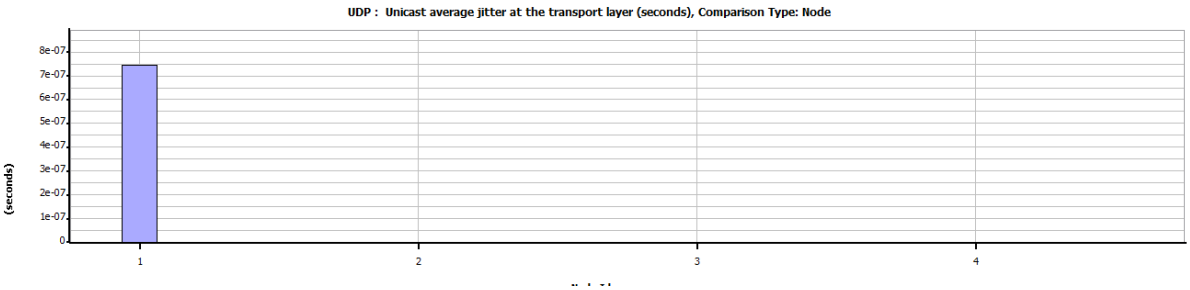
Save and run the scenario

To find average jitter of TCP and UDP

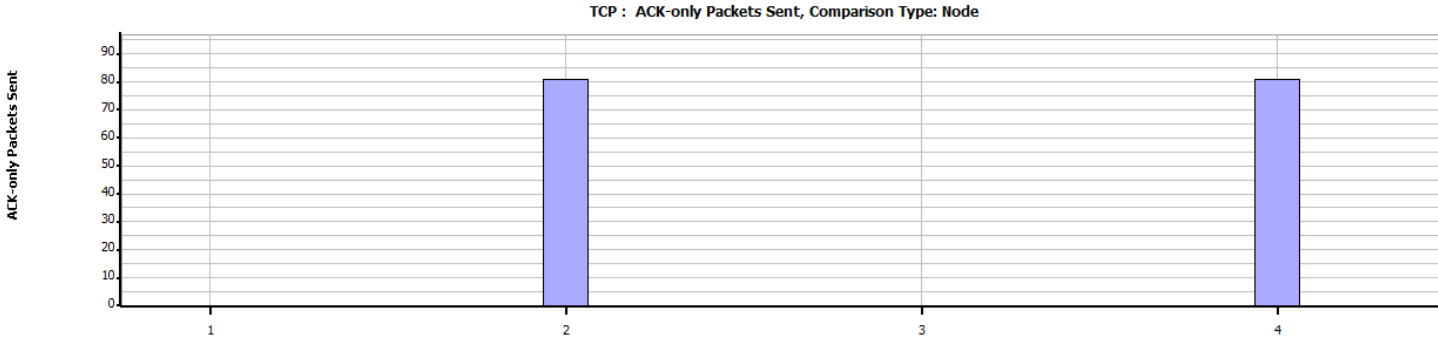
Go to analysis

Select transport layer and the appropriate application (TCP or UDP client)

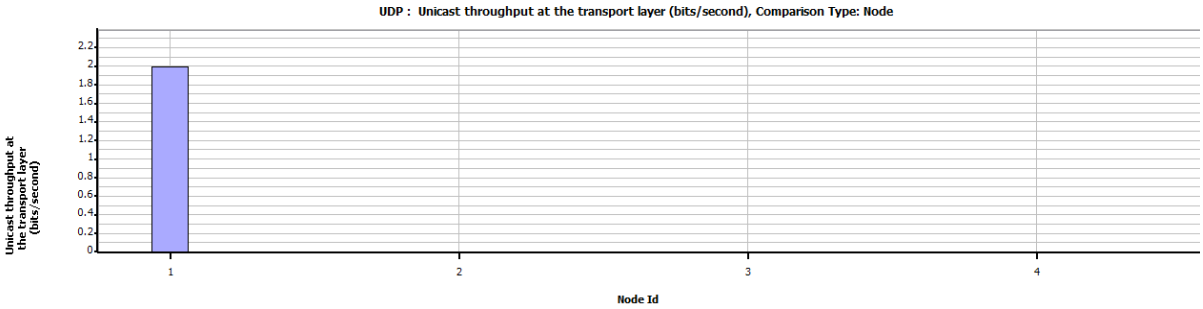
Unicast average jitter at the transport layer



Number of ACK packets sent



UDP throughput at the transport layer



3. Simulate a network of N nodes with point to point connection; apply TCP and UDP applications vary the queue size and bandwidth and find

i) number of packets dropped due to queue overflow

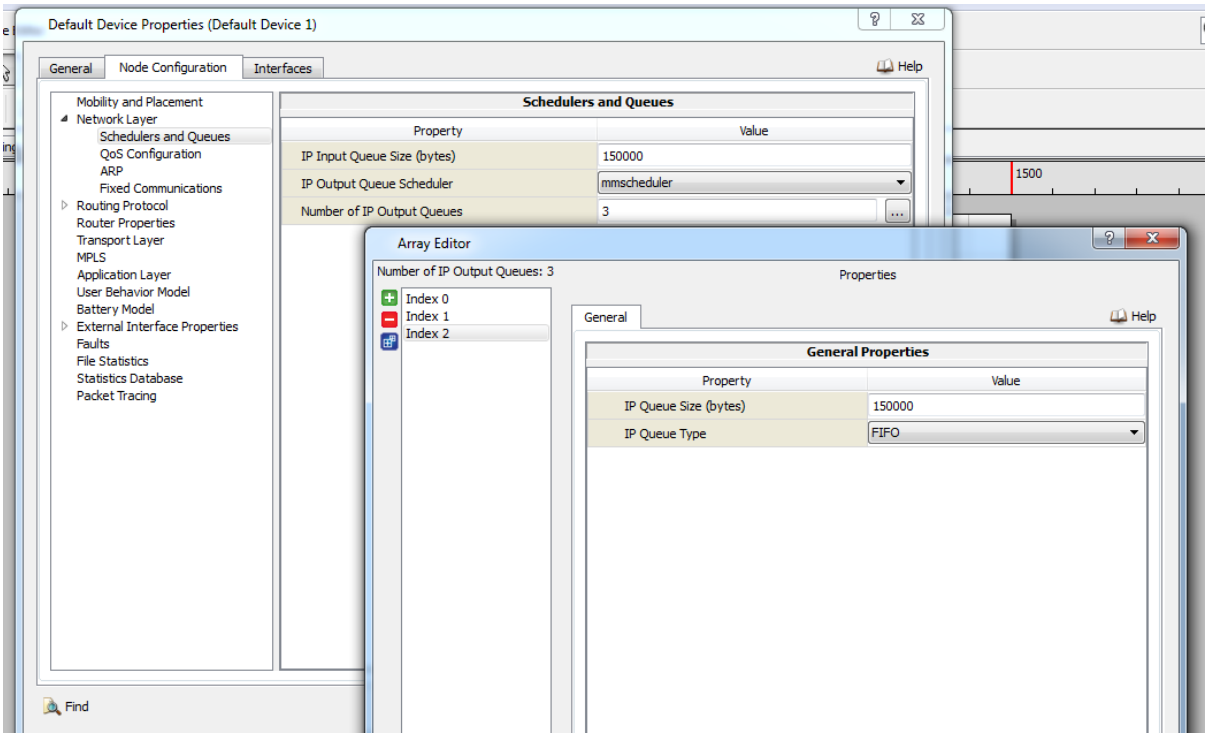
ii) Average hop count for data packets

iii) Average delay and jitter.

iv)apply FTP and TELNET traffic between the nodes of the above network and analyze the throughput.

Procedure to vary the queue size

1. Select a node for which queue size needs to be varied
2. Select the interface , go to properties select interfaces
3. Go to network layer choose the option : queues and scheduling and modify the queue size



4. Simulate Ethernet LAN with N nodes , configure multicast traffic and Determine

i)the total multicast data bytes received

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iv)Packets sent by DVMRP

v)Neighbours for every node as determined by DVMRP

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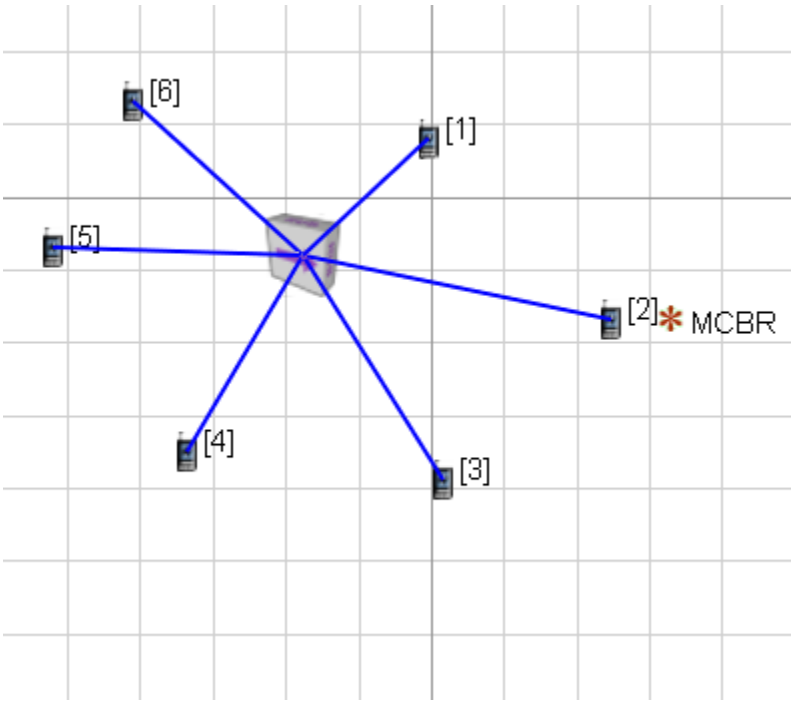
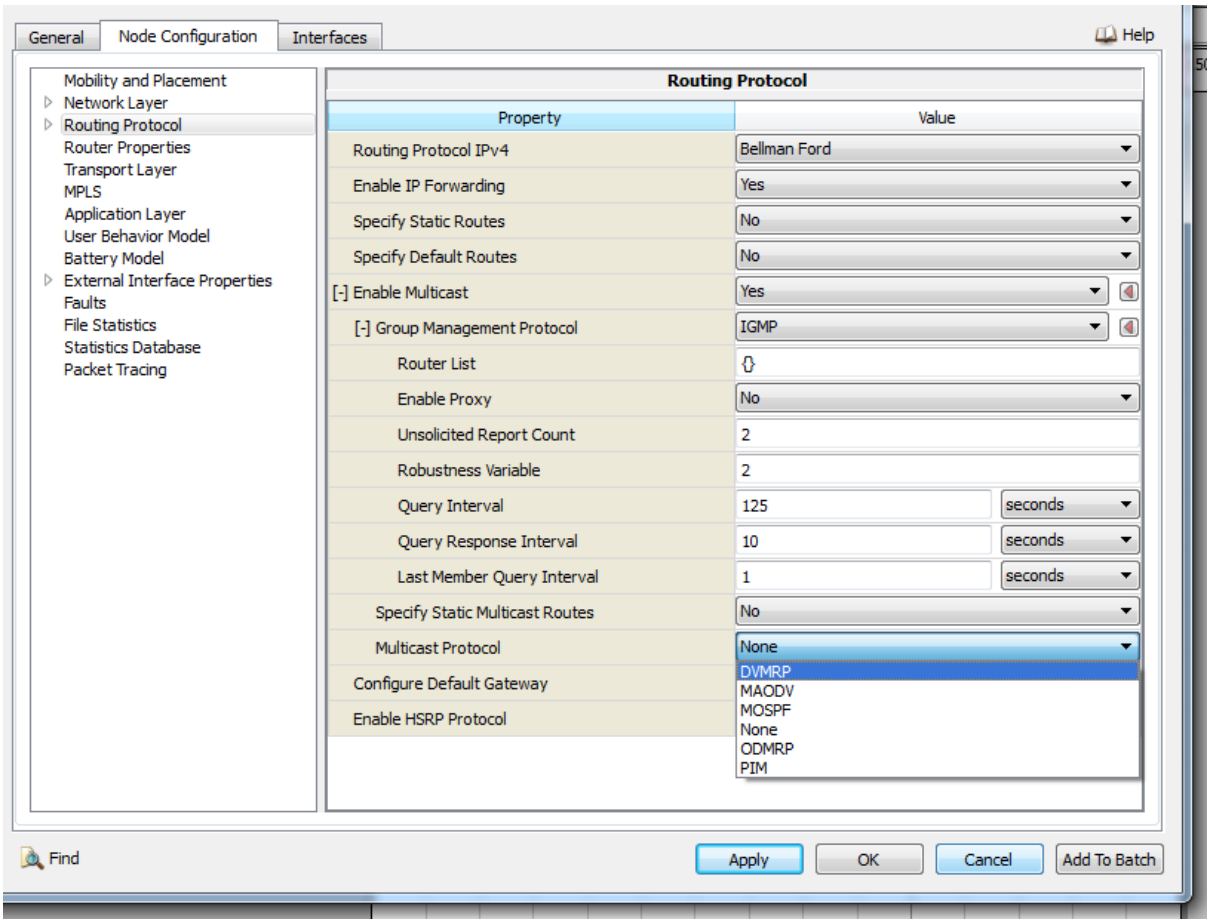
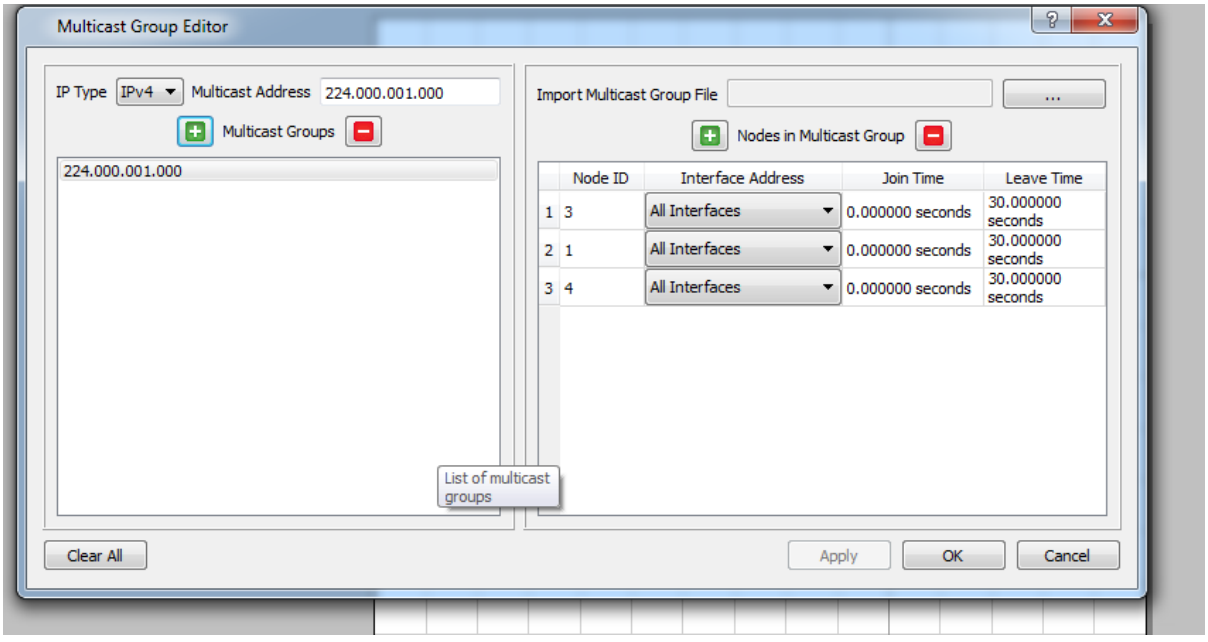


Procedure to configure multicast traffic

1. Select HUB , select routing protocol under node configuration tab
2. set enable multicast field to yes
3. Group management protocol to IGMP
4. Multicast routing protocol to DVMRP
5. Update router list with the node id of the sender
6. Select multicast group editor from tool
7. Add the receiving nodes.


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
Routing Protocol
Property
Value
Routing Protocol IPv4
Bellman Ford
Enable IP Forwarding
Yes
Specify Static Routes
No
Specify Default Routes
No
[-] Enable Multicast
Yes
[-] Group Management Protocol
IGMP
Router List
{}
Enable Proxy
No
Unsolicited Report Count
2
Robustness Variable
2
Query Interval
125
seconds
Query Response Interval
10
seconds
Last Member Query Interval
1
seconds
Specify Static Multicast Routes
No
Multicast Protocol
None
Configure Default Gateway
Enable HSRP Protocol
DVMRP
MAODV
MOSPF
None
ODMRP
PIM
Find
Apply
OK
Cancel
Add To Batch


Multicast Group Editor
IP Type
IPv4
Multicast Address
224.000.001.000
Multicast Groups
224.000.001.000
Import Multicast Group File
...
Nodes in Multicast Group
Node ID
Interface Address
Join Time
Leave Time
1 3 All Interfaces 0.000000 seconds 30.000000 seconds
2 1 All Interfaces 0.000000 seconds 30.000000 seconds
3 4 All Interfaces 0.000000 seconds 30.000000 seconds
List of multicast groups
Clear All
Apply
OK
Cancel

6. Simulate a wireless ad hoc network apply relevant TCP and UDP applications between any 2 nodes and determine

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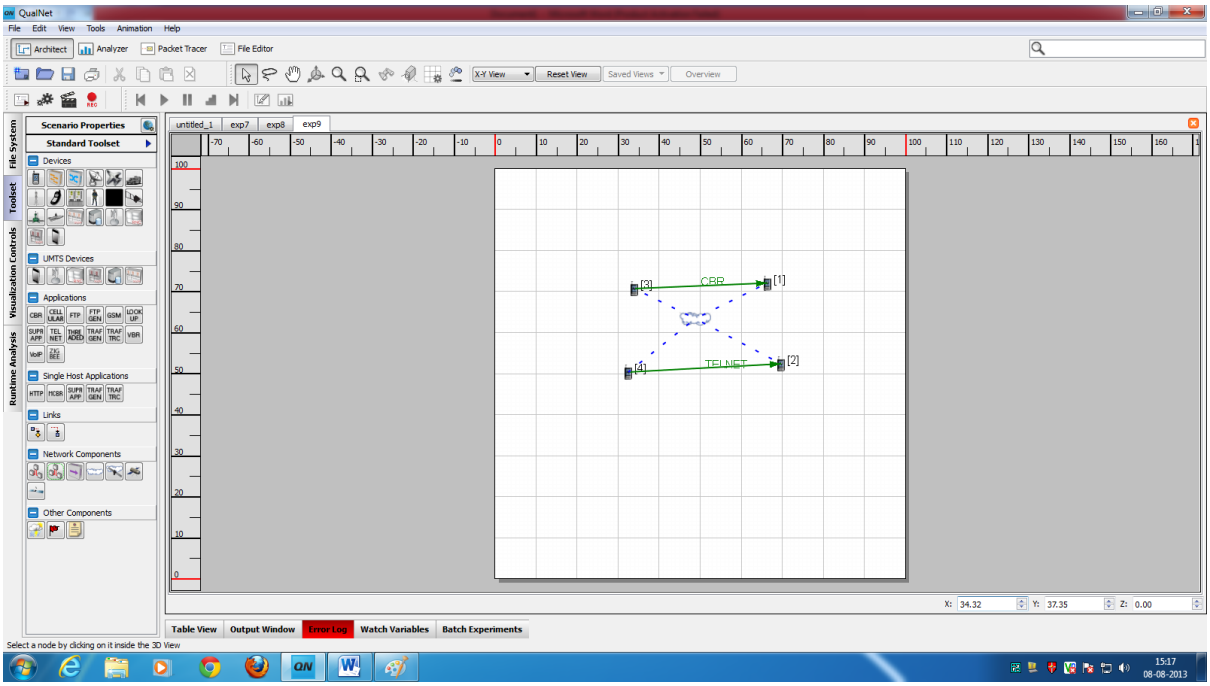
   ii) Number of CTS packets sent by the node

   iii) Number of RTS packets sent and ACK packets sent by the node

   iv) Determine the number of RTS retransmission due to timeout

   v) Packet retransmission due to ACK time out

   vi) Signals received with error



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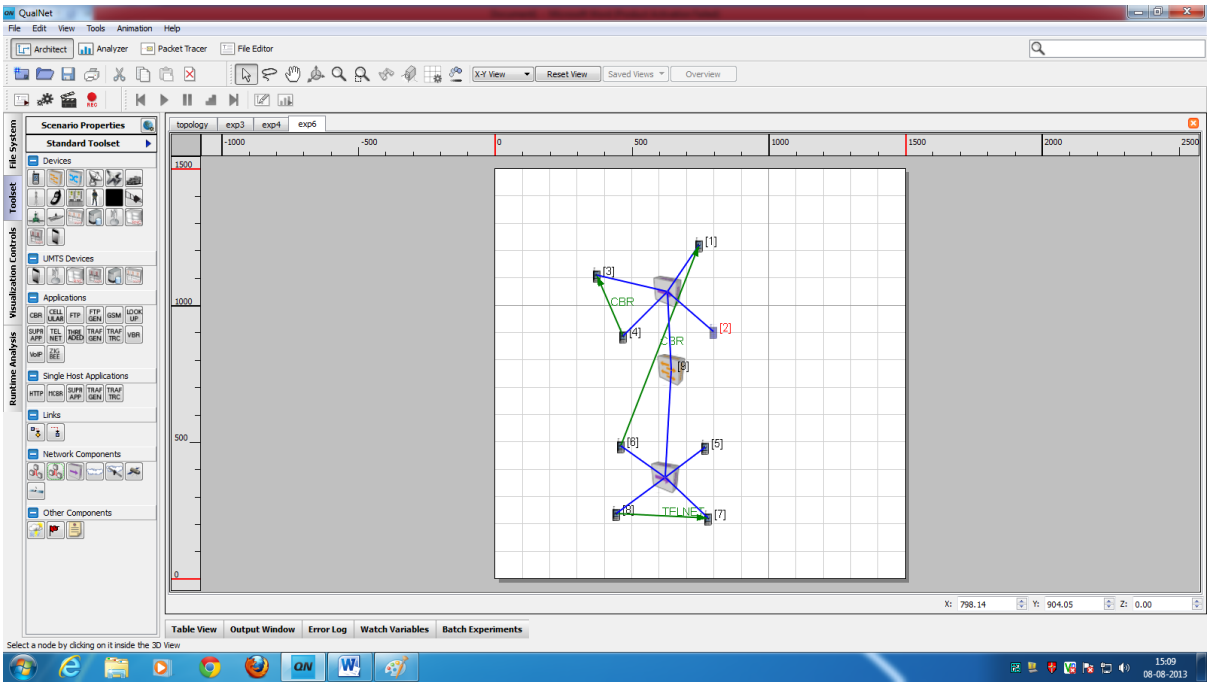
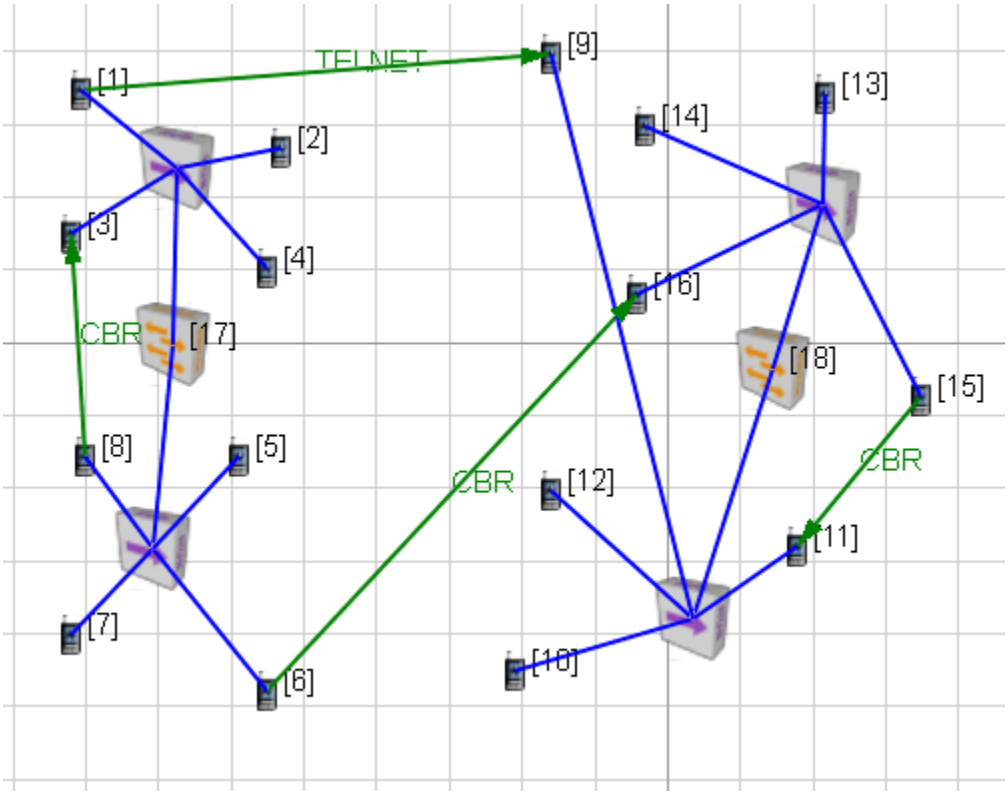
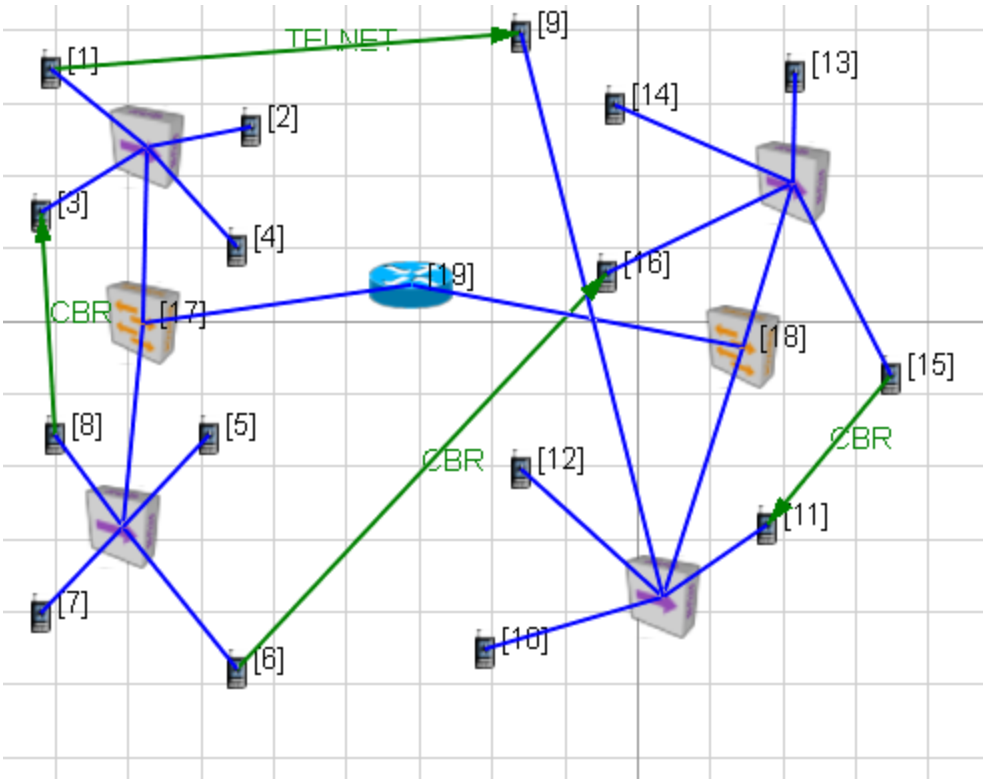

QualNet
File Edit View Tools Animation Help
Architect
Analyzer
Packet Tracer
File Editor
Scenario Properties
Standard Toolset
Devices
UMTS Devices
Applications
Single Host Applications
Links
Network Components
Other Components
topology
exp3
exp4
exp6
CBR
CBR
TELNET
[1]
[2]
[3]
[4]
[5]
[6]
[7]
[8]
[9]
Table View
Output Window
Error Log
Watch Variables
Batch Experiments
Select a node by clicking on it inside the 3D View
15:09
08-08-2013

8. Simulate a network with the topology as shown in the figure, apply TCP and UDP applications between nodes shown in the figure. Modify the network to make communication happen between node 1 and 9 and node 6 and 16



Modified network: use a node between the 2 networks configure it as router connect to the 2 switches



To set a node as router

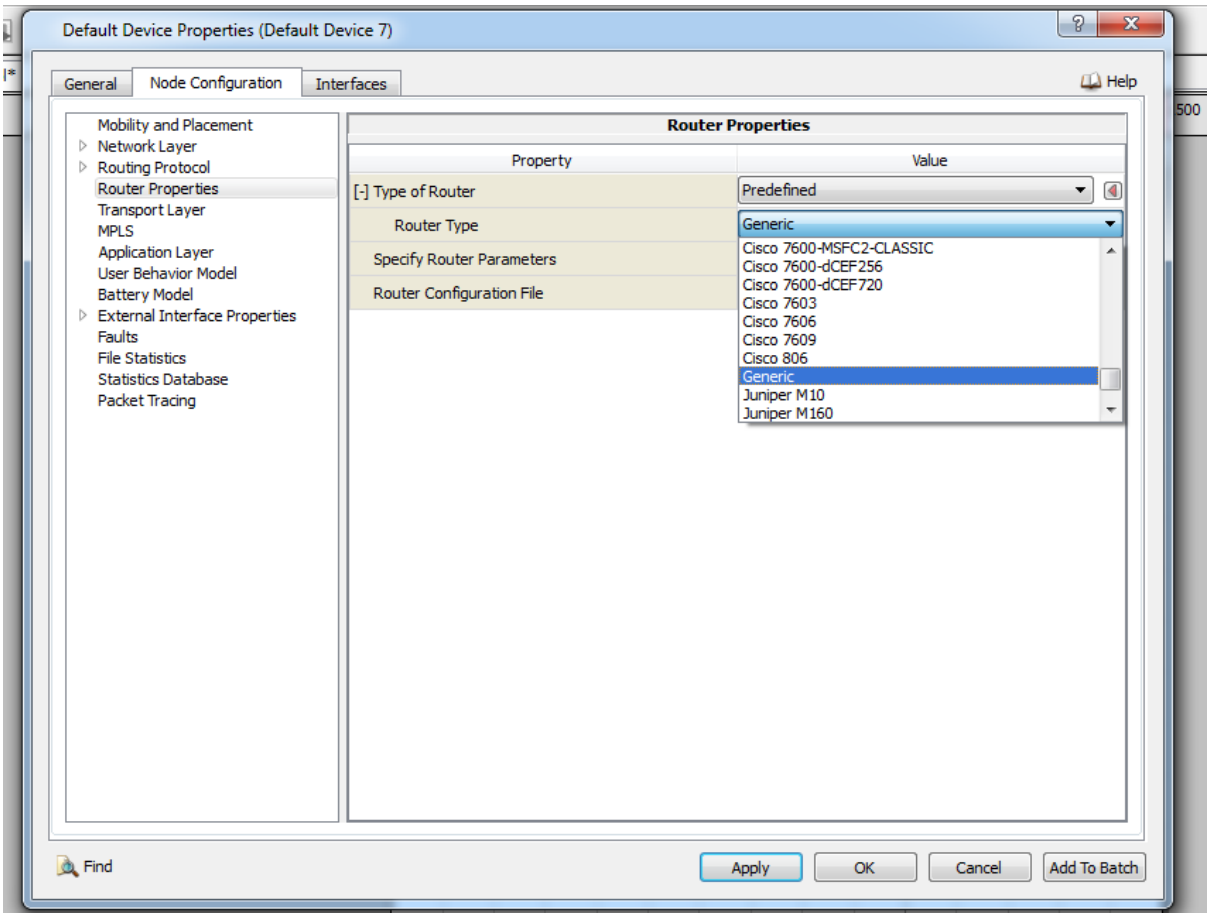
1. Choose the node

2. go to properties

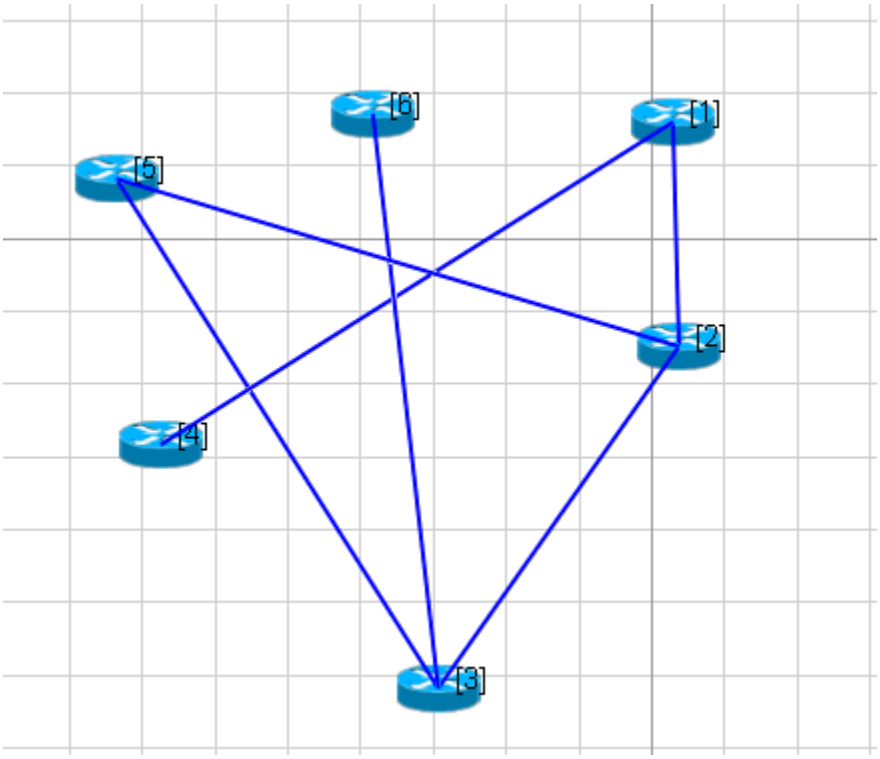
3. node configuration , choose router properties

4. set type of router field to predefined

5. choose a router type from drop down menu(Cisco or Juniper)

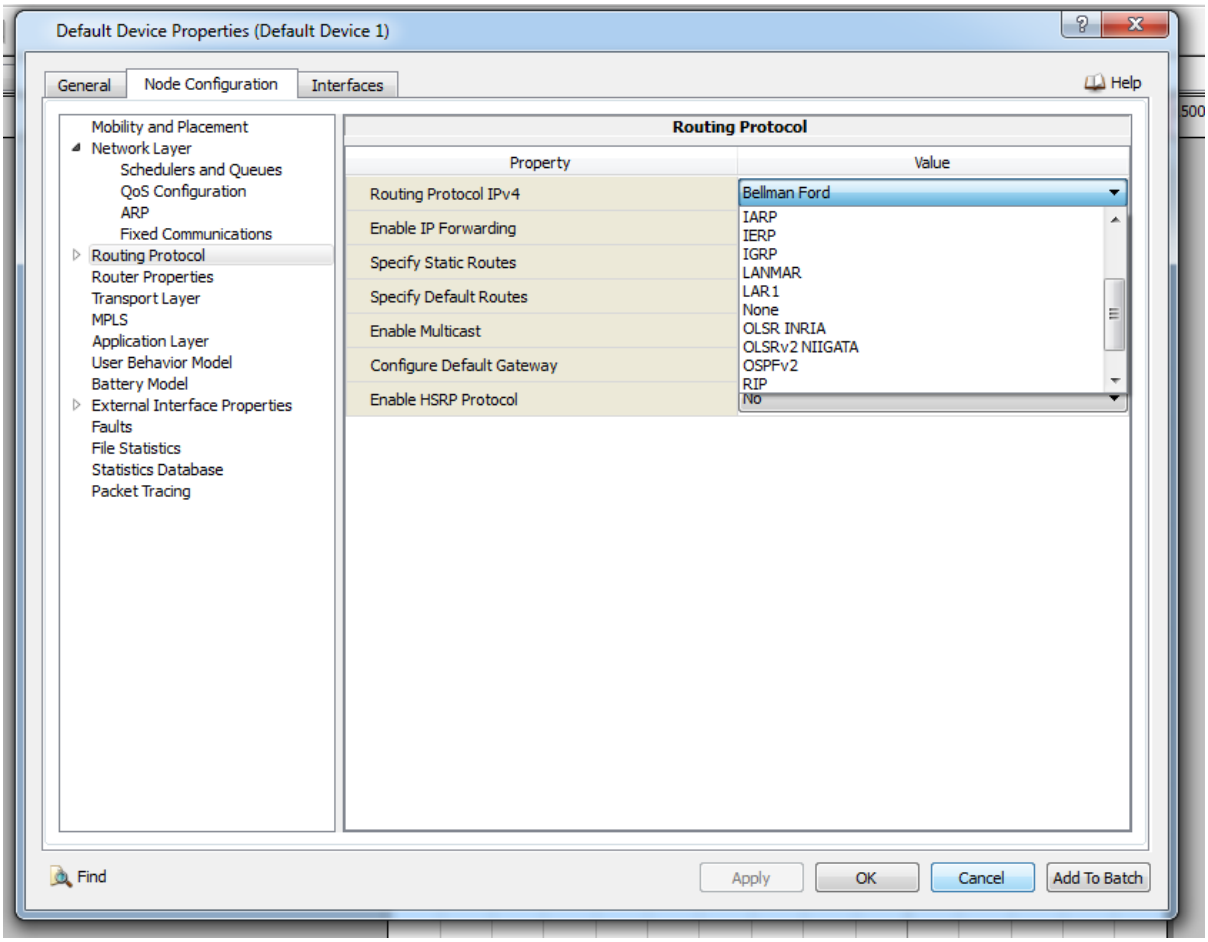

Default Device Properties (Default Device 7)
General
Node Configuration
Interfaces
Help
Mobility and Placement
Network Layer
Routing Protocol
Router Properties
Transport Layer
MPLS
Application Layer
User Behavior Model
Battery Model
External Interface Properties
Faults
File Statistics
Statistics Database
Packet Tracing
Router Properties
Property
Value
[-] Type of Router
Predefined
Router Type
Generic
Specify Router Parameters
Router Configuration File
Cisco 7600-MSFC2-CLASSIC
Cisco 7600-dCEF256
Cisco 7600-dCEF720
Cisco 7603
Cisco 7606
Cisco 7609
Cisco 806
Generic
Juniper M10
Juniper M160
Find
Apply
OK
Cancel
Add To Batch

9. Configure a network of 5 routers with point to point connection. Apply RIP and OSPF routing algorithms and compare.

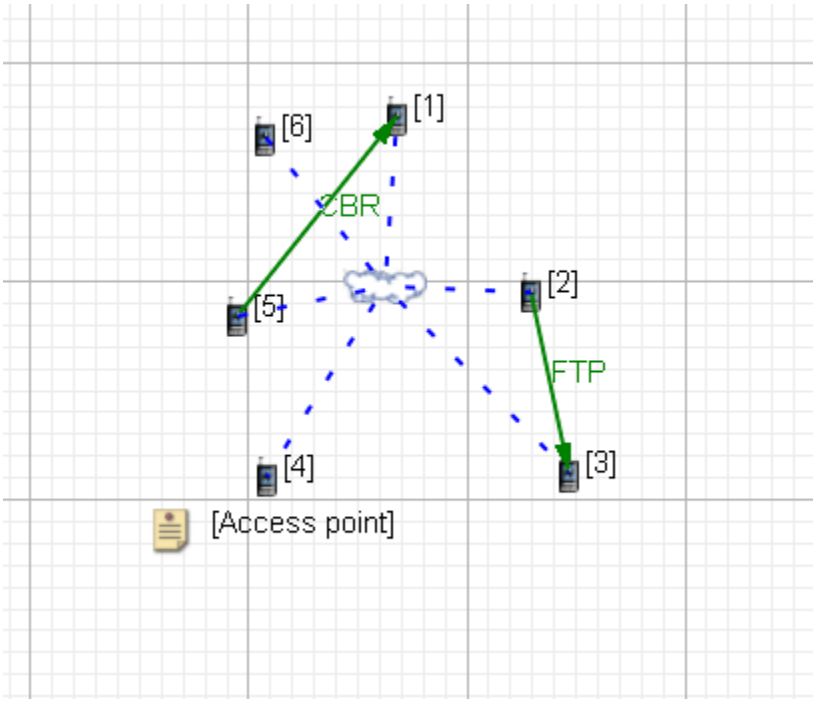


Configure routing protocol

1. Select the node
2. Under Node configuration choose routing protocol
3. Set the routing protocol field to the desired routing protocol


Default Device Properties (Default Device 1)
General
Node Configuration
Interfaces
Help
Mobility and Placement
Network Layer
Schedulers and Queues
QoS Configuration
ARP
Fixed Communications
Routing Protocol
Router Properties
Transport Layer
MPLS
Application Layer
User Behavior Model
Battery Model
External Interface Properties
Faults
File Statistics
Statistics Database
Packet Tracing
Routing Protocol
Property
Value
Routing Protocol IPv4
Bellman Ford
Enable IP Forwarding
Specify Static Routes
Specify Default Routes
Enable Multicast
Configure Default Gateway
Enable HSRP Protocol
No
IARP
IERP
IGRP
LANMAR
LAR1
None
OLSR INRIA
OLSRv2 NIIGATA
OSPFv2
RIP
Find
Apply
OK
Cancel
Add To Batch

10. Simulate a wireless infrastructure network with 6 nodes and analyze



Select the subnet

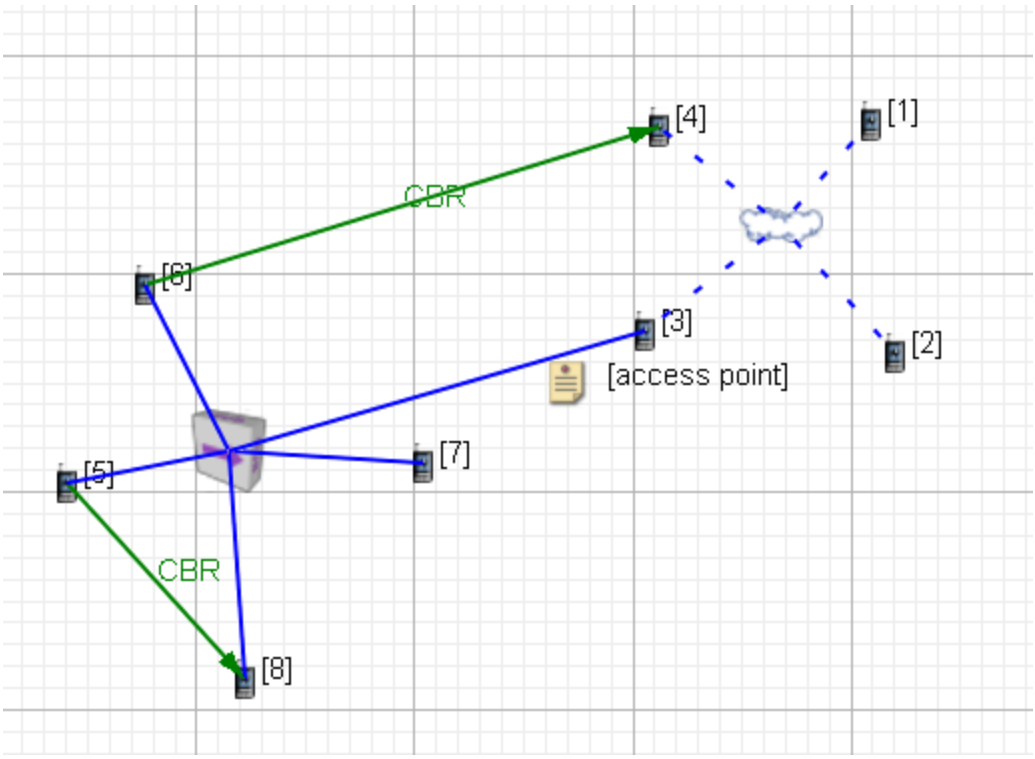
Set station association type to Dynamic

Station scan type to active

To set a node as access point

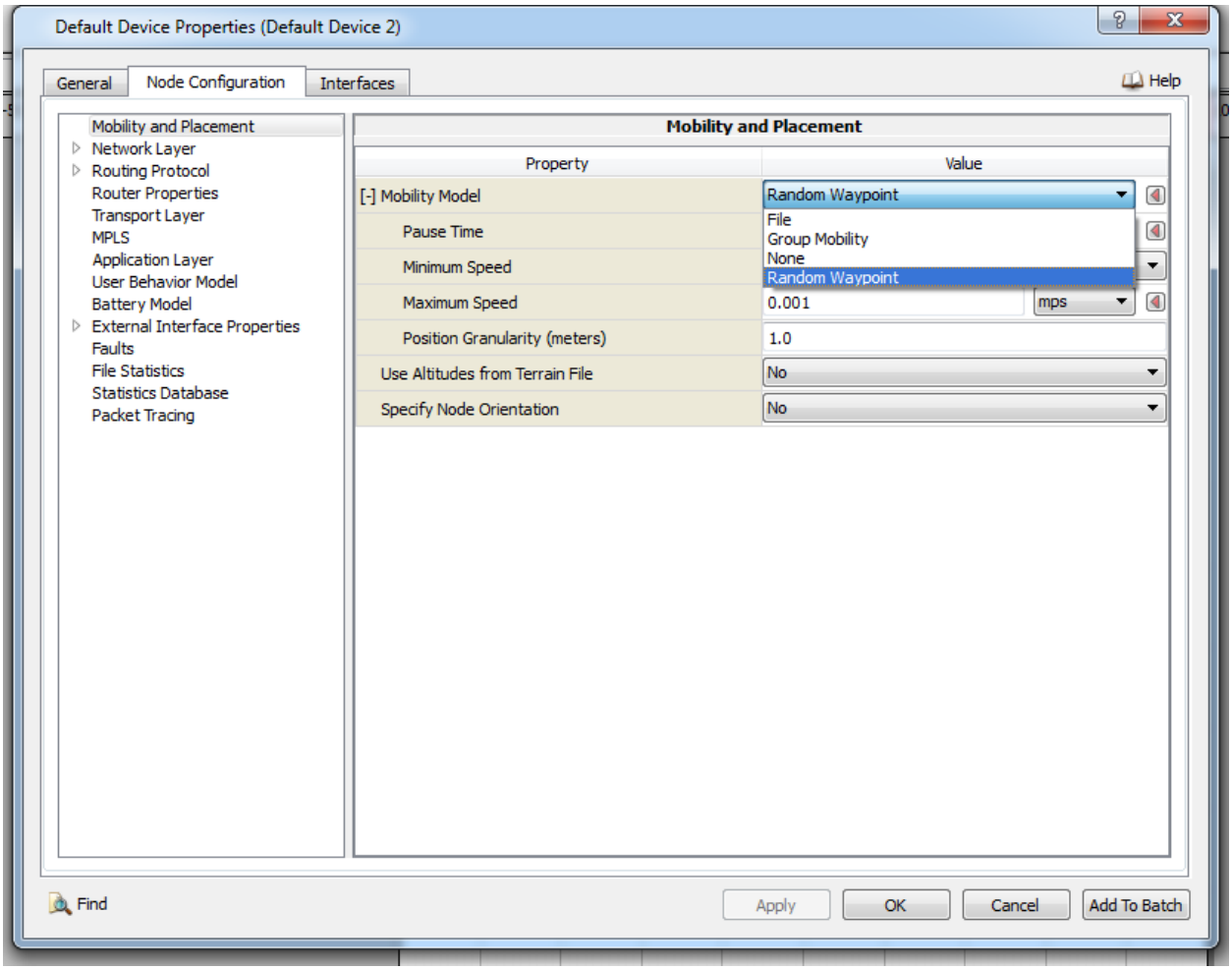
1. Select the node
2. From properties select interface0
3. Select MAC layer
4. Set as access point field to yes

11. Configure a wired network with 4 nodes and wireless infrastructure network with 4 nodes apply relevant TCP and UDP applications from a node in wired network to a node in wireless network and analyze



12. a. Simulate wireless ad hoc network with 6 nodes give mobility to a node and analyze
    b. give mobility to all the nodes.

    To give mobility to all the nodes
    Select the nodes
    Go to properties, node configuration choose the mobility model


Default Device Properties (Default Device 2)
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
Mobility and Placement
Property
Value
[-] Mobility Model
Random Waypoint
File
Group Mobility
None
Random Waypoint
Pause Time
Minimum Speed
Maximum Speed
0.001
mps
Position Granularity (meters)
1.0
Use Altitudes from Terrain File
No
Specify Node Orientation
No
Find
Apply
OK
Cancel
Add To Batch