

## Experiment 3

### Wired and Wireless LANs

#### Objective:

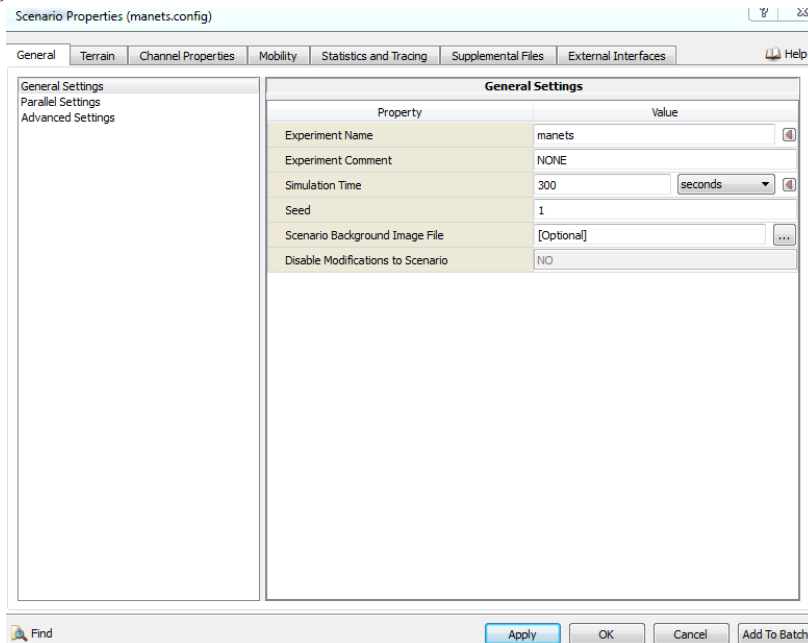
- A) To Simulate the Ad-hoc network with 30 nodes with multiple traffic. Repeat the simulation of the network by introducing mobility (MANETs) for the nodes and compare the performance of the networks.
- B) To Simulate the Infrastructure Basic Service Set (IBSS) network with 30 nodes with multiple traffic and analyse the performance of the network.

#### Procedure:

A) Go to File → New → Save as → manets

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

Click Apply, Ok



Set the Terrain Properties

Scenario Properties (manets.config)

General Terrain Channel Properties Mobility Statistics and Tracing Supplemental Files External Interfaces Help

**Terrain**

| Property                     | Value                                    |
|------------------------------|--|
| [.] Coordinate System        | Cartesian                                |
| Scenario Dimensions (meters) | X: 1500 Y: 1500                          |
| Altitude Range (meters)      | Above Sea Level: 1500 Below Sea Level: 0 |
| Terrain Data Format          | None                                     |
| Urban Terrain Format         | None                                     |
| Weather Mobility Interval    | 10 seconds                               |

Find Apply OK Cancel Add To Batch

**Step 1: Go to Tools → Node Placement**

Node Placement

Number of Nodes: 30

Device Type: Default

Placement Strategy

Placement Model: Random

Seed: 1

☐ Use Altitudes from Terrain File

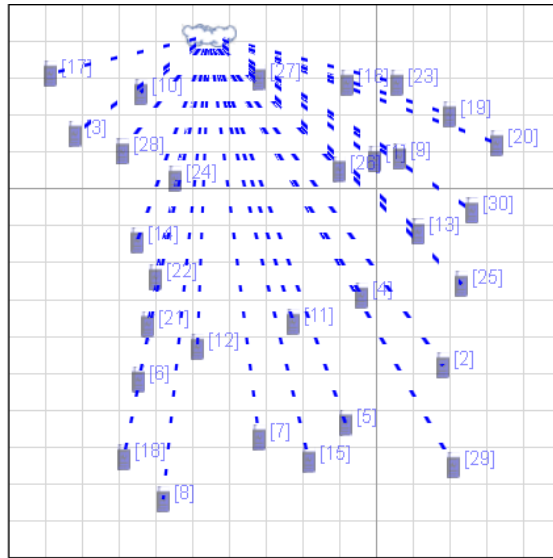
Placement Data

Origin : X Axis 0 Y Axis 0

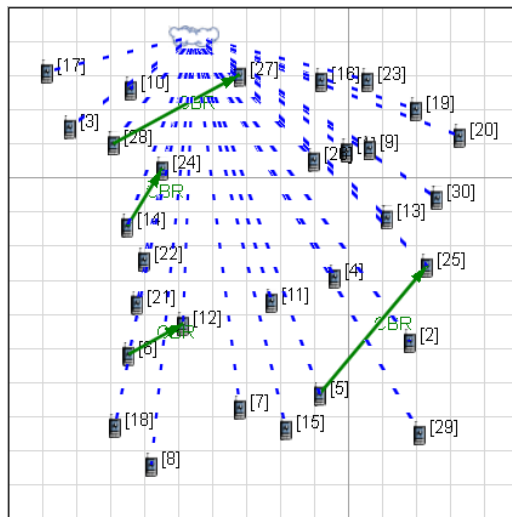
Dimensions (meters) : X Axis 1500 Y Axis 1500

Apply OK Cancel

Select all the nodes, under **Network components** --> select “Wireless Network” place in canvas.



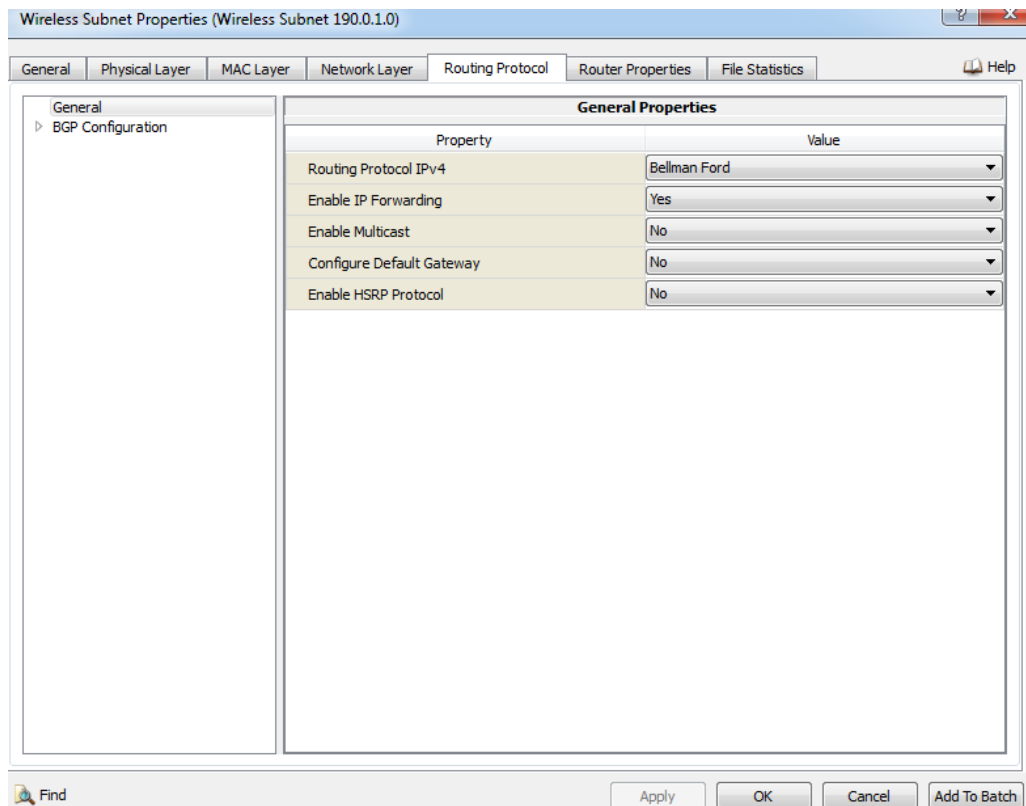
**Step 2:** Create CBR Traffic between some pair of nodes.(under Applications → select CBR)



**Step 3:** Go to Table view → Networks

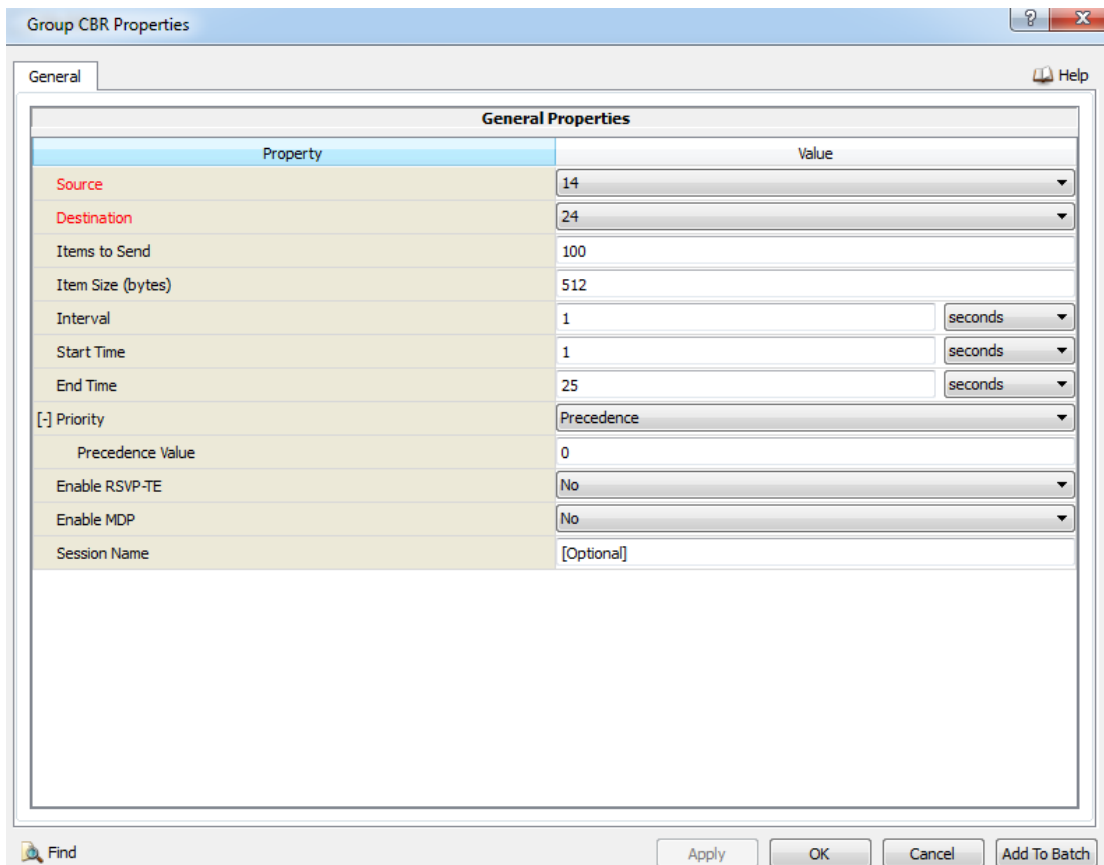
Select Wireless subnet, right click, properties

Select the Routing Protocol as Bellman Ford



**Step 4:** Go to Table view → Applications

Select all the CBR sources, Right click, properties



Group CBR Properties

General

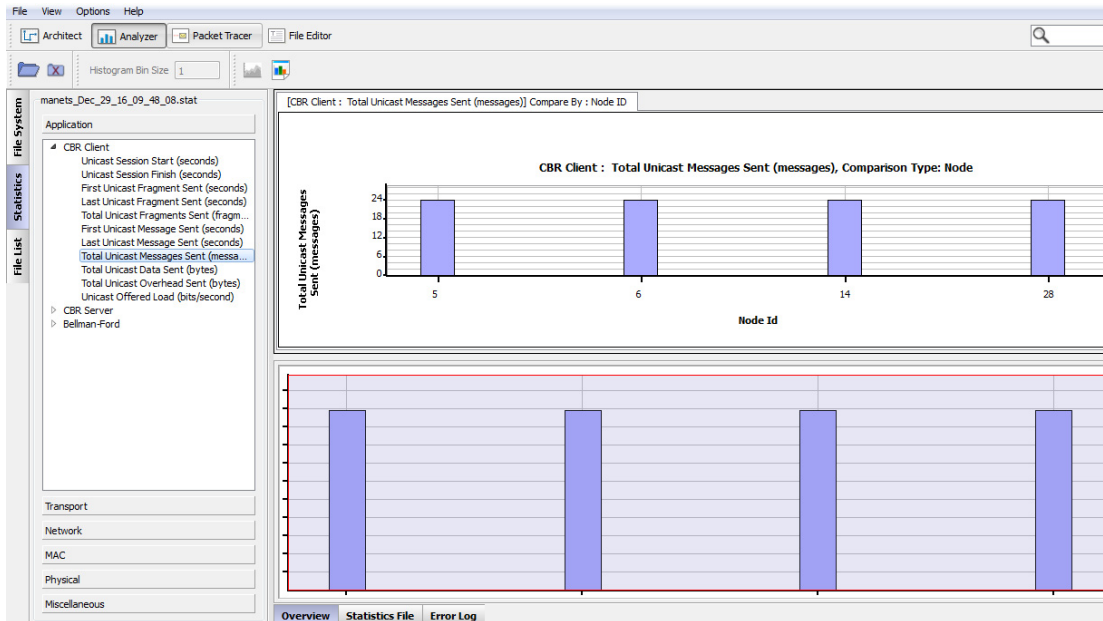
Help

| Property          | Value      |
|-------------------|------------|
| Source            | 14         |
| Destination       | 24         |
| Items to Send     | 100        |
| Item Size (bytes) | 512        |
| Interval          | 1 seconds  |
| Start Time        | 1 seconds  |
| End Time          | 25 seconds |
| [.] Priority      | Precedence |
| Precedence Value  | 0          |
| Enable RSVP-TE    | No         |
| Enable MDP        | No         |
| Session Name      | [Optional] |

Find

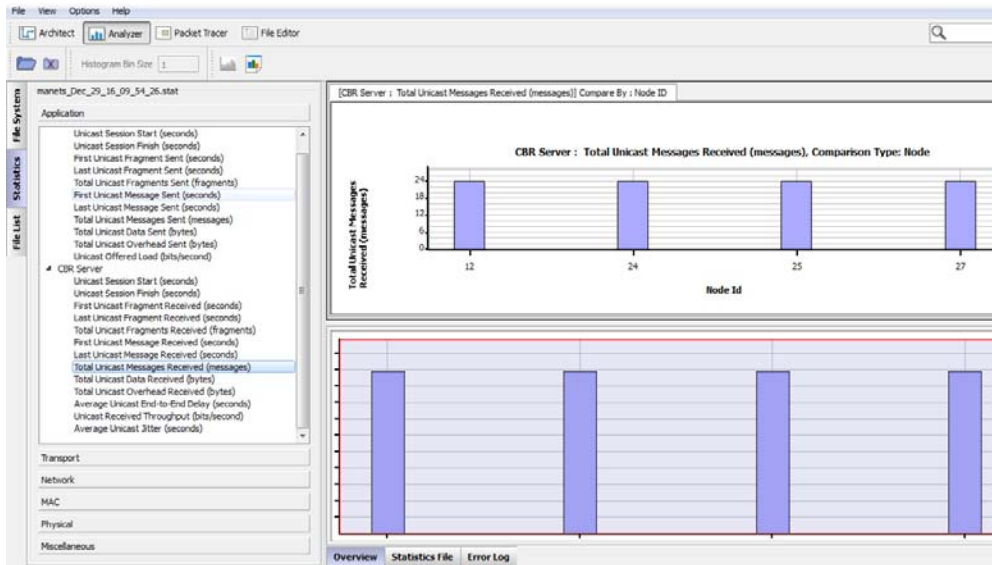
Apply OK Cancel Add To Batch

**Step 5:** Save the Scenario, Run Simulation, Play, Analyze Statistics of Current Scenario.  
Observe “Total Unicast Messages sent”.



Similarly, observe “Total Unicast Messages Received”, Throughput, End-to-End Delay, and Jitter.

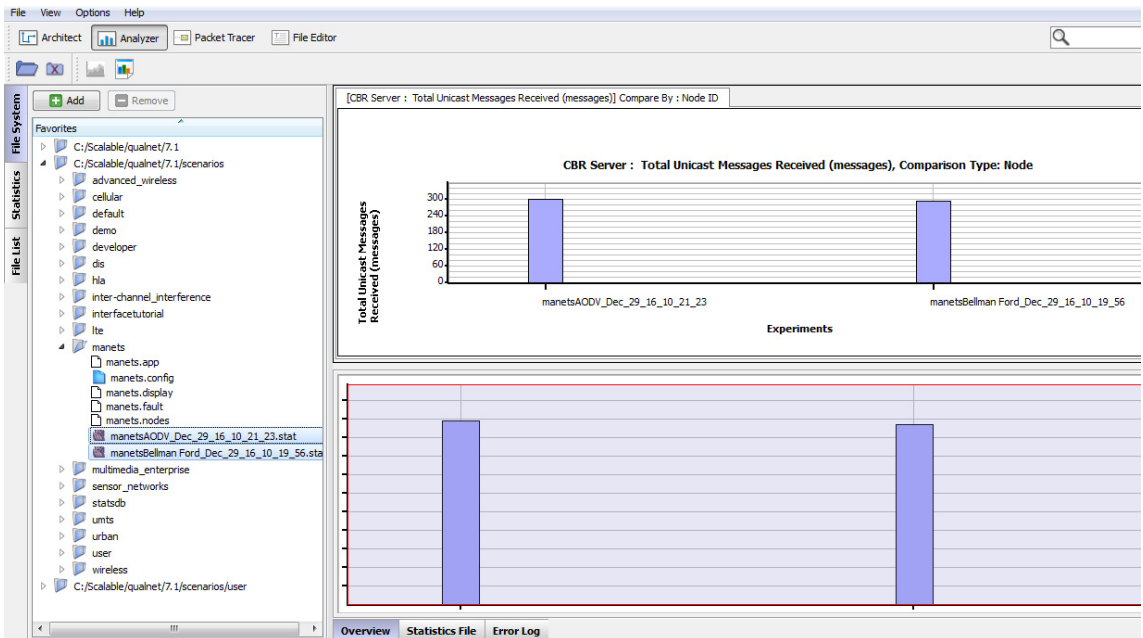
**Step 6:** Change the Routing Protocol to AODV and repeat the procedure.  
Compare the statistics (Total Unicast Messages received, End-to-End Delay, Throughput, Jitter etc.)



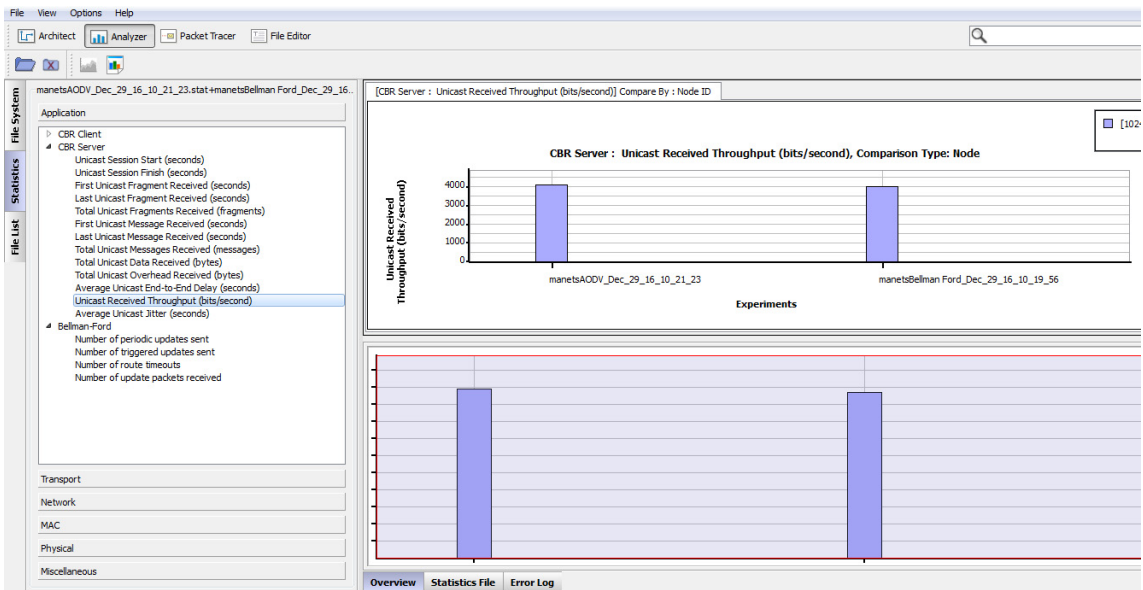
**Step 7:** We can also compare the performance of the AODV and Bellman Ford Protocols as follows:

Give the different experiment name (scenario Properties → General → Experiment name) for each Routing Protocol (Table view → Networks → Routing Protocol)  
After Run Simulations

Go to File system, select the statistics files (.stat) in the Experiment name folder (path: qualnet/7.1/scenarios/user/manets) Right click, Analyze.



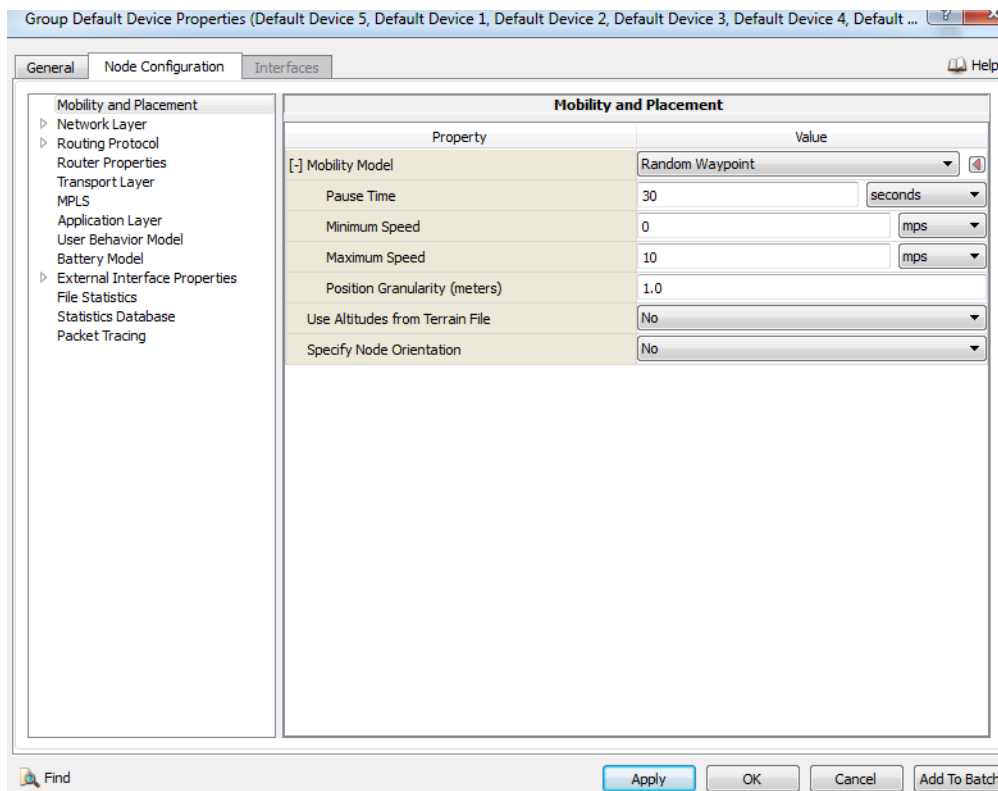
Go to Statistics; compare the End-to-End Delay, Throughput and Jitter.





## With Mobility (MANETs):

**Step 8:** In the same scenario, Go to Table view → Nodes → select all the nodes, right click, properties → Node Configuration → Mobility and Placement → Mobility Model → Random Waypoint

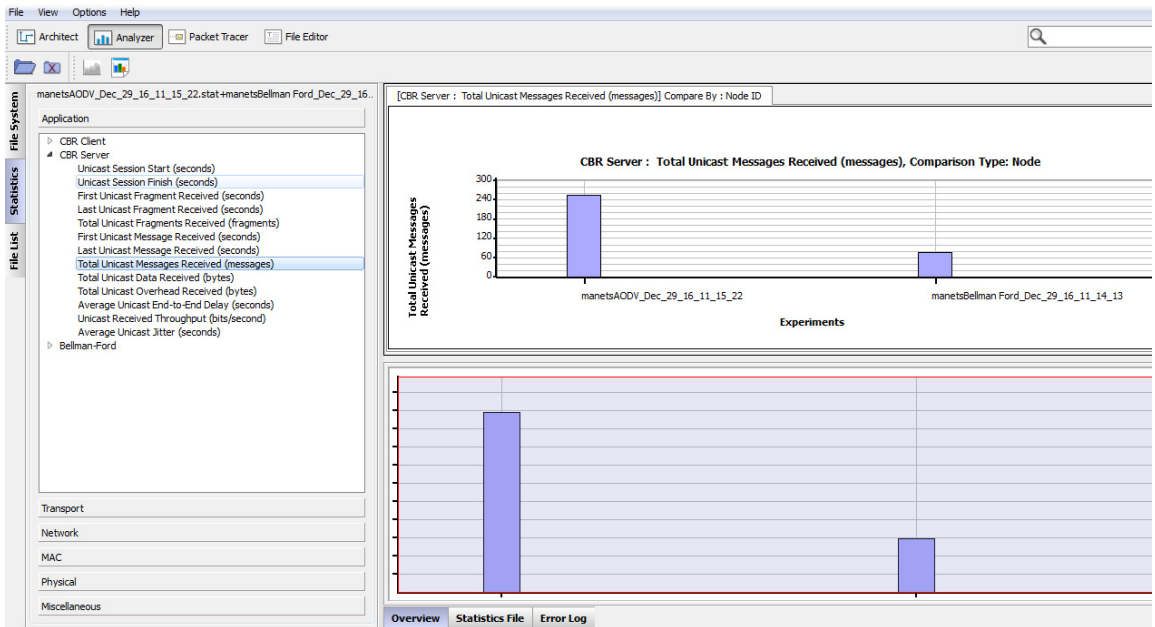


**Step 9:** Save the Scenario, Run Simulation, Play, Analyze Statistics of Current Scenario.

Repeat the procedure for AODV Routing Protocol. (Change the scenario name to “manetsAODV”)

**Step 10:** Go to File system → select the both the statistics files (.stat), right click Analyze.

Go to Statistics, compare the Total Unicast messages received, End-to-End Delay, Throughput, Jitter etc.



## B) Procedure:

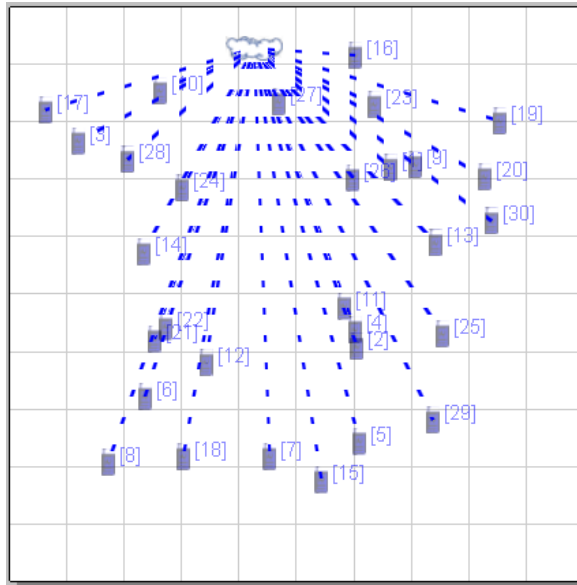
Create a folder with your registration number under “C://qualnet/7.4/scenarios/user/”

Go to File→new→save as→wifiaccesspoint

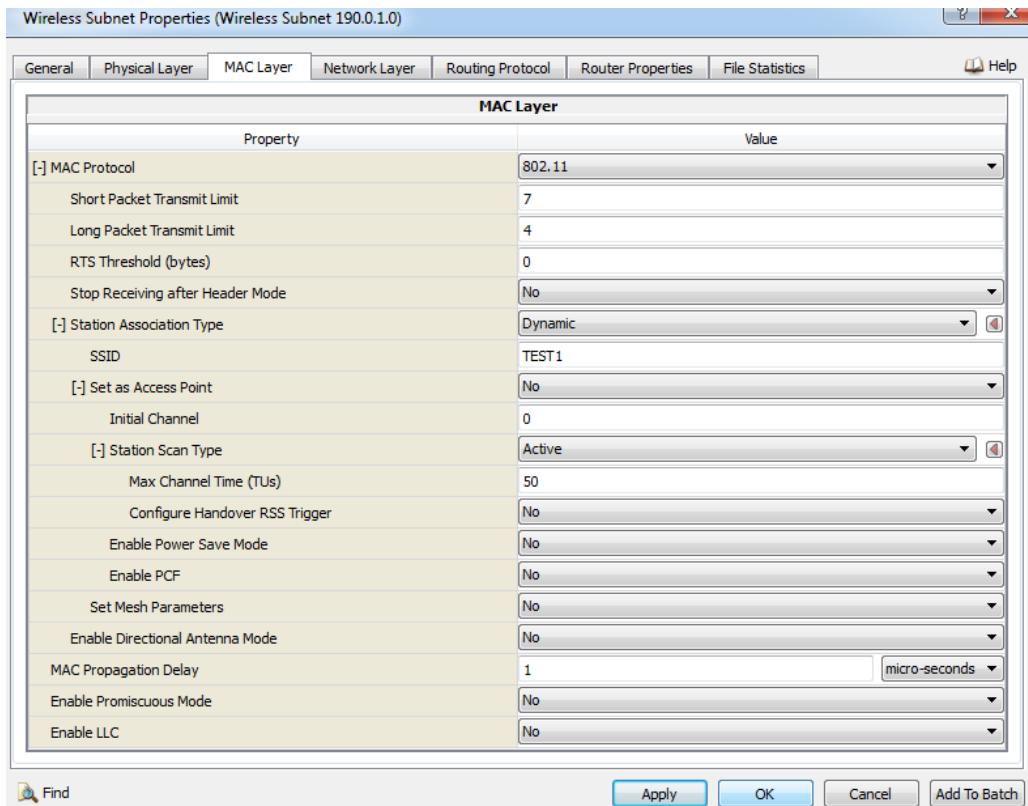
Go to Scenario Properties→General Settings → Give Experiment name, Simulation Time: 300 Seconds

Terrain → scenario Dimensions →1000 x 1000 meters

**Step 1:** Go to Tools → Node placement → Number of nodes → 30 Click Apply, Ok  
Select all the nodes, under Network Components→ select Wireless Network, and drag on to canvas.



**Step 2:** Go to Table view → Networks, right click, properties → MAC Layer → Station Association Type → Dynamic Station Scan Type → Active



### Step 3: To set Access point:

Select one of the nodes (which you want to set as access point) in the canvas, right click, properties, interfaces, MAC Layer → Set as Access point → YES

Default Device Properties (Default Device 27)

General Node Configuration Interfaces Help

Interface 0

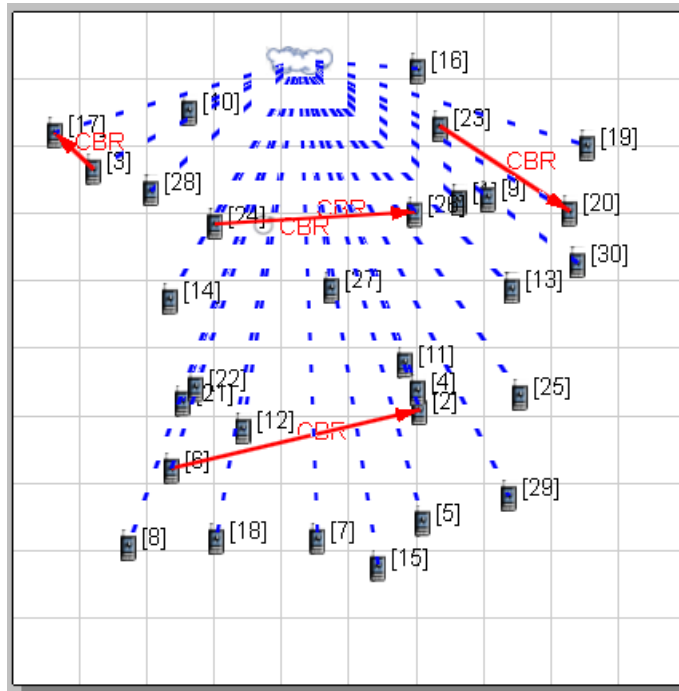
- Physical Layer
- MAC Layer
- Network Layer
- Routing Protocol
- Faults
- File Statistics

**MAC Layer**

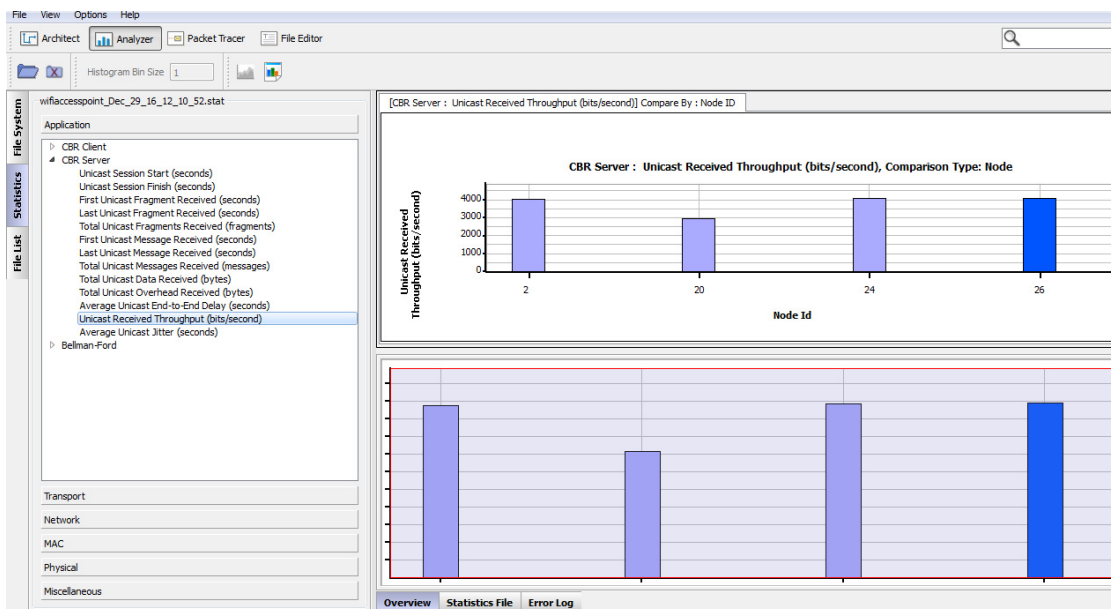
| Property                         | Value           |
|----------------------------------|-----------------|
| [.] MAC Protocol                 | 802.11          |
| Short Packet Transmit Limit      | 7               |
| Long Packet Transmit Limit       | 4               |
| RTS Threshold (bytes)            | 0               |
| Stop Receiving after Header Mode | No              |
| [.] Station Association Type     | Dynamic         |
| SSID                             | TEST 1          |
| [.] Set as Access Point          | Yes             |
| Beacon Start Time (TUs)          | 1               |
| Beacon Interval (TUs)            | 200             |
| DTIM Period (beacon intervals)   | 3               |
| Relay Frames                     | Yes             |
| Enable Power Save Mode           | No              |
| Operating Channel                | 0               |
| Set as Point Coordinator         | No              |
| Set Mesh Parameters              | No              |
| Enable Directional Antenna Mode  | No              |
| MAC Propagation Delay            | 1 micro-seconds |
| Enable Promiscuous Mode          | No              |

Find Apply OK Cancel Add To Batch

**Step 4:** Create CBR Traffic between few pairs of nodes.



**Step 5:** Save the scenario, Run Simulation, Play and Analyze Statistics of Current Scenario.



## Step 6: For creating Mobility for the Nodes:

Go to Table View → Nodes → Select all the nodes, right click, properties → Node Configuration → Mobility and Placement → Mobility Model → Random Way Point

Default Device Properties (Default Device 1)

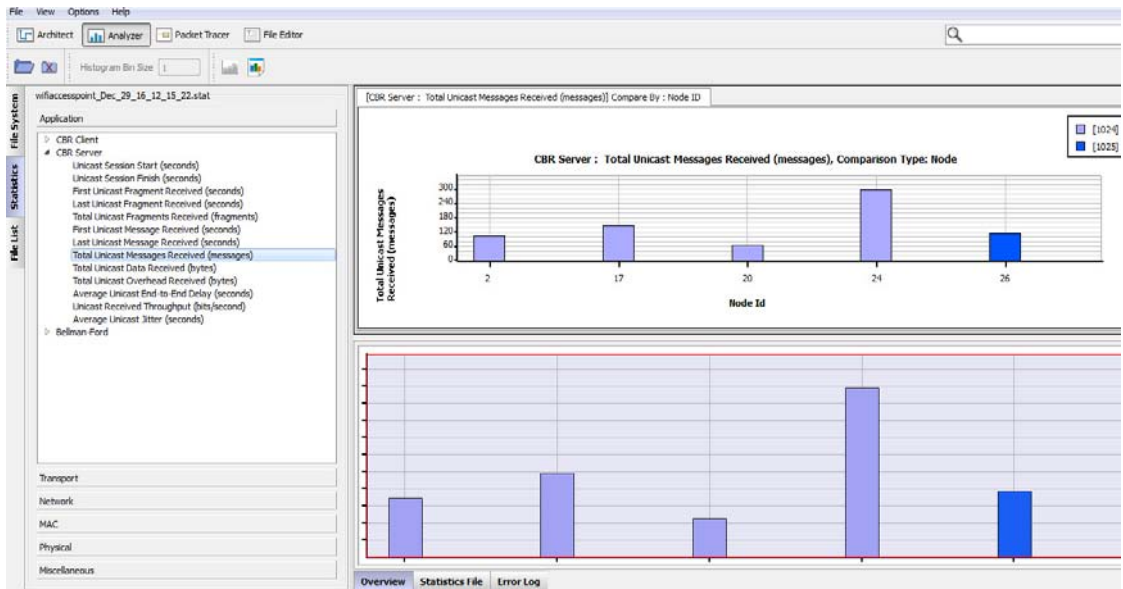
General Node Configuration Interfaces Help

Mobility and Placement

| Property                        | Value           |
|---------------------------------|-----------------|
| [.] Mobility Model              | Random Waypoint |
| Pause Time                      | 30 seconds      |
| Minimum Speed                   | 0 mps           |
| Maximum Speed                   | 10 mps          |
| Position Granularity (meters)   | 1.0             |
| Use Altitudes from Terrain File | No              |
| Specify Node Orientation        | No              |

Find Apply OK Cancel Add To Batch

**Step 7:** Save the Scenario, Run Simulation, Play, Analyze Statistics of Current Scenario  
Observe the “Total Unicast Messages Sent” at Client.



Similarly, observe “Total Unicast Messages Received”, Throughput, End-to-End Delay, and Jitter.

**Exercise 1:** Simulate CSMA/CA network and analyse the performance over CSMA network.